

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RECEIVED

NOV 18 2019

FORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

CARLSBAD ARTESIA O.C.D.

5. Lease Serial No.
NMLC065421

6. If Indian, Allottee or Tribe Name

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

8. Well Name and No.
RIVERBOAT 12/1 WOMD FED COM 1H9. API Well No.
30-015-45304-00-X110. Field and Pool or Exploratory Area
PURPLE SAGE-WOLFCAMP (GAS)11. 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: AMITHY E CRAWFORD
E-Mail: acrawford@cimarex.com3a. Address
600 N MARIENFELD STE 600
MIDLAND, TX 797013b. Phone No. (include area code)
Ph: 432-620-19094. Location of Well (Footage, Sec., T., R., M., or Survey Description)
Sec 13 T24S R26E NWNW 45FNL 310FWL
32.224499 N Lat, 104.254105 W Lon

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

TYPE OF SUBMISSION

- ☒ Notice of Intent
- ☐ Subsequent Report
- ☐ Final Abandonment Notice

- ☐ Acidize
- ☐ Alter Casing
- ☐ Casing Repair
- ☐ Change Plans
- ☐ Convert to Injection

- ☐ Deepen
- ☐ Hydraulic Fracturing
- ☐ New Construction
- ☐ Plug and Abandon
- ☐ Plug Back

- ☐ Production (Start/Resume)
- ☐ Reclamation
- ☐ Recomplete
- ☐ Temporarily Abandon
- ☐ Water Disposal

- ☐ Water Shut-Off
- ☐ Well Integrity
- ☒ Other
Change to Original A
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 of the Riverboat 12-1 WOMD Fed Com 1H as follows:

Proposed:
330' FNL & 676' FWL Section 1 24S 26E

Cimarex respectfully requests approval to change the casing design and cement plans for the Riverboat 12-1 WOMD Fed Com 1H well.

Please see the attached drilling plan for additional details:

Remove ?? intermediate casing

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

Carlsbad Field Office
OCD Artesia

All previous COAs still apply, except for the following: J.B.

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

Electronic Submission #491227 verified by the BLM Well Information System
For CIMAREX ENERGY COMPANY, sent to the Carlsbad
Committed to AFMS for processing by PRISCILLA PEREZ on 11/06/2019 (20PP0346SE)

Name (Printed/Typed) AMITHY E CRAWFORD

Title REGULATORY ANALYST

Signature (Electronic Submission)

Date 11/06/2019

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By JEROMY PORTER

Title PETROLEUM ENGINEER

Date 11/08/2019

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office 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 ****

Accepted 1/27/20 KJ

Additional data for EC transaction #491227 that would not fit on the form

32. Additional remarks, continued

Set 5-1/2" long string production casing
8-3/4" hole
5-1/2" 20# L80 LTC 0- 8,200'
5-1/2" 20# L80 BTC 8,200'-18,777'

****No new surface disturbance****

Please see attached- wellsite layout, Updated C102, Updated Directional and updated Drilling Plan/spec sheet.

Revisions to Operator-Submitted EC Data for Sundry Notice #491227

	Operator Submitted	BLM Revised (AFMSS)
Sundry Type:	APDCH NOI	APDCH NOI
Lease:	NMLC065421	NMLC065421
Agreement:		
Operator:	CIMAREX ENERGY CO. 600 N. MARIENFELD SUITE 600 MIDLAND, TX 79701 Ph: 432-620-1909	CIMAREX ENERGY COMPANY 600 N MARIENFELD STE 600 MIDLAND, TX 79701 Ph: 432.620.1936 Fx: 918.749.8059
Admin Contact:	AMITHY E CRAWFORD REGULATORY ANALYST E-Mail: acrawford@cimarex.com Ph: 432-620-1909	AMITHY E CRAWFORD REGULATORY ANALYST E-Mail: acrawford@cimarex.com Ph: 432-620-1909
Tech Contact:	AMITHY E CRAWFORD REGULATORY ANALYST E-Mail: acrawford@cimarex.com Ph: 432-620-1909	AMITHY E CRAWFORD REGULATORY ANALYST E-Mail: acrawford@cimarex.com Ph: 432-620-1909
Location:		
State:	NM	NM
County:	EDDY	EDDY
Field/Pool:	PURPLE SAGE WOLFCAMP	PURPLE SAGE-WOLFCAMP (GAS)
Well/Facility:	RIVERBOAT 12-1 WOMD FED COM 1H Sec 13 T24S R26E 45FNL 310FWL	RIVERBOAT 12/1 WOMD FED COM 1H Sec 13 T24S R26E NWNW 45FNL 310FWL 32.224499 N Lat, 104.254105 W Lon

Additional data for EC transaction #491227 that would not fit on the form

32. Additional remarks, continued

Set 5-1/2" long string production casing

8-3/4" hole

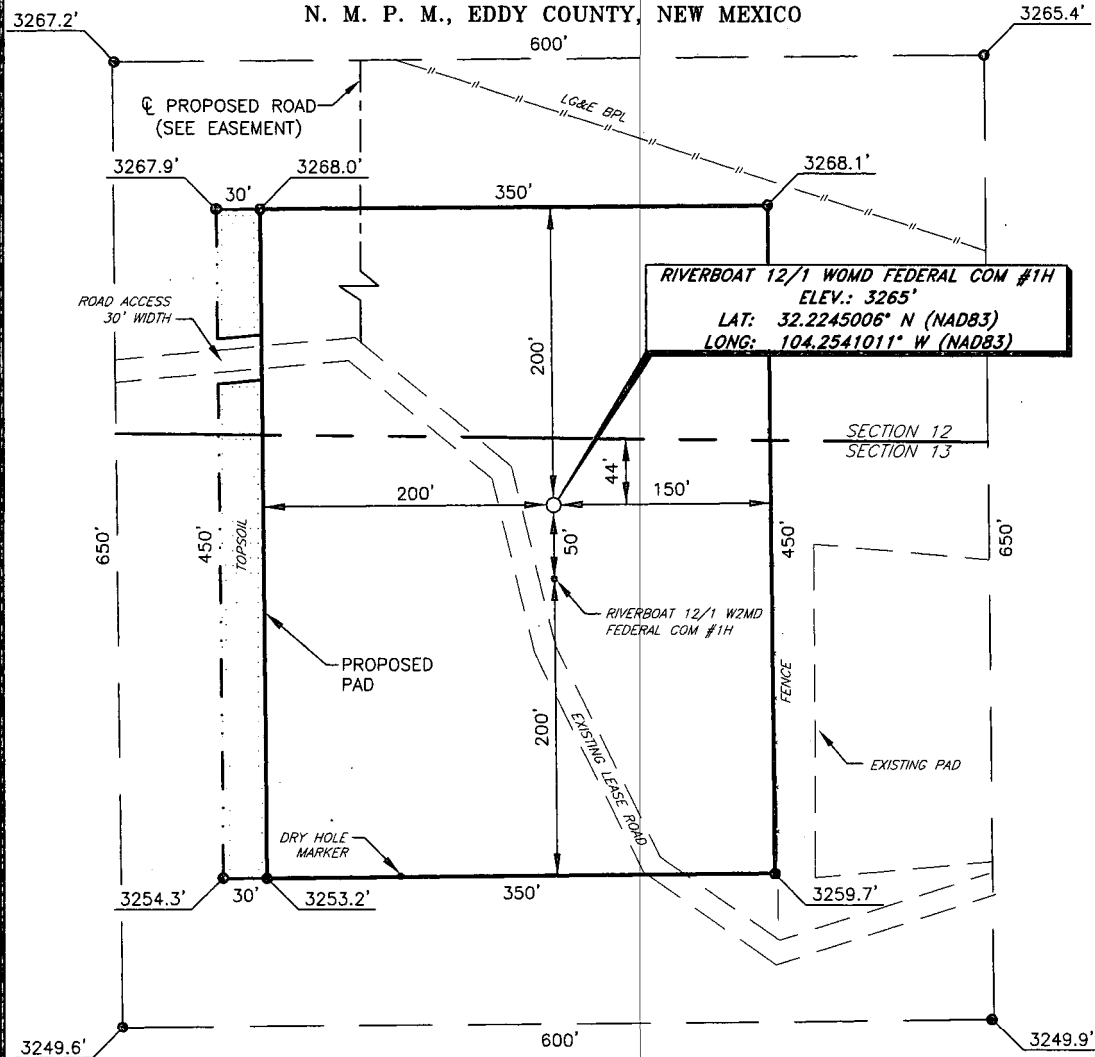
5-1/2" 20# L80 LTC 0- 8,200'

5-1/2" 20# L80 BTC 8,200'-18,777'

****No new surface disturbance****

Please see attached- wellsite layout, Updated C102, Updated Directional and updated Drilling Plan/spec sheet.

MEWBOURNE OIL COMPANY
RIVERBOAT 21/1 WOMB FEDERAL COM #1H
(45' FNL & 310' FEL)
SECTION 13, T24S, R26E
N. M. P. M., EDDY COUNTY, NEW MEXICO



DIRECTIONS TO LOCATION

From the intersection of CR-396 (Black River Village Rd.) and CR-763 (Bounds Rd.);
 Go Northeast on CR-763 approx. 1.3 miles to a lease road on the right;
 Turn right and go Southeast approx. 0.7 miles to location on the left.

THIS IS NOT A BOUNDARY SURVEY, APPARENT PROPERTY CORNERS AND PROPERTY LINES ARE SHOWN FOR INFORMATION ONLY. BOUNDARY DATA IS SHOWN FROM A PREVIOUS SURVEY REFERENCED HEREON.

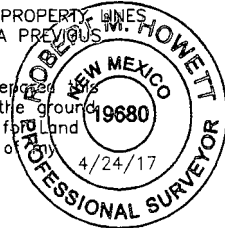
I, R. M. Howett, a N. M. Professional Surveyor, hereby certify that I prepared this unclassified survey of a well location from an actual survey made on the ground under my direct supervision, said survey and plat meet the Min. Stds. for Land Surveying in the State of N. M. and are true and correct to the best of my knowledge and belief.

SCALE: 1" = 100'
 0 50 100

BEARINGS ARE
 NAD 83 GRID - NM EAST
 DISTANCES ARE GROUND

Robert M. Howett
 Robert M. Howett NM PS 19680

Firm No.: NM 4655451



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NO.	REVISION	DATE
JOB NO.:	LS1704186	
DWG. NO.:	1704186PAD	

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 100'
DATE: 4-18-2017
SURVEYED BY: ML/JL
DRAWN BY: LPS
APPROVED BY: RMH
SHEET: 1 OF 1

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

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-015-45304	² Pool Code 98220	³ Pool Name Purple Sage (Wolfcamp) Gas
⁴ Property Code 322503	⁵ Property Name RIVERBOAT 12/1 WOMB FEDERAL COM	⁶ Well Number 1H
⁷ OGRID NO. 215099	⁸ Operator Name CIMAREX ENERGY COMPANY	⁹ Elevation 3265'

¹⁰ Surface Location

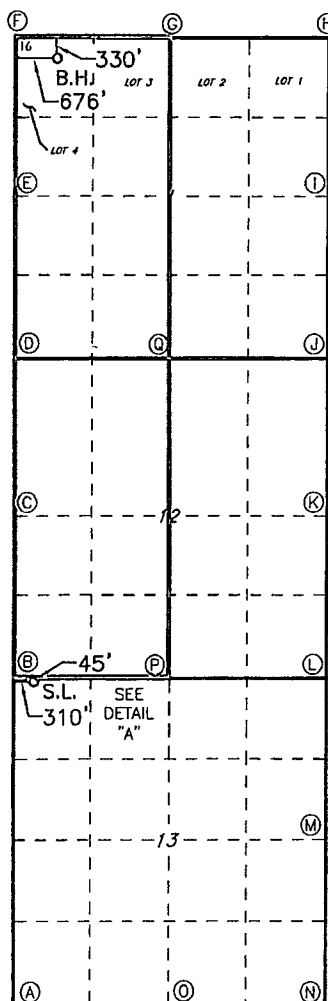
UL or lot no. D	Section 13	Township 24S	Range 26E	Lot Idn	Feet from the 45	North/South line NORTH	Feet From the 310	East/West line WEST	County EDDY
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¹¹ Bottom Hole Location If Different From Surface

UL or lot no. 4	Section 1	Township 24S	Range 26E	Lot Idn	Feet from the 330	North/South line NORTH	Feet From the 676	East/West line WEST	County EDDY
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¹² Dedicated Acres 640.36	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
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No allowable will be assigned to this completion until all interest have been consolidated or a non-standard unit has been approved by the division.



GEODETIC DATA NAD 27 GRID - NM EAST SURFACE LOCATION N: 445358.3 - E: 524656.1 LAT: 32.2243818° N LONG: 104.2536014° W BOTTOM HOLE N: 455626.4 - E: 525002.2 LAT: 32.2526081° N LONG: 104.2524573° W CORNER DATA NAD 83 GRID - NM EAST A: CALCULATED CORNER N: 440160.6 - E: 565581.4 B: FOUND BRASS CAP "1968" N: 445464.0 - E: 565528.1 C: FOUND BRASS CAP "1968" N: 448117.8 - E: 565496.3 D: FOUND BRASS CAP "1968" N: 450771.2 - E: 565465.1 E: FOUND BRASS CAP "1968" N: 453387.1 - E: 565488.1 F: FOUND BRASS CAP "1968" N: 456010.7 - E: 565511.5 G: FOUND BRASS CAP "1968" N: 456025.2 - E: 568172.1 DETAIL "A" 3267.2' 600' 3265.4' 3249.6' 3249.9'	GEODETIC DATA NAD 83 GRID - NM EAST SURFACE LOCATION N: 445416.1 - E: 565838.5 LAT: 32.2245006° N LONG: 104.2541011° W BOTTOM HOLE N: 455684.5 - E: 566184.4 LAT: 32.2527265° N LONG: 104.2529577° W H: FOUND BRASS CAP "1968" N: 456040.6 - E: 570833.1 I: FOUND BRASS CAP "1968" N: 453378.3 - E: 570839.7 J: FOUND BRASS CAP "1968" N: 450715.6 - E: 570845.6 K: FOUND BRASS CAP "1968" N: 448065.7 - E: 570825.4 L: FOUND BRASS CAP "1968" N: 445414.9 - E: 570824.5 M: FOUND BRASS CAP "1968" N: 442765.3 - E: 570824.0 N: FOUND BRASS CAP "1968" N: 440115.7 - E: 570822.3 O: FOUND BRASS CAP "1968" N: 440136.5 - E: 568202.3 P: FOUND BRASS CAP "1968" N: 445439.9 - E: 568176.4 Q: FOUND BRASS CAP "1968" N: 450743.5 - E: 568155.7
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¹⁷ 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 to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature: *Amithy Crawford* Date: 11/6/2019

Printed Name: Amithy Crawford

E-mail Address: acrawford@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.

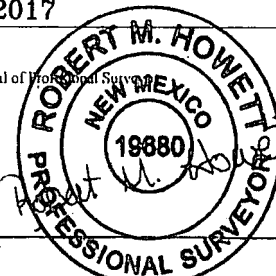
4-18-2017

Date of Survey

Signature and Seal of Professional Surveyor

19680

Certificate Number



1. Geological Formations

TVD of target 8,790

Pilot Hole TD N/A

MD at TD 18,777

Deepest expected fresh water

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone	Hazards
Salado	1030	N/A	
Castille	1660	N/A	
Lamar	1861	N/A	
Bell Canyon	1980	N/A	
Cherry Canyon	2874	N/A	
Brushy Canyon	3792	Hydrocarbons	
Bone Spring	5372	Hydrocarbons	
Bone Spring 1st	6386	Hydrocarbons	
Bone Spring 2nd	6918	Hydrocarbons	
Bone Spring 3rd	7054	Hydrocarbons	
Harkey	7801	Hydrocarbons	
Wolfcamp	8600	Hydrocarbons	
Wolfcamp (Target)	8720	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	425	425	13-3/8"	48.00	H-40/J-55 Hybrid	ST&C	3.76	8.80	15.78
12 1/4	0	1870	1870	9-5/8"	36.00	J-55	ST&C	2.04	3.55	5.85
8 3/4	0	8200	8200	5-1/2"	17.00	L-80	LT&C	1.48	1.82	2.25
8 3/4	8200	18777	8819	5-1/2"	17.00	L-80	BT&C	1.37	1.69	37.73
BLM Minimum Safety Factor								1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.

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

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

3. Cementing Program

Casing	# Sks	Wt. lb/gal	Yld ft ³ /sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surface	98	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	354	12.90	1.88	9.65	12	Lead: 35:65 (Poz.C) + Salt + Bentonite
	109	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Production	597	10.50	3.45	22.18	N/A	Lead: NeoCem
	2486	14.80	1.34	6.32	9.5	Tail: Class C + LCM

Casing String	TOC	% Excess	
Surface		0	32
Intermediate		0	50
Production		1685	25

Cimarex request the ability to perform casing integrity tests after plug bump of cement job.

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	3M	Annular	X	50% of working pressure
			Blind Ram		3M
			Pipe Ram	X	
			Double Ram	X	
			Other		
8 3/4	13 5/8	5M	Annular	X	50% of working pressure
			Blind Ram	X	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 425'	FW Spud Mud	8.40 - 8.90	30-32	N/C
425' to 1870'	Brine Water	9.70 - 10.20	30-32	N/C
1870' to 18777'	Cut Brine or OBM	9.50 - 10.00	27-70	N/C

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

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring
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6. Logging and Testing Procedures

Logging, Coring and Testing	
	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
X	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	4585 psi
Abnormal Temperature	No

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

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

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

A multi-bowl wellhead system will be utilized.

After running the 13-3/8" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 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.

All casing strings will be tested as per Onshore Order No.2 to atleast 0.22 psi/ft or 1,500 whichever is greater and not to exceed 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.

[Print](#)

OCTG Performance Data

Casing Performance

Availability: ERW

Pipe Body Geometry

Outside Diameter:	13.375 in	Inside Diameter:	12.715 in
Wall Thickness:	0.330 in	Cross Section Area:	13.524 sq in
Nominal Weight:	48.00 lb/ft	Drift Diameter:	12.559 in
Plain End Weight:	46.02 lb/ft	Alternate Drift Diameter:	-

Pipe Body Performance

Grade:	H40	Collapse Strength (ERW):	740 psi
Pipe Body Yield Strength:	541000 lbf	Collapse Strength (SMLS):	-

SC Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	3220 lb-ft	2420 lb-ft	4030 lb-ft
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	1730 psi
Joint Strength:	322000 lbf		

LC Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	-	-	-
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	-
Joint Strength:	-		

BC Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	-	-	-
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	-
Joint Strength:	-		

PE Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	-	-	-
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	1730 psi
Joint Strength:	-		

Cimarex Riverboat 12-1 WOMD Federal Com 1H - Rev0 RM 04Nov19

Proposal Geodetic Report

(Non-Def Plan)



Report Date: November 04, 2019 - 02:33 PM
 Client: Cimarex Energy
 Field: NM Eddy County (NAD 83)
 Structure / Slot: Cimarex Riverboat 12-1 WOMD Federal Com 1H / New Slot
 Well: Riverboat 12-1 WOMD Federal Com 1H
 Borehole: Riverboat 12-1 WOMD Federal Com 1H
 UWI / API#: Unknown / Unknown
 Survey Name: Cimarex Riverboat 12-1 WOMD Federal Com 1H - Rev0 RM 04Nov19
 Survey Date: November 04, 2019
 Tort / AHD / DDI / ERD Ratio: 101.661' / 10642.378 ft / 6.364' / 1.211
 Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
 Location Lat / Long: N 32° 13' 28.20154", W 104° 15' 14.76415"
 Location Grid N/E Y/X: N 445416.100 ftUS, E 565838.500 ftUS
 CRS Grid Convergence Angle: 0.0422°
 Grid Scale Factor: 0.99990978
 Version / Patch: 2.10.782.0

Survey / DLS Computation: Minimum Curvature / Lubinski
 Vertical Section Azimuth: 359.910° (Grid North)
 Vertical Section Origin: 0.000 ft, 0.000 ft
 TVD Reference Datum: RKB
 TVD Reference Elevation: 3291.000 ft above MSL
 Seabed / Ground Elevation: 3265.000 ft above MSL
 Magnetic Declination: 7.239°
 Total Gravity Field Strength: 988.4510mgn (9.80665 Based)
 Gravity Model: GARM
 Total Magnetic Field Strength: 47783.658 nT
 Magnetic Dip Angle: 59.862°
 Declination Date: November 04, 2019
 Magnetic Declination Model: HDGM 2019
 North Reference: Grid North
 Grid Convergence Used: 0.0422°
 Total Corr Mag North->Grid North: 7.1968°
 Local Coord Referenced To: Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL [45' FNL, 310' FWL]	0.00	0.00	1.93	0.00	0.00	0.00	0.00	N/A	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	100.00	0.00	90.52	100.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	200.00	0.00	90.52	200.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	300.00	0.00	90.52	300.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	400.00	0.00	90.52	400.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	500.00	0.00	90.52	500.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	600.00	0.00	90.52	600.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	700.00	0.00	90.52	700.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	800.00	0.00	90.52	800.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	900.00	0.00	90.52	900.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1000.00	0.00	90.52	1000.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
Salado (Top Salt)	1030.00	0.00	90.52	1030.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1100.00	0.00	90.52	1100.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1200.00	0.00	90.52	1200.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1300.00	0.00	90.52	1300.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1400.00	0.00	90.52	1400.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1500.00	0.00	90.52	1500.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1600.00	0.00	90.52	1600.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
Castille (Base Salt)	1660.00	0.00	90.52	1660.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1700.00	0.00	90.52	1700.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1800.00	0.00	90.52	1800.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
Lamar	1861.00	0.00	90.52	1861.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	1900.00	0.00	90.52	1900.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
Bell Canyon (Top Delaware) Nudge 2"/100' DLS	1980.00	0.00	90.52	1980.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	2000.00	0.00	90.52	2000.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
	2100.00	2.00	90.52	2099.98	-0.02	-0.02	1.75	2.00	445416.08	565840.24	N 32 13 28.20	W 104 15 14.74
	2200.00	4.00	90.52	2199.84	-0.07	-0.06	6.98	2.00	445416.04	565845.48	N 32 13 28.20	W 104 15 14.68
	2300.00	6.00	90.52	2299.45	-0.17	-0.14	15.69	2.00	445415.96	565854.19	N 32 13 28.20	W 104 15 14.58
Hold Nudge	2301.48	6.03	90.52	2300.92	-0.17	-0.14	15.85	2.00	445415.96	565854.35	N 32 13 28.20	W 104 15 14.58
	2400.00	6.03	90.52	2398.90	-0.28	-0.24	26.20	0.00	445415.86	565864.69	N 32 13 28.20	W 104 15 14.48
	2500.00	6.03	90.52	2498.35	-0.39	-0.33	36.70	0.00	445415.77	565875.20	N 32 13 28.20	W 104 15 14.34
	2600.00	6.03	90.52	2597.79	-0.50	-0.43	47.20	0.00	445415.67	565885.70	N 32 13 28.20	W 104 15 14.21
	2700.00	6.03	90.52	2697.24	-0.82	-0.52	57.71	0.00	445415.58	565896.20	N 32 13 28.20	W 104 15 14.09
	2800.00	6.03	90.52	2796.69	-0.73	-0.62	68.21	0.00	445415.48	565906.70	N 32 13 28.19	W 104 15 13.97
Cherry Canyon	2877.74	6.03	90.52	2874.00	-0.81	-0.69	76.38	0.00	445415.41	565914.87	N 32 13 28.19	W 104 15 13.88
	2900.00	6.03	90.52	2896.13	-0.84	-0.72	78.71	0.00	445415.38	565917.21	N 32 13 28.19	W 104 15 13.85
	3000.00	6.03	90.52	2995.58	-0.95	-0.81	89.22	0.00	445415.29	565927.71	N 32 13 28.19	W 104 15 13.73
	3100.00	6.03	90.52	3095.03	-1.06	-0.91	99.72	0.00	445415.19	565938.21	N 32 13 28.19	W 104 15 13.60
	3200.00	6.03	90.52	3194.47	-1.18	-1.00	110.23	0.00	445415.10	565948.71	N 32 13 28.19	W 104 15 13.48
	3300.00	6.03	90.52	3293.92	-1.29	-1.10	120.73	0.00	445415.00	565959.22	N 32 13 28.19	W 104 15 13.36
	3400.00	6.03	90.52	3393.37	-1.40	-1.19	131.23	0.00	445414.91	565969.72	N 32 13 28.19	W 104 15 13.24
	3500.00	6.03	90.52	3492.81	-1.51	-1.29	141.74	0.00	445414.81	565980.22	N 32 13 28.19	W 104 15 13.11
	3600.00	6.03	90.52	3592.26	-1.62	-1.38	152.24	0.00	445414.72	565990.73	N 32 13 28.19	W 104 15 12.99
	3700.00	6.03	90.52	3691.71	-1.74	-1.48	162.74	0.00	445414.62	566001.23	N 32 13 28.19	W 104 15 12.87
	3800.00	6.03	90.52	3791.15	-1.85	-1.58	173.24	0.00	445414.52	566011.73	N 32 13 28.18	W 104 15 12.75
Brushy Canyon	3800.85	6.03	90.52	3792.00	-1.85	-1.58	173.34	0.00	445414.52	566011.82	N 32 13 28.18	W 104 15 12.75
	3900.00	6.03	90.52	3890.60	-1.96	-1.67	183.75	0.00	445414.43	566022.33	N 32 13 28.18	W 104 15 12.63
	4000.00	6.03	90.52	3990.05	-2.07	-1.77	194.25	0.00	445414.33	566032.74	N 32 13 28.18	W 104 15 12.50
	4100.00	6.03	90.52	4089.49	-2.18	-1.86	204.76	0.00	445414.24	566043.24	N 32 13 28.18	W 104 15 12.38
	4200.00	6.03	90.52	4188.94	-2.30	-1.96	215.26	0.00	445414.14	566053.74	N 32 13 28.18	W 104 15 12.26
	4300.00	6.03	90.52	4288.39	-2.41	-2.05	225.76	0.00	445414.05	566064.24	N 32 13 28.18	W 104 15 12.14
	4400.00	6.03	90.52	4387.83	-2.52	-2.15	236.27	0.00	445413.95	566074.75	N 32 13 28.18	W 104 15 12.01
	4500.00	6.03	90.52	4487.28	-2.63	-2.24	246.77	0.00	445413.86	566085.25	N 32 13 28.18	W 104 15 11.89
	4600.00	6.03	90.52	4586.73	-2.74	-2.34	257.28	0.00	445413.76	566095.75	N 32 13 28.18	W 104 15 11.77
	4700.00	6.03	90.52	4686.18	-2.86	-2.44	267.78	0.00	445413.67	566106.25	N 32 13 28.18	W 104 15 11.65
	4800.00	6.03	90.52	4785.62	-2.97	-2.53	278.28	0.00	445413.57	566116.76	N 32 13 28.17	W 104 15 11.52
	4900.00	6.03	90.52	4885.07	-3.08	-2.63	288.79	0.00	445413.47	566127.26	N 32 13 28.17	W 104 15 11.40
	5000.00	6.03	90.52	4984.52	-3.19	-2.72	299.29	0.00	445413.38	566137.76	N 32 13 28.17	W 104 15 11.28
	5100.00	6.03	90.52	5083.96	-3.30	-2.82	309.79	0.00	445413.28	566148.27	N 32 13 28.17	W 104 15 11.16
	5200.00	6.03	90.52	5183.41	-3.42	-2.91	320.30	0.00	445413.19	566158.77	N 32 13 28.17	W 104 15 11.04
	5300.00	6.03	90.52	5282.86	-3.53	-3.01	330.80	0.00	445413.09	566169.27	N 32 13 28.17	W 104 15 10.91
Top Bone Spring	5389.64	6.03	90.52	5372.00	-3.63	-3.09	340.22	0.00	445413.01	566178.69	N 32 13 28.17	W 104 15 10.80
	5400.00	6.03	90.52	5382.30	-3.64	-3.10	341.30	0.00	445413.00	566179.77	N 32 13 28.17	W 104 15 10.79
	5500.00	6.03	90.52	5481.75	-3.75	-3.20	351.81	0.00	445412.90	566190.28	N 32 13 28.17	W 104 15 10.67
Drop to Vertical 2"/100' DLS	5518.35	6.03	90.52	5500.00	-3.77	-3.22	353.74	0.00	445412.88	566192.20	N 32 13 28.17	W 104 15 10.65
	5600.00	4.40	90.52	5581.31	-3.85	-3.28	361.15	2.00	445412.82	566199.62	N 32 13 28.17	W 104 15 10.56
	5700.00	2.40	90.52	5681.13	-3.91	-3.34	367.08	2.00	445412.76	566205.54	N 32 13 28.17	W 104 15 10.49
	5800.00	0.40	90.52	5781.09	-3.94	-3.36	369.51	2.00	445412.74	566207.98	N 32 13 28.17	W 104 15 10.46
Hold Vertical	5819.83	0.00	90.52	5800.92	-3.94	-3.36	369.58	2.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	5900.00	0.00	90.52	5881.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (ft/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	6000.00	0.00	90.52	6081.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6100.00	0.00	90.52	6081.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6200.00	0.00	90.52	6181.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6300.00	0.00	90.52	6281.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6400.00	0.00	90.52	6381.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
Top 1st BSPG SS	6404.91	0.00	90.52	6386.00	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6500.00	0.00	90.52	6481.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6600.00	0.00	90.52	6581.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6700.00	0.00	90.52	6681.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6800.00	0.00	90.52	6781.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	6900.00	0.00	90.52	6881.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
Top 2nd BSPG SS	6936.91	0.00	90.52	6918.00	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7000.00	0.00	90.52	6981.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7100.00	0.00	90.52	7081.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7200.00	0.00	90.52	7181.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7300.00	0.00	90.52	7281.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7400.00	0.00	90.52	7381.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7500.00	0.00	90.52	7481.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7600.00	0.00	90.52	7581.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7700.00	0.00	90.52	7681.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7800.00	0.00	90.52	7781.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	7900.00	0.00	90.52	7881.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	8000.00	0.00	90.52	7981.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	8100.00	0.00	90.52	8081.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	8200.00	0.00	90.52	8181.09	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
KOP - Build 12"/100' DLS	8228.87	0.00	90.52	8209.96	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
	8300.00	8.54	359.10	8280.83	1.35	1.93	369.50	12.00	445418.03	566207.97	N 32 13 28.22	W 104 15 10.46
Top 3rd BSPG Carb	8325.57	11.60	359.10	8306.00	5.82	6.40	369.43	12.00	445422.50	566207.90	N 32 13 28.26	W 104 15 10.46
	8400.00	20.54	359.10	8377.45	26.40	26.98	369.11	12.00	445443.07	566207.57	N 32 13 28.47	W 104 15 10.47
	8500.00	32.54	359.10	8466.75	70.99	71.57	368.41	12.00	445487.66	566206.87	N 32 13 28.91	W 104 15 10.48
	8600.00	44.54	359.10	8544.83	133.17	133.74	367.43	12.00	445549.83	566205.90	N 32 13 29.52	W 104 15 10.49
Top Wolfcamp	8685.33	54.78	359.10	8600.00	198.11	198.68	366.41	12.00	445614.77	566204.88	N 32 13 30.16	W 104 15 10.50
	8700.00	56.54	359.10	8608.28	210.22	210.80	366.22	12.00	445626.88	566204.69	N 32 13 30.28	W 104 15 10.50
	8800.00	68.54	359.10	8654.31	298.78	299.35	364.83	12.00	445715.42	566203.29	N 32 13 31.16	W 104 15 10.51
Build 4"/100' DLS	8853.87	75.00	359.10	8671.16	348.91	350.48	364.02	12.00	445766.55	566202.49	N 32 13 31.67	W 104 15 10.52
	8900.00	76.84	359.21	8682.38	394.65	395.22	363.36	4.00	445801.29	566201.83	N 32 13 32.11	W 104 15 10.53
Wolfcamp "Y" SS	8935.35	78.25	359.29	8690.00	429.17	429.74	362.91	4.00	445845.80	566201.38	N 32 13 32.45	W 104 15 10.54
	9000.00	80.84	359.43	8701.73	492.73	493.30	362.20	4.00	445900.36	566200.67	N 32 13 33.08	W 104 15 10.54
	9100.00	84.83	359.65	8714.20	591.93	592.50	361.41	4.00	446008.54	566199.87	N 32 13 34.06	W 104 15 10.55
	9200.00	88.82	359.87	8719.74	691.76	692.32	360.99	4.00	446108.36	566199.46	N 32 13 35.05	W 104 15 10.56
Wolfcamp "Y" SS Tgt Landing Point	9218.93	89.58	359.91	8720.00	710.68	711.25	360.95	4.00	446127.28	566199.42	N 32 13 35.24	W 104 15 10.56
	9300.00	89.58	359.91	8720.59	791.75	792.32	360.82	0.00	446208.35	566199.29	N 32 13 36.04	W 104 15 10.56
	9400.00	89.58	359.91	8721.33	891.75	892.32	360.67	0.00	446308.34	566199.13	N 32 13 37.03	W 104 15 10.56
	9500.00	89.58	359.91	8722.06	991.75	992.32	360.51	0.00	446408.32	566198.98	N 32 13 38.02	W 104 15 10.56
	9600.00	89.58	359.91	8722.79	1091.74	1092.31	360.35	0.00	446508.31	566198.82	N 32 13 39.01	W 104 15 10.56
	9700.00	89.58	359.91	8723.52	1191.74	1192.31	360.20	0.00	446608.30	566198.66	N 32 13 40.00	W 104 15 10.56
	9800.00	89.58	359.91	8724.26	1291.74	1292.31	360.04	0.00	446708.29	566198.51	N 32 13 40.99	W 104 15 10.56
	9900.00	89.58	359.91	8724.99	1391.74	1392.30	359.88	0.00	446808.28	566198.35	N 32 13 41.98	W 104 15 10.56
	10000.00	89.58	359.91	8725.72	1491.73	1492.30	359.72	0.00	446908.26	566198.19	N 32 13 42.97	W 104 15 10.56
	10100.00	89.58	359.91	8726.45	1591.73	1592.30	359.57	0.00	447008.25	566198.03	N 32 13 43.95	W 104 15 10.56
	10200.00	89.58	359.91	8727.18	1691.73	1692.30	359.41	0.00	447108.24	566197.88	N 32 13 44.94	W 104 15 10.57
	10300.00	89.58	359.91	8727.92	1791.73	1792.29	359.25	0.00	447208.23	566197.72	N 32 13 45.93	W 104 15 10.57
	10400.00	89.58	359.91	8728.65	1891.72	1892.29	359.10	0.00	447308.22	566197.56	N 32 13 46.92	W 104 15 10.57
	10500.00	89.58	359.91	8729.38	1991.72	1992.29	358.94	0.00	447408.20	566197.41	N 32 13 47.91	W 104 15 10.57
	10600.00	89.58	359.91	8730.11	2091.72	2092.28	358.78	0.00	447508.19	566197.25	N 32 13 48.90	W 104 15 10.57
	10700.00	89.58	359.91	8730.85	2191.72	2192.28	358.62	0.00	447608.18	566197.09	N 32 13 49.89	W 104 15 10.57
	10800.00	89.58	359.91	8731.58	2291.72	2292.28	358.47	0.00	447708.17	566196.93	N 32 13 50.88	W 104 15 10.57
	10900.00	89.58	359.91	8732.31	2391.71	2392.28	358.31	0.00	447808.15	566196.78	N 32 13 51.87	W 104 15 10.57
	11000.00	89.58	359.91	8733.04	2491.71	2492.27	358.15	0.00	447908.14	566196.62	N 32 13 52.86	W 104 15 10.57
	11100.00	89.58	359.91	8733.78	2591.70	2592.27	358.00	0.00	448008.13	566196.46	N 32 13 53.85	W 104 15 10.57
	11200.00	89.58	359.91	8734.51	2691.70	2692.27	357.84	0.00	448108.12	566196.31	N 32 13 54.84	W 104 15 10.58
	11300.00	89.58	359.91	8735.24	2791.70	2792.26	357.68	0.00	448208.11	566196.15	N 32 13 55.83	W 104 15 10.58
	11400.00	89.58	359.91	8735.97	2891.70	2892.26	357.52	0.00	448308.09	566195.99	N 32 13 56.82	W 104 15 10.58
	11500.00	89.58	359.91	8736.71	2991.69	2992.26	357.37	0.00	448408.08	566195.83	N 32 13 57.81	W 104 15 10.58
	11600.00	89.58	359.91	8737.44	3091.69	3092.26	357.21	0.00	448508.07	566195.68	N 32 13 58.80	W 104 15 10.58
	11700.00	89.58	359.91	8738.17	3191.69	3192.25	357.05	0.00	448608.06	566195.52	N 32 13 59.79	W 104 15 10.58
	11800.00	89.58	359.91	8738.90	3291.69	3292.25	356.90	0.00	448708.05	566195.36	N 32 14 0.78	W 104 15 10.58
	11900.00	89.58	359.91	8739.63	3391.68	3392.25	356.74	0.00	448808.03	566195.21	N 32 14 1.77	W 104 15 10.58
Base "Y" SS	11949.89	89.58	359.91	8740.37	3491.68	3492.24	356.66	0.00	448857.92	566195.13	N 32 14 2.26	W 104 15 10.58
	12000.00	89.58	359.91	8741.10	3591.68	3592.24	356.58	0.00	448908.02	566195.05	N 32 14 3.25	W 104 15 10.58
	12100.00	89.58	359.91	8741.83	3691.67	3692.24	356.42	0.00	449008.01	566194.89	N 32 14 4.24	W 104 15 10.58
	12200.00	89.58	359.91	8742.56	3791.67	3792.24	356.27	0.00	449108.00	566194.73	N 32 14 5.23	W 104 15 10.58
	12300.00	89.58	359.91	8743.29	3891.67	3892.23	356.11	0.00	449207.99	566194.58	N 32 14 6.22	W 104 15 10.59
	12400.00	89.58	359.91	8744.03	3991.67	3992.23	355.95	0.00	449307.97	566194.42	N 32 14 7.21	W 104 15 10.59
	12500.00	89.58	359.91	8744.76	4091.66	4092.23	355.80	0.00	449407.96	566194.26	N 32 14 8.20	W 104 15 10.59
	12600.00	89.58	359.91	8745.49	4191.66	4192.23	355.64	0.00	449507.95	566194.11	N 32 14 9.19	W 104 15 10.59
	12700.00	89.58	35									

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 ° ' ")
	15200.00	89.58	359.91	8763.80	6891.59	6692.15	351.55	0.00	452107.64	566190.02	N 32 14 34.42	W 104 15 10.61
	15300.00	89.58	359.91	8764.53	6781.59	6792.15	351.40	0.00	452207.63	566189.86	N 32 14 35.41	W 104 15 10.61
	15400.00	89.58	359.91	8765.27	6891.59	6892.15	351.24	0.00	452307.61	566189.71	N 32 14 36.40	W 104 15 10.62
	15500.00	89.58	359.91	8766.00	6991.59	6992.15	351.08	0.00	452407.60	566189.55	N 32 14 37.39	W 104 15 10.62
	15600.00	89.58	359.91	8766.73	7091.58	7092.14	350.92	0.00	452507.59	566189.39	N 32 14 38.38	W 104 15 10.62
	15700.00	89.58	359.91	8767.46	7191.58	7192.14	350.77	0.00	452607.58	566189.24	N 32 14 39.37	W 104 15 10.62
	15800.00	89.58	359.91	8768.20	7291.58	7292.14	350.61	0.00	452707.57	566189.08	N 32 14 40.36	W 104 15 10.62
	15900.00	89.58	359.91	8768.93	7391.58	7392.14	350.45	0.00	452807.55	566188.92	N 32 14 41.35	W 104 15 10.62
	16000.00	89.58	359.91	8769.66	7491.57	7492.13	350.30	0.00	452907.54	566188.76	N 32 14 42.33	W 104 15 10.62
	16100.00	89.58	359.91	8770.39	7591.57	7592.13	350.14	0.00	453007.53	566188.61	N 32 14 43.32	W 104 15 10.62
	16200.00	89.58	359.91	8771.13	7691.57	7692.13	349.98	0.00	453107.52	566188.45	N 32 14 44.31	W 104 15 10.62
	16300.00	89.58	359.91	8771.86	7791.57	7792.12	349.82	0.00	453207.51	566188.29	N 32 14 45.30	W 104 15 10.62
	16400.00	89.58	359.91	8772.59	7891.56	7892.12	349.67	0.00	453307.49	566188.14	N 32 14 46.29	W 104 15 10.63
	16500.00	89.58	359.91	8773.32	7991.56	7992.12	349.51	0.00	453407.48	566187.98	N 32 14 47.28	W 104 15 10.63
	16600.00	89.58	359.91	8774.05	8091.56	8092.12	349.35	0.00	453507.47	566187.82	N 32 14 48.27	W 104 15 10.63
	16700.00	89.58	359.91	8774.79	8191.55	8192.11	349.20	0.00	453607.46	566187.66	N 32 14 49.26	W 104 15 10.63
	16800.00	89.58	359.91	8775.52	8291.55	8292.11	349.04	0.00	453707.45	566187.51	N 32 14 50.25	W 104 15 10.63
	16900.00	89.58	359.91	8776.25	8391.55	8392.11	348.88	0.00	453807.43	566187.35	N 32 14 51.24	W 104 15 10.63
	17000.00	89.58	359.91	8776.98	8491.55	8492.10	348.72	0.00	453907.42	566187.19	N 32 14 52.23	W 104 15 10.63
	17100.00	89.58	359.91	8777.72	8591.54	8592.10	348.57	0.00	454007.41	566187.04	N 32 14 53.22	W 104 15 10.63
	17200.00	89.58	359.91	8778.45	8691.54	8692.10	348.41	0.00	454107.40	566186.88	N 32 14 54.21	W 104 15 10.63
	17300.00	89.58	359.91	8779.18	8791.54	8792.10	348.25	0.00	454207.39	566186.72	N 32 14 55.20	W 104 15 10.63
	17400.00	89.58	359.91	8779.91	8891.54	8892.09	348.10	0.00	454307.37	566186.56	N 32 14 56.19	W 104 15 10.63
	17500.00	89.58	359.91	8780.65	8991.53	8992.09	347.94	0.00	454407.36	566186.41	N 32 14 57.18	W 104 15 10.64
	17600.00	89.58	359.91	8781.38	9091.53	9092.09	347.78	0.00	454507.35	566186.25	N 32 14 58.17	W 104 15 10.64
	17700.00	89.58	359.91	8782.11	9191.53	9192.08	347.62	0.00	454607.34	566186.09	N 32 14 59.16	W 104 15 10.64
	17800.00	89.58	359.91	8782.84	9291.52	9292.08	347.47	0.00	454707.33	566185.94	N 32 15 0.15	W 104 15 10.64
	17900.00	89.58	359.91	8783.58	9391.52	9392.08	347.31	0.00	454807.31	566185.78	N 32 15 1.13	W 104 15 10.64
	18000.00	89.58	359.91	8784.31	9491.52	9492.08	347.15	0.00	454907.30	566185.62	N 32 15 2.12	W 104 15 10.64
	18100.00	89.58	359.91	8785.04	9591.52	9592.07	347.00	0.00	455007.29	566185.46	N 32 15 3.11	W 104 15 10.64
	18200.00	89.58	359.91	8785.77	9691.51	9692.07	346.84	0.00	455107.28	566185.31	N 32 15 4.10	W 104 15 10.64
	18300.00	89.58	359.91	8786.50	9791.51	9792.07	346.68	0.00	455207.26	566185.15	N 32 15 5.09	W 104 15 10.64
	18400.00	89.58	359.91	8787.24	9891.51	9892.07	346.52	0.00	455307.25	566184.99	N 32 15 6.08	W 104 15 10.64
	18500.00	89.58	359.91	8787.97	9991.51	9992.06	346.37	0.00	455407.24	566184.84	N 32 15 7.07	W 104 15 10.65
	18600.00	89.58	359.91	8788.70	10091.50	10092.06	346.21	0.00	455507.23	566184.68	N 32 15 8.06	W 104 15 10.65
	18700.00	89.58	359.91	8789.43	10191.50	10192.06	346.05	0.00	455607.22	566184.52	N 32 15 9.05	W 104 15 10.65

Cimarex
Riverboat 12-1
WOMD Federal
Com 1H - PBHL
[330' FNL, 676'
FWL]

18777.29 89.58 359.91 8790.00 10268.79 10269.35 345.93 0.00 455684.50 566184.40 N 32 15 9.82 W 104 15 10.65

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 (in)	Diameter (in)	Expected Max Inclination (deg)	Survey Tool Type	Borehole / Survey
	1	0.000	26.000	1/100.000	17.500		13.375		NAL_MWD_IFR1+MS-Depth Only	Riverboat 12-1 WOMD Federal Com 1H / Cimarex Riverboat 12-1 WOMD Federal Com 1H - Rev0
	1	26.000	18777.292	1/100.000	17.500		13.375		NAL_MWD_IFR1+MS	Riverboat 12-1 WOMD Federal Com 1H / Cimarex Riverboat 12-1

Cimarex Riverboat 12-1 WOMD Federal Com 1H - Rev0 RM 04Nov19
Proposal Geodetic Report
 (Non-Def Plan)



Report Date:	November 04, 2019 - 02:33 PM	Survey / DLS Computation:	Minimum Curvature / Lubinski
Client:	Cimarex Energy	Vertical Section Azimuth:	359.910 ° (Grid North)
Field:	NM Eddy County (NAD 83)	Vertical Section Origin:	0.000 ft, 0.000 ft
Structure / Slot:	Cimarex Riverboat 12-1 WOMD Federal Com 1H / New Slot	TVD Reference Datum:	RKB
Well:	Riverboat 12-1 WOMD Federal Com 1H	TVD Reference Elevation:	3291.000 ft above MSL
Borehole:	Riverboat 12-1 WOMD Federal Com 1H	Seabed / Ground Elevation:	3265.000 ft above MSL
UWI / API#:	Unknown / Unknown	Magnetic Declination:	7.239 °
Survey Name:	Cimarex Riverboat 12-1 WOMD Federal Com 1H - Rev0 RM 04Nov19	Total Gravity Field Strength:	998.4510mgn (9.80665 Based)
Survey Date:	November 04, 2019	Gravity Model:	GARM
Tort / AHD / DDI / ERD Ratio:	101.561 ° / 10642.378 ft / 6.364 / 1.211	Total Magnetic Field Strength:	47783.658 nT
Coordinate Reference System:	NAD83 New Mexico State Plane, Eastern Zone, US Feet	Magnetic Dip Angle:	59.862 °
Location Lat / Long:	N 32° 13' 28.20154", W 104° 15' 14.76415"	Declination Date:	November 04, 2019
Location Grid N/E Y/X:	N 445416.100 ftUS, E 565838.500 ftUS	Magnetic Declination Model:	HDGM 2019
CRS Grid Convergence Angle:	0.0422 °	North Reference:	Grid North
Grid Scale Factor:	0.99990978	Grid Convergence Used:	0.0422 °
Version / Patch:	2.10.782.0	Total Corr Mag North->Grid North:	7.1968 °
		Local Coord Referenced To:	Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL [45' FNL, 310' FWL]	0.00	0.00	1.93	0.00	0.00	0.00	0.00	N/A	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
Nudge 2"/100'	2000.00	0.00	90.52	2000.00	0.00	0.00	0.00	0.00	445416.10	565838.50	N 32 13 28.20	W 104 15 14.76
DLS	2301.48	6.03	90.52	2300.92	-0.17	-0.14	15.85	2.00	445415.96	565854.35	N 32 13 28.20	W 104 15 14.58
Hold Nudge	5518.35	6.03	90.52	5500.00	-3.77	-3.22	353.74	0.00	445412.88	566192.20	N 32 13 28.17	W 104 15 10.65
2"/100' DLS	5819.83	0.00	90.52	5800.92	-3.94	-3.36	369.58	2.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
Hold Vertical	8228.87	0.00	90.52	8209.96	-3.94	-3.36	369.58	0.00	445412.74	566208.05	N 32 13 28.17	W 104 15 10.46
KOP - Build												
12"/100' DLS												
Build 4"/100'	8853.87	75.00	359.10	8671.16	349.91	350.48	364.02	12.00	445766.55	566202.49	N 32 13 31.67	W 104 15 10.52
DLS	9218.93	89.58	359.91	8720.00	710.68	711.25	360.95	4.00	446127.28	566199.42	N 32 13 35.24	W 104 15 10.56
Landing Point												
Cimarex												
Riverboat 12-1												
WOMD Federal												
Com 1H - PBHL	18777.29	89.58	359.91	8790.00	10268.79	10268.35	345.93	0.00	455684.50	566184.40	N 32 15 9.82	W 104 15 10.65
[330' FNL, 676' FWL]												

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	17.500	13.375		NAL_MWD_IFR1+MS-Depth Only	Riverboat 12-1 WOMD Federal Com 1H / Cimarex Riverboat 12-1
	1	26.000	18777.292	1/100.000	17.500	13.375		NAL_MWD_IFR1+MS	WOMD Federal Com 1H - Rev0 Riverboat 12-1 WOMD Federal Com 1H / Cimarex Riverboat 12-1

Cimarex Riverboat 12-1 WOMB Federal Com 1H - Rev0 RM 04Nov19 Anti-Collision Summary Report

Analysis Date-24hr Time: November 04, 2019 - 14:40
 Client: Cimarex Energy
 Field: NM Eddy County (NAD 83)
 Structure: Cimarex Riverboat 12-1 WOMB Federal Com 1H
 Slot: New Slot
 Well: Riverboat 12-1 WOMB Federal Com 1H
 Borehole: Riverboat 12-1 WOMB Federal Com 1H
 Scan MD Range: 0.00ft ~ 18777.29ft

Analysis Method: 3D Least Distance
 Reference Trajectory: Cimarex Riverboat 12-1 WOMB Federal Com 1H - Rev0 RM 04Nov19 (Non-Def)
 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: 2.10.782.0
 Database \ Project: US1153APP452.dir.slb.com\drilling-NM Eddy County 2.10

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

Offset Selection Criteria

Wellhead distance scan: Restricted within 59787.79 ft
 Selection filters: Definitive Surveys - Definitive Plans - Definitive surveys exclude definitive plans

Offset Trajectories Summary

- 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			Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	Cl-Cl (ft)	MAS (ft)	EOU (ft)			MD (ft)	TVD (ft)	Alert	Minor	Major		

Results highlighted: Sep-Factor separation <= 1.50 ft

Cognate Oil Offset Federal #1 (Offset) Plugged Gas Inc Only On-12100ft (Def Survey)												
8621.89	32.81	8620.61	8589.08	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
8621.87	32.81	8620.58	8589.06	N/A	MAS = 10.00 (m)	10.00	10.00					MinPt-O-SF
8621.86	32.81	8620.54	8589.05	247747.12	MAS = 10.00 (m)	26.00	26.00					MinPts
8620.79	32.81	8598.65	8587.99	413.22	MAS = 10.00 (m)	720.00	720.00					MinPt-CICI
8621.31	61.20	8580.08	8560.11	215.81	OSF1.50	1260.00	1260.00					MinPt-CICI
8621.35	61.35	8580.02	8560.00	215.27	OSF1.50	1290.00	1290.00					MINPT-O-EOU
8621.43	61.45	8580.00	8559.97	214.91	OSF1.50	1310.00	1310.00					MinPt-O-ADP
8620.06	74.37	8570.05	8545.69	176.89	OSF1.50	1510.00	1510.00					MinPt-CICI
8620.34	75.22	8569.70	8545.11	174.86	OSF1.50	1590.00	1590.00					MINPT-O-EOU
8620.70	75.65	8569.83	8545.05	173.87	OSF1.50	1630.00	1630.00					MinPt-O-ADP
8614.60	116.93	8536.27	8497.73	111.73	OSF1.50	2350.00	2349.18					MinPt-CICI
8603.59	218.78	8457.31	8384.82	59.33	OSF1.50	4270.00	4258.55					MinPt-CICI
8607.21	229.85	8453.48	8377.27	56.46	OSF1.50	4660.00	4646.40					MINPT-O-EOU
8611.63	235.27	8454.35	8376.35	55.20	OSF1.50	4850.00	4835.35					MinPt-O-ADP
8612.08	304.99	8408.32	8307.08	42.53	OSF1.50	5990.00	5961.09					MinPt-CICI
8611.87	397.37	8346.52	8214.49	32.61	OSF1.50	7760.00	7741.09					MinPt-CICI
1503.52	458.91	1194.25	1044.61	4.99	OSF1.50	15620.00	8766.88	OSF<5.00				Enter Alert
455.43	481.61	143.97	-6.18	1.48	OSF1.50	18670.00	8774.57		OSF<1.50			Enter Minor
306.72	482.82	-5.44	-155.90	0.98	OSF1.50	18820.00	8775.67			OSF<1.00		Enter Major
50.28	495.11	-281.01	-444.84	0.14	OSF1.50	17110.00	8777.79					MinPt-O-SF
48.67	494.99	-281.83	-446.32	0.14	OSF1.50	17120.00	8777.86					MinPts
301.04	451.99	-0.71	-150.95	1.00	OSF1.50	17420.00	8780.06					Exit Major
449.72	451.64	148.19	-1.92	1.49	OSF1.50	17570.00	8781.16			OSF>1.50	OSF>1.00	Exit Minor
1497.78	452.22	1195.87	1045.56	4.98	OSF1.50	18620.00	8788.85	OSF>5.00				Exit Alert
1654.98	452.34	1352.99	1202.84	5.50	OSF1.50	18777.29	8790.00					TD

John Cravay Bradley Federal #1 (Offset) Plugged Gas Inc Only On-1669ft (Def Survey)												
291.24	32.81	289.95	258.43	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
289.73	32.81	288.29	256.92	1994.22	MAS = 10.00 (m)	20.00	20.00					MinPt-O-SF
289.54	32.81	288.16	256.73	3064.07	MAS = 10.00 (m)	26.00	26.00					MINPT-O-EOU
289.48	88.93	229.76	200.55	4.93	OSF1.50	360.00	360.00	OSF<5.00				Enter Alert
289.48	290.13	95.63	-0.65	1.50	OSF1.50	1000.00	1000.00		OSF<1.50			Enter Minor
289.48	434.73	-0.77	-145.26	1.00	OSF1.50	1480.00	1480.00			OSF<1.00		Enter Major
289.48	604.49	-113.95	-315.01	0.72	OSF1.50	2000.00	2000.00					MinPts
340.11	514.62	-3.40	-174.51	0.99	OSF1.50	2180.00	2179.88					Exit Major
416.62	420.26	136.02	-3.64	1.49	OSF1.50	2301.48	2300.62			OSF>1.50	OSF>1.00	Exit Minor
764.43	232.57	608.96	531.86	4.95	OSF1.50	2710.00	2707.18	OSF>5.00				Exit Alert
9539.59	436.91	9247.88	9102.67	32.84	OSF1.50	14940.00	8781.90					MinPt-O-SF
12567.35	521.29	12209.40	12036.07	36.22	OSF1.50	18777.29	8790.00					TD

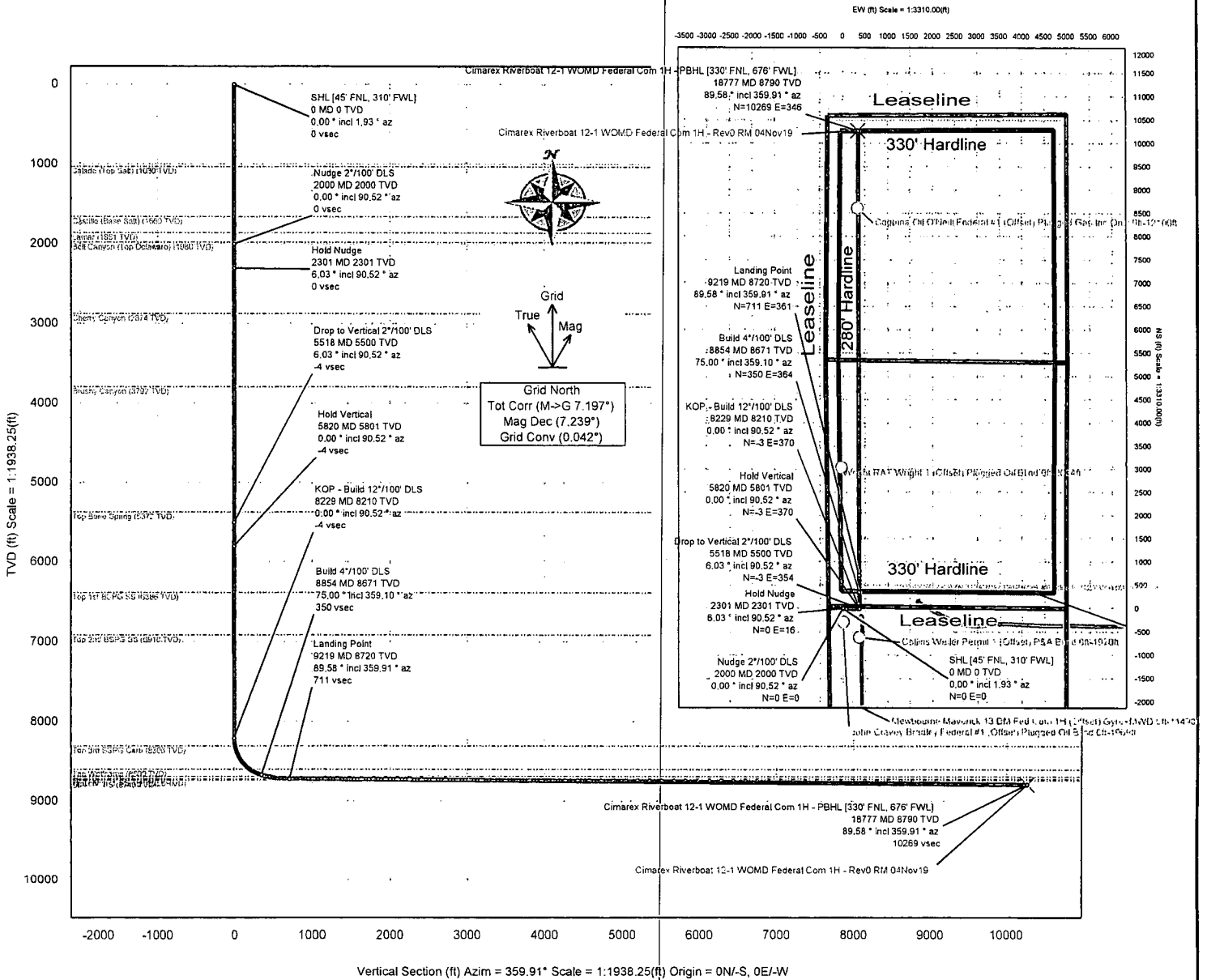
Cognate Weiler Permitt's (Offset) P&A Blind On-1970ft (Def Survey)												
712.68	32.81	711.39	679.87	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
711.47	32.81	710.06	678.67	5563.08	MAS = 10.00 (m)	26.00	26.00					MinPt-O-SF
711.19	216.57	568.39	494.63	4.95	OSF1.50	780.00	780.00	OSF<5.00				Enter Alert
711.17	605.11	307.33	106.06	1.70	OSF1.50	2020.00	2020.00					MinPts
1162.87	349.84	929.21	813.03	5.00	OSF1.50	2970.00	2965.75	OSF>5.00				Exit Alert
9524.02	436.69	9232.47	9087.34	32.81	OSF1.50	14620.00	8759.55					MinPt-O-SF
12818.67	525.68	12487.79	12293.00	36.66	OSF1.50	18777.29	8790.00					TD

Newbourne Maverick 13 DM Fed Com 1H (Offset) Gyro-MWD On-11400ft (Def Survey)												
379.79	32.81	377.81	345.98	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
379.45	32.81	377.43	346.64	10253.95	MAS = 10.00 (m)	10.00	10.00					MinPt-O-SF
379.37	32.81	377.38	346.56	293349.54	MAS = 10.00 (m)	26.00	26.00					WRP
377.31	32.81	373.06	344.59	165.68	MAS = 10.00 (m)	480.00	480.00					MinPts
377.43	32.81	372.94	344.62	149.67	MAS = 10.00 (m)	540.00	540.00					MINPT-O-EOU
211.04	38.82	184.47	172.22	8.53	OSF1.50	5610.00	5591.28					MinPt-O-SF
210.46	38.64	184.01	171.82	8.54	OSF1.50	5680.00	5661.15					MinPt-O-ADP
210.43	38.62	184.01	171.82	8.55	OSF1.50	5690.00	5671.14					MINPT-O-EOU
210.42	38.59	184.01	171.83	8.55	OSF1.50	5700.00	5681.13					MinPt-CICI
209.99	40.11	182.53	169.88	8.21	OSF1.50	6480.00	6461.09					MinPts
210.07	40.14	182.60	169.94	8.21	OSF1.50	6490.00	6471.09					MinPt-O-SF
2433.60	35.18	2409.48	2398.42	109.86	OSF1.50	9700.00	8723.52					MinPt-O-SF
10720.19	58.17	10680.76	10662.03	286.15	OSF1.50	18777.29	8790.00					TD

Offset Trajectory	Separation			Allow Dev. (ft)	Sep. Fact.	Controlling Rule	Reference Trajectory		Risk Level			Alert	Status
	CI-CI (ft)	MAS (ft)	EOU (ft)				MD (ft)	TVD (ft)	Alert	Minor	Major		
Newbourne Annabets 13-18 W28A Federal Com 11H (Offset) Gas Cond WWD Off (17700) (Def Survey)													
	1676.66	32.81	1675.83	1644.15	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
	1676.67	32.81	1675.51	1643.86	57462.77	MAS = 10.00 (m)	20.00	20.00					MinPt-O-SF
	1676.63	32.81	1675.48	1643.82	77350.10	MAS = 10.00 (m)	28.00	28.00					WRP
	1676.61	32.81	1675.45	1643.81	49197.29	MAS = 10.00 (m)	40.00	40.00					MinPts
	1676.65	32.81	1675.43	1643.84	17355.41	MAS = 10.00 (m)	60.00	60.00					MINPT-O-EQU
	1343.28	32.81	1322.94	1310.47	71.49	MAS = 10.00 (m)	5600.00	5581.31					MinPt-O-SF
	1308.96	32.81	1287.43	1276.15	65.36	MAS = 10.00 (m)	6710.00	6691.09					MinPts
	1307.55	36.39	1282.78	1271.15	56.19	OSF1.50	7770.00	7751.09					MinPt-CICI
	1307.56	36.43	1282.76	1271.12	56.11	OSF1.50	7780.00	7761.09					MINPT-O-EQU
	1307.58	36.47	1282.77	1271.11	56.03	OSF1.50	7790.00	7771.09					MinPt-O-ADP
	1311.36	38.68	1284.80	1272.68	54.01	OSF1.50	8070.00	8051.09					MINPT-O-EQU
	1294.60	41.53	1286.17	1253.13	49.56	OSF1.50	8630.00	8565.54					MinPt-CICI
	1294.69	41.58	1286.16	1253.11	49.50	OSF1.50	8640.00	8572.14					MinPts
	1382.12	45.43	1351.18	1336.70	47.65	OSF1.50	9140.00	8717.25					MinPt-O-SF
	10196.11	60.23	10155.30	10135.88	262.51	OSF1.50	18777.29	8790.00					TD
Wright RAT Wright 11 Offset Plugged Oil Blind On-2034H (Def Survey)													
	3041.71	32.81	3040.42	3008.90	N/A	MAS = 10.00 (m)	0.00	0.00					Surface
	3041.68	32.81	3039.13	3008.87	2418.41	MAS = 10.00 (m)	26.00	26.00					WRP
	3041.66	610.15	2634.48	2431.53	7.49	OSF1.50	2000.00	2000.00					MinPt-CICI
	3041.69	625.23	2624.43	2416.45	7.31	OSF1.50	2050.00	2050.00					MinPts
	6700.05	76.19	6648.83	6623.86	134.15	OSF1.50	11500.00	8736.71					MinPt-CICI
	6700.78	77.85	6648.45	6622.93	131.25	OSF1.50	11600.00	8737.44					MINPT-O-EQU
	6705.06	82.76	6649.46	6622.30	123.43	OSF1.50	11760.00	8738.61					MinPt-O-ADP
	9348.23	456.17	9043.69	8992.06	30.62	OSF1.50	16020.00	8784.45					MinPt-O-SF
	9891.24	478.83	9570.92	9411.41	31.00	OSF1.50	18777.29	8790.00					TD

Borehole:	Well:	Field:	Structure:
Riverboat 12-1 WOMB Federal Com 1H	Riverboat 12-1 WOMB Federal Com 1H	NM Eddy County (NAD 83)	Cimarex Riverboat 12-1 WOMB Federal Com 1H

Gravity & Magnetic Parameters	Surface Location	Miscellaneous
Model: HDGM 2019 Dip: 59.862° Date: 04-Nov-2019	NAD83 New Mexico State Plane, Eastern Zone, US Feet	Sket: New Sket
MagDec: 7.239° FS: 47793.658mT Gravity FS: 998.451mgm (9.80665 Based)	Lat: N 32 13 28.20 Northing: 445416.111US Grid Conv: 0.0422°	TVD Ref: RKB(3281ft above MSL)
	Lon: W 104 15 14.76 Easting: 565838.511US Scale Fact: 0.9990978	Plan: Cimarex Riverboat 12-1 WOMB Federal Com 1H - Rev0 RM 04Nov19



Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL (45' FNL, 310' FWL)	0.00	0.00	1.93	0.00	0.00	0.00	0.00	0.00
Salado (Top Salt)	1030.00	0.00	90.52	1030.00	0.00	0.00	0.00	0.00
Castile (Base Salt)	1660.00	0.00	90.52	1660.00	0.00	0.00	0.00	0.00
Lamar	1861.00	0.00	90.52	1861.00	0.00	0.00	0.00	0.00
Bell Canyon (Top Delaware)	1980.00	0.00	90.52	1980.00	0.00	0.00	0.00	0.00
Nudge 2'/100' DLS	2000.00	0.00	90.52	2000.00	0.00	0.00	0.00	0.00
Hold Nudge	2301.48	6.03	90.52	2300.92	-0.17	-0.14	15.85	2.00
Cherry Canyon	2877.74	6.03	90.52	2874.00	-0.81	-0.69	76.38	0.00
Brushy Canyon	3800.85	6.03	90.52	3792.00	-1.85	-1.58	173.34	0.00
Top Bone Spring	5389.64	6.03	90.52	5372.00	-3.83	-3.09	340.22	0.00
Drop to Vertical 2'/100' DLS	5518.35	6.03	90.52	5500.00	-3.77	-3.22	353.74	0.00
Hold Vertical	5819.83	0.00	90.52	5800.92	-3.94	-3.36	369.58	2.00
Top 1st BSPG SS	6404.91	0.00	90.52	6386.00	-3.94	-3.36	369.58	0.00
Top 2nd BSPG SS	6936.91	0.00	90.52	6918.00	-3.94	-3.36	369.58	0.00
KOP - Build 12'/100' DLS	8228.87	0.00	90.52	8209.96	-3.94	-3.36	369.58	0.00
Top 3rd BSPG Carb	8325.57	11.60	359.10	8306.00	5.62	6.40	369.43	12.00
Top Wolfcamp	8685.33	54.78	359.10	8600.00	198.11	198.68	366.41	12.00
Build 4'/100' DLS	8853.87	75.00	359.10	8671.16	349.91	350.48	364.02	12.00
Wolfcamp 'Y' SS	8935.35	78.25	359.29	8690.00	429.17	429.74	362.91	4.00
Landing Point	9218.93	89.58	359.91	8720.00	710.68	711.25	360.95	4.00
Wolfcamp 'Y' SS Tgt	9218.93	89.58	359.91	8720.00	710.69	711.25	360.95	0.00
Base 'Y' SS	11949.89	89.58	359.91	8740.00	3441.57	3442.14	356.66	0.00
Cimarex Riverboat 12-1 WOMB Federal Com 1H - PBHL (330' FNL, 676' FWL)	16777.29	89.58	359.91	8790.00	10268.79	10269.35	345.93	0.00

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	CIMAREX ENERGY COMPANY
LEASE NO.:	NMLC065421
WELL NAME & NO.:	Riverboat 12/1 W0MD FED COM 1H
SURFACE HOLE FOOTAGE:	45'/N & 310'/W
BOTTOM HOLE FOOTAGE:	330'/N & 676'/W
LOCATION:	Section 13, T.24 S., R.26 E., NMPM
COUNTY:	EddyCounty, New Mexico

COA

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

All previous COAs still apply, except for the following:

A. CASING

1. The 13-3/8 inch surface casing shall be set at approximately **425 feet** (a minimum of **70 feet (Eddy County)** into the Rustler Anhydrite and above the salt) and cemented to the surface. **Excess cement calculates to 12%, additional cement might be required.**
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.

- d. If cement falls back, remedial cementing will be done prior to drilling out that string.
2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above.
Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.
- ❖ **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.**
3. 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.

B. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).
2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **3000 (3M)** psi.
3. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the intermediate casing shoe shall be **5000 (5M)** psi.
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
 - e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

C. SPECIAL REQUIREMENT (S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

JJP11082019

GENERAL REQUIREMENTS

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

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

☒ Eddy County

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

☒ Lea County

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

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
 - a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure

- rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
- b. When the operator proposes to set surface casing with Spudder Rig
 - Notify the BLM when moving in and removing the Spudder Rig.
 - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
 - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.
 2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.
 3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.
2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.
3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.
5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.
6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.
7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.
8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: The flex line must meet the requirements of API 16C. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.
3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.
4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.

- b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
 - e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
- 5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).
 - b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).
 - c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
 - d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall

have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

- e. The results of the test shall be reported to the appropriate BLM office.
- f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
- g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.
- h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.