

Form 3160-3
(June 2015)FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: <input type="checkbox"/> DRILL <input type="checkbox"/> REENTER 1b. Type of Well: <input type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other 1c. Type of Completion: <input type="checkbox"/> Hydraulic Fracturing <input type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone		5. Lease Serial No. 6. If Indian, Allottee or Tribe Name 7. If Unit or CA Agreement, Name and No. 8. Lease Name and Well No.
2. Name of Operator		9. API Well No. 30-015-49855
3a. Address	3b. Phone No. (include area code)	10. Field and Pool, or Exploratory
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface At proposed prod. zone		11. Sec., T. R. M. or Blk. and Survey or Area
14. Distance in miles and direction from nearest town or post office*		12. County or Parish
13. State		
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)	16. No of acres in lease	17. Spacing Unit dedicated to this well
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.	19. Proposed Depth	20. BLM/BIA Bond No. in file
21. Elevations (Show whether DF, KDB, RT, GL, etc.)	22. Approximate date work will start*	23. Estimated duration
24. Attachments		

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

- | | |
|---|---|
| 1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification.
6. Such other site specific information and/or plans as may be requested by the BLM. |
|---|---|

25. Signature	Name (Printed/Typed)	Date
Title		
Approved by (Signature)	Name (Printed/Typed)	Date
Title		
Office		

Application approval 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.
Conditions of approval, if any, are attached.

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.



Dean R McClure

08/23/2022

(Continued on page 2)

*(Instructions on page 2)

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 30-015-49855		² Pool Code 98220		³ Pool Name PURPLE SAGE; WOLFCAMP (GAS)				
⁴ Property Code 333195		⁵ Property Name CROSSBOW FEDERAL 23-27-8 WXY			⁶ Well Number 2H			
⁷ OGRID No. 372098		⁸ Operator Name MARATHON OIL PERMIAN LLC			⁹ Elevation 3158'			
¹⁰ Surface Location								
UL or lot no. P	Section 8	Township 23S	Range 27E	Lot Idn 1029	Feet from the SOUTH	Feet from the 288	East/West line EAST	County EDDY
¹¹ Bottom Hole Location If Different From Surface								
UL or lot no. M	Section 7	Township 23S	Range 27E	Lot Idn 990	Feet from the SOUTH	Feet from the 330	East/West line WEST	County EDDY
¹² Dedicated Acres 637.68		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.

LAST TAKE POINT/BOTTOM HOLE LOCATION
990' FSL 330' FWL, SECTION 7
NAD 83, SPCS NM EAST
X:571213.00' / Y:478236.70'
LAT:32.31470833N / LON:-104.23662528W
NAD 27, SPCS NM EAST
X:530031.11' / Y:478177.91'
LAT:32.31458993N / LON:-104.23612380W

CORNER COORDINATES
NAD 83, SPCS NM EAST
A - X: 570879.74' / Y: 479890.39'
B - X: 581328.41' / Y: 480085.92'
C - X: 581420.97' / Y: 477316.50'
D - X: 570884.96' / Y: 477243.10'

FIRST TAKE POINT
1052' FSL 330' FEL, SECTION 8
NAD 83, SPCS NM EAST
X:581055.69' / Y:478366.48'
LAT:32.31503664N / LON:-104.20476369W
NAD 27, SPCS NM EAST
X:539873.66' / Y:478307.57'
LAT:32.31491778N / LON:-104.20426339W

CORNER COORDINATES
NAD 27, SPCS NM EAST
A - X: 529697.88' / Y: 479831.57'
B - X: 540146.41' / Y: 480026.96'
C - X: 540238.91' / Y: 477257.61'
D - X: 529703.05' / Y: 477184.35'

KICK OFF POINT
1053' FSL 255' FEL, SECTION 8
NAD 83, SPCS NM EAST
X:581130.68' / Y:478368.07'
LAT:32.31504076N / LON:-104.20452094W
NAD 27, SPCS NM EAST
X:539948.64' / Y:478309.16'
LAT:32.31492191N / LON:-104.20402066W

SURFACE HOLE LOCATION
1029' FSL 288' FEL, SECTION 8
NAD 83, SPCS NM EAST
X:581098.53' / Y:478343.64'
LAT:32.314076N / LON:-104.20462534W
NAD 27, SPCS NM EAST
X:539916.49' / Y:478284.74'
LAT:32.31485487N / LON:-104.20412483W

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: *Adrian Covarrubias* Date: **10/21/2020**

Printed Name: **Adrian Covarrubias**

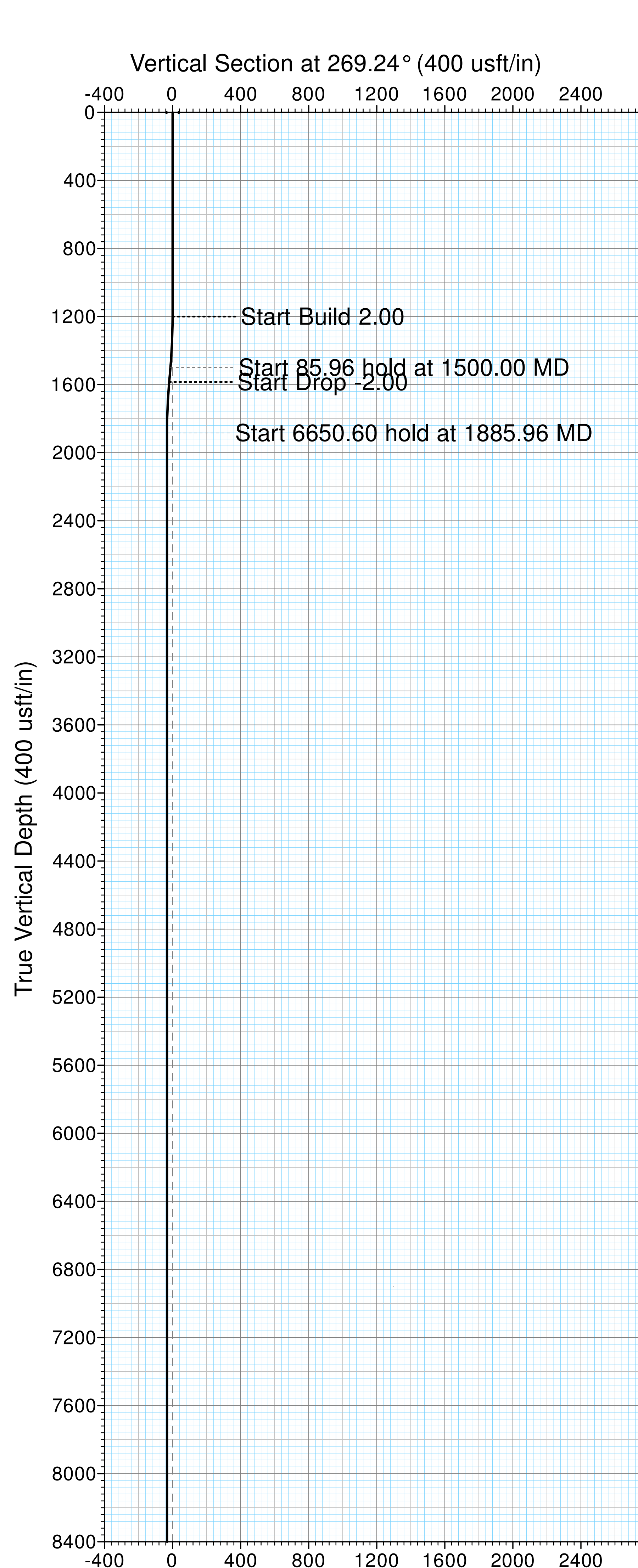
E-mail Address:

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.

SEPTEMBER 4, 2018
Date of Survey

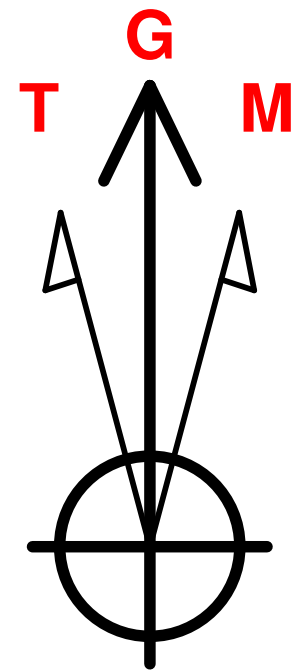
Signature and Seal of Professional Surveyor: *Lloyd P. Short*

Certificate Number: **LLOYD P. SHORT 21653**



Marathon Oil
Eddy County, NM
Crossbow Fed 23-27-8 (2-4-8-10)
WXY #2H
Prelim Plan A

US State Plane 1927 (Exact solution)
NAD 1927 (NADCON CONUS)
Clarke 1866
New Mexico East 3001
Mean Sea Level



Azimuths to Grid North
True North: -0.07°
Magnetic North: 7.23°

Magnetic Field
Strength: 47944.8snT
Dip Angle: 60.03°
Date: 10/19/2018
Model: HDGM

Azimuth Corrections

Total Magnetic Corr. (M to G): 7.23°

Declination (M to T): 7.30° East

RKB Elevation: well @ 3183.00usft

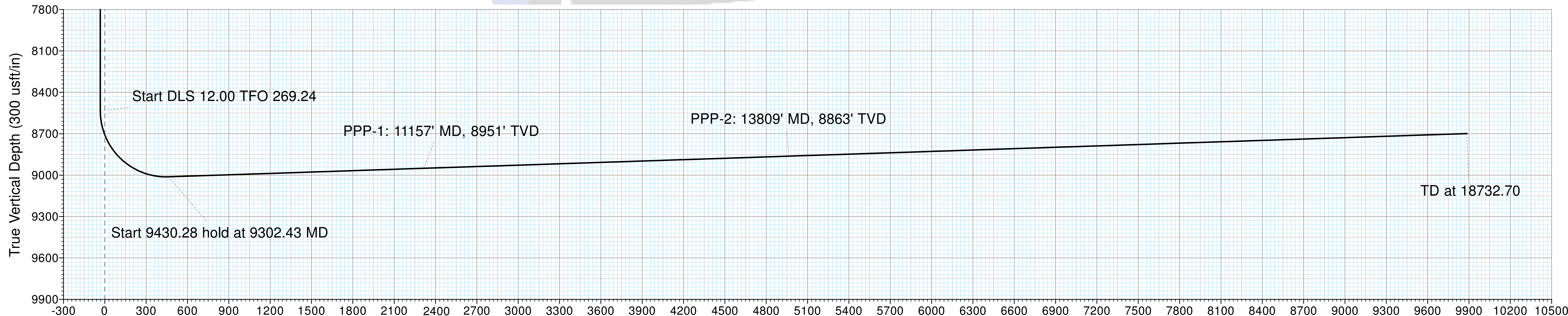
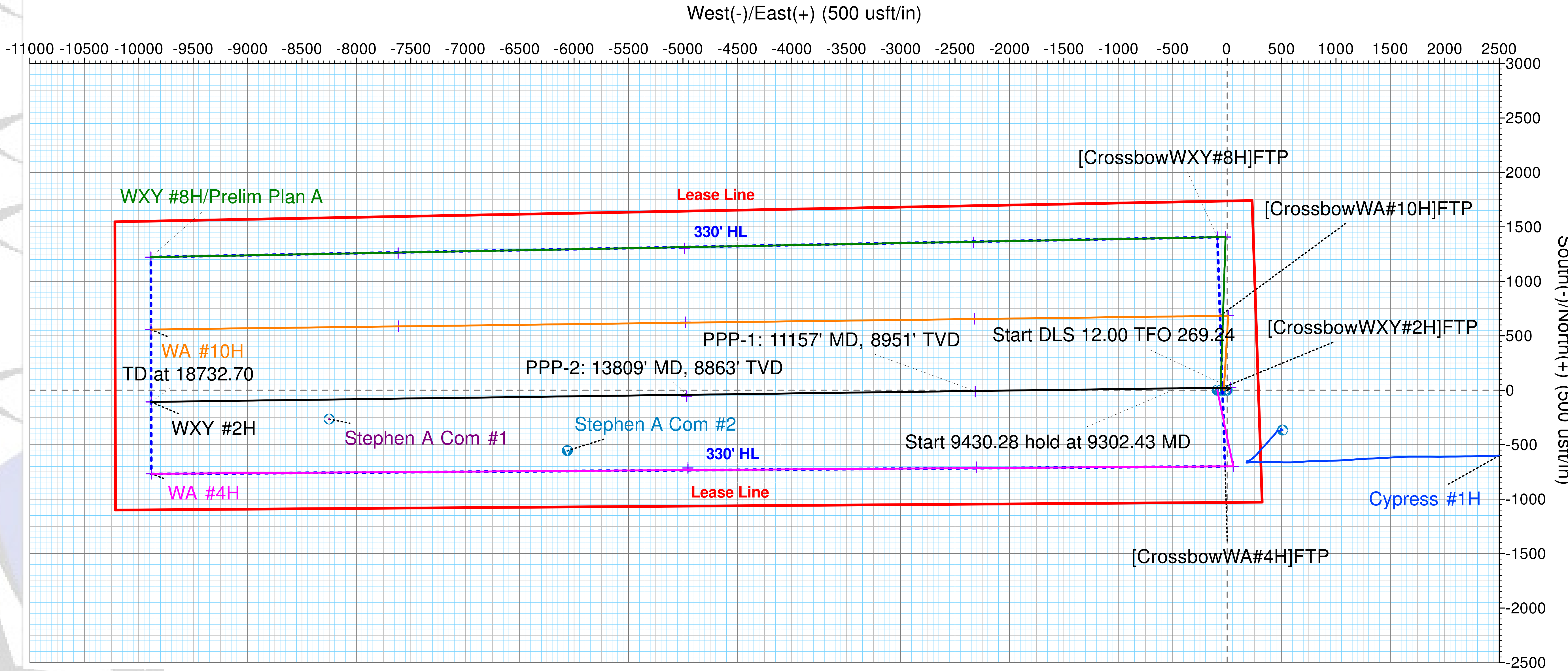
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	478284.74	539916.49	32.3149	-104.2041	

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	Vsect
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00
3	1500.00	6.00	52.78	1499.45	9.49	12.50	2.00	-12.62
4	1585.96	6.00	52.78	1584.94	14.93	19.65	0.00	-19.85
5	1885.96	0.00	0.00	1884.40	24.42	32.15	2.00	-32.47
6	8536.57	0.00	0.00	8535.00	24.42	32.15	0.00	-32.47
7	9302.43	91.90	269.24	9012.20	17.89	-461.13	12.00	460.85
8	18732.70	91.90	269.24	8699.05	-106.83	-9885.38	0.00	9885.93

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting
[CrossbowWXY#2H]FTP	0.00	22.83	-42.83	478307.57	539873.66
[CrossbowWXY#2H]KOP	8535.00	24.42	32.15	478309.16	539948.64
[CrossbowWXY#2H]LTP/BHL	8699.05	-106.83	-9885.38	478177.91	530031.11
[CrossbowWXY#2H]PPP-2	8863.00	-53.77	-4964.65	478230.97	534951.84
[CrossbowWXY#2H]PPP-1	8951.00	-12.52	-2313.96	478272.22	537602.53





Pro Directional Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WXY #2H
Project:	Eddy County, NM	TVD Reference:	well @ 3183.00usft
Site:	Crossbow Fed 23-27-8 (2-4-8-10)	MD Reference:	well @ 3183.00usft
Well:	WXY #2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Prelim Plan A	Database:	WellPlanner1

Project	Eddy County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Crossbow Fed 23-27-8 (2-4-8-10)		
Site Position:		Northing:	478,284.74 usft
From:	Map	Easting:	539,916.49 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.3149
		Longitude:	-104.2041
		Grid Convergence:	0.07 °

Well	WXY #2H		
Well Position	+N/-S	0.00 usft	Northing: 478,284.74 usft
	+E/-W	0.00 usft	Easting: 539,916.49 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32.3149
		Longitude:	-104.2041
		Ground Level:	3,158.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	10/19/2018	7.30
			Dip Angle (°)
			60.03
			Field Strength (nT)
			47,944.80

Design	Prelim Plan A		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.00	0.00	0.00
			Direction (°)
			269.24

Survey Tool Program	Date	10/6/2020		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	1,850.00	Prelim Plan A (OH)	MWD+IFR1	OWSG MWD + IFR1
1,850.00	5,400.00	Prelim Plan A (OH)	MWD+IFR1	OWSG MWD + IFR1
5,400.00	10,000.00	Prelim Plan A (OH)	MWD+IFR1	OWSG MWD + IFR1
10,000.00	18,732.58	Prelim Plan A (OH)	MWD+IFR1	OWSG MWD + IFR1

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[CrossbowWXY#2H]FTP									
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00



Pro Directional Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WXY #2H
Project:	Eddy County, NM	TVD Reference:	well @ 3183.00usft
Site:	Crossbow Fed 23-27-8 (2-4-8-10)	MD Reference:	well @ 3183.00usft
Well:	WXY #2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Prelim Plan A	Database:	WellPlanner1

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
1,300.00	2.00	52.78	1,299.98	1.06	1.39	-1.40	2.00	2.00	0.00
1,400.00	4.00	52.78	1,399.84	4.22	5.56	-5.61	2.00	2.00	0.00
1,500.00	6.00	52.78	1,499.45	9.49	12.50	-12.62	2.00	2.00	0.00
Start 85.96 hold at 1500.00 MD									
1,585.96	6.00	52.78	1,584.94	14.93	19.65	-19.85	0.00	0.00	0.00
Start Drop -2.00									
1,600.00	5.72	52.78	1,598.91	15.79	20.79	-21.00	2.00	-2.00	0.00
1,700.00	3.72	52.78	1,698.56	20.77	27.35	-27.62	2.00	-2.00	0.00
1,800.00	1.72	52.78	1,798.45	23.64	31.12	-31.43	2.00	-2.00	0.00
1,885.96	0.00	0.00	1,884.40	24.42	32.15	-32.47	2.00	-2.00	0.00
Start 6650.60 hold at 1885.96 MD									
1,900.00	0.00	0.00	1,898.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,000.00	0.00	0.00	1,998.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,100.00	0.00	0.00	2,098.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,200.00	0.00	0.00	2,198.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,300.00	0.00	0.00	2,298.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,400.00	0.00	0.00	2,398.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,500.00	0.00	0.00	2,498.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,600.00	0.00	0.00	2,598.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,700.00	0.00	0.00	2,698.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,800.00	0.00	0.00	2,798.43	24.42	32.15	-32.47	0.00	0.00	0.00
2,900.00	0.00	0.00	2,898.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,000.00	0.00	0.00	2,998.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,100.00	0.00	0.00	3,098.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,200.00	0.00	0.00	3,198.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,300.00	0.00	0.00	3,298.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,400.00	0.00	0.00	3,398.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,500.00	0.00	0.00	3,498.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,600.00	0.00	0.00	3,598.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,700.00	0.00	0.00	3,698.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,800.00	0.00	0.00	3,798.43	24.42	32.15	-32.47	0.00	0.00	0.00
3,900.00	0.00	0.00	3,898.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,000.00	0.00	0.00	3,998.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,100.00	0.00	0.00	4,098.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,200.00	0.00	0.00	4,198.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,300.00	0.00	0.00	4,298.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,400.00	0.00	0.00	4,398.43	24.42	32.15	-32.47	0.00	0.00	0.00



Pro Directional Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WXY #2H
Project:	Eddy County, NM	TVD Reference:	well @ 3183.00usft
Site:	Crossbow Fed 23-27-8 (2-4-8-10)	MD Reference:	well @ 3183.00usft
Well:	WXY #2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Prelim Plan A	Database:	WellPlanner1

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,500.00	0.00	0.00	4,498.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,600.00	0.00	0.00	4,598.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,700.00	0.00	0.00	4,698.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,800.00	0.00	0.00	4,798.43	24.42	32.15	-32.47	0.00	0.00	0.00
4,900.00	0.00	0.00	4,898.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,000.00	0.00	0.00	4,998.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,100.00	0.00	0.00	5,098.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,200.00	0.00	0.00	5,198.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,300.00	0.00	0.00	5,298.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,400.00	0.00	0.00	5,398.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,500.00	0.00	0.00	5,498.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,600.00	0.00	0.00	5,598.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,700.00	0.00	0.00	5,698.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,800.00	0.00	0.00	5,798.43	24.42	32.15	-32.47	0.00	0.00	0.00
5,900.00	0.00	0.00	5,898.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,000.00	0.00	0.00	5,998.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,100.00	0.00	0.00	6,098.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,200.00	0.00	0.00	6,198.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,300.00	0.00	0.00	6,298.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,400.00	0.00	0.00	6,398.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,500.00	0.00	0.00	6,498.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,600.00	0.00	0.00	6,598.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,700.00	0.00	0.00	6,698.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,800.00	0.00	0.00	6,798.43	24.42	32.15	-32.47	0.00	0.00	0.00
6,900.00	0.00	0.00	6,898.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,000.00	0.00	0.00	6,998.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,100.00	0.00	0.00	7,098.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,200.00	0.00	0.00	7,198.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,300.00	0.00	0.00	7,298.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,400.00	0.00	0.00	7,398.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,500.00	0.00	0.00	7,498.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,600.00	0.00	0.00	7,598.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,700.00	0.00	0.00	7,698.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,800.00	0.00	0.00	7,798.43	24.42	32.15	-32.47	0.00	0.00	0.00
7,900.00	0.00	0.00	7,898.43	24.42	32.15	-32.47	0.00	0.00	0.00
8,000.00	0.00	0.00	7,998.43	24.42	32.15	-32.47	0.00	0.00	0.00
8,100.00	0.00	0.00	8,098.43	24.42	32.15	-32.47	0.00	0.00	0.00
8,200.00	0.00	0.00	8,198.43	24.42	32.15	-32.47	0.00	0.00	0.00
8,300.00	0.00	0.00	8,298.43	24.42	32.15	-32.47	0.00	0.00	0.00
8,400.00	0.00	0.00	8,398.43	24.42	32.15	-32.47	0.00	0.00	0.00
8,500.00	0.00	0.00	8,498.43	24.42	32.15	-32.47	0.00	0.00	0.00
8,536.57	0.00	0.00	8,535.00	24.42	32.15	-32.47	0.00	0.00	0.00
Start DLS 12.00 TFO 269.24 - [CrossbowWXY#2H]KOP									
8,550.00	1.61	269.24	8,548.43	24.42	31.96	-32.28	12.00	12.00	0.00



Pro Directional Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WXY #2H
Project:	Eddy County, NM	TVD Reference:	well @ 3183.00usft
Site:	Crossbow Fed 23-27-8 (2-4-8-10)	MD Reference:	well @ 3183.00usft
Well:	WXY #2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Prelim Plan A	Database:	WellPlanner1

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,575.00	4.61	269.24	8,573.39	24.40	30.60	-30.93	12.00	12.00	0.00
8,600.00	7.61	269.24	8,598.25	24.36	27.94	-28.26	12.00	12.00	0.00
8,625.00	10.61	269.24	8,622.93	24.31	23.98	-24.30	12.00	12.00	0.00
8,650.00	13.61	269.24	8,647.37	24.24	18.74	-19.06	12.00	12.00	0.00
8,675.00	16.61	269.24	8,671.50	24.16	12.22	-12.54	12.00	12.00	0.00
8,700.00	19.61	269.24	8,695.26	24.05	4.45	-4.77	12.00	12.00	0.00
8,725.00	22.61	269.24	8,718.58	23.93	-4.55	4.23	12.00	12.00	0.00
8,750.00	25.61	269.24	8,741.40	23.80	-14.76	14.44	12.00	12.00	0.00
8,775.00	28.61	269.24	8,763.65	23.65	-26.15	25.84	12.00	12.00	0.00
8,800.00	31.61	269.24	8,785.27	23.48	-38.69	38.38	12.00	12.00	0.00
8,825.00	34.61	269.24	8,806.21	23.30	-52.35	52.03	12.00	12.00	0.00
8,850.00	37.61	269.24	8,826.40	23.11	-67.08	66.76	12.00	12.00	0.00
8,875.00	40.61	269.24	8,845.80	22.90	-82.84	82.53	12.00	12.00	0.00
8,900.00	43.61	269.24	8,864.34	22.68	-99.61	99.30	12.00	12.00	0.00
8,925.00	46.61	269.24	8,881.98	22.44	-117.31	117.01	12.00	12.00	0.00
8,950.00	49.61	269.24	8,898.67	22.20	-135.92	135.62	12.00	12.00	0.00
8,975.00	52.61	269.24	8,914.37	21.94	-155.38	155.07	12.00	12.00	0.00
9,000.00	55.61	269.24	8,929.02	21.67	-175.63	175.32	12.00	12.00	0.00
9,025.00	58.61	269.24	8,942.59	21.39	-196.62	196.32	12.00	12.00	0.00
9,050.00	61.61	269.24	8,955.05	21.11	-218.29	217.99	12.00	12.00	0.00
9,075.00	64.61	269.24	8,966.35	20.81	-240.58	240.28	12.00	12.00	0.00
9,100.00	67.61	269.24	8,976.48	20.51	-263.43	263.14	12.00	12.00	0.00
9,125.00	70.61	269.24	8,985.39	20.20	-286.79	286.49	12.00	12.00	0.00
9,150.00	73.61	269.24	8,993.07	19.88	-310.57	310.28	12.00	12.00	0.00
9,175.00	76.61	269.24	8,999.49	19.56	-334.73	334.44	12.00	12.00	0.00
9,200.00	79.61	269.24	9,004.64	19.24	-359.19	358.90	12.00	12.00	0.00
9,225.00	82.61	269.24	9,008.50	18.91	-383.88	383.60	12.00	12.00	0.00
9,250.00	85.61	269.24	9,011.07	18.59	-408.75	408.46	12.00	12.00	0.00
9,275.00	88.61	269.24	9,012.32	18.25	-433.71	433.43	12.00	12.00	0.00
9,302.43	91.90	269.24	9,012.20	17.89	-461.13	460.85	12.00	12.00	0.00
Start 9430.28 hold at 9302.43 MD									
9,400.00	91.90	269.24	9,008.96	16.60	-558.64	558.37	0.00	0.00	0.00
9,500.00	91.90	269.24	9,005.64	15.28	-658.58	658.31	0.00	0.00	0.00
9,600.00	91.90	269.24	9,002.32	13.96	-758.51	758.26	0.00	0.00	0.00
9,700.00	91.90	269.24	8,999.00	12.63	-858.45	858.20	0.00	0.00	0.00
9,800.00	91.90	269.24	8,995.68	11.31	-958.38	958.15	0.00	0.00	0.00
9,900.00	91.90	269.24	8,992.36	9.99	-1,058.32	1,058.09	0.00	0.00	0.00
10,000.00	91.90	269.24	8,989.04	8.67	-1,158.26	1,158.04	0.00	0.00	0.00
10,100.00	91.90	269.24	8,985.72	7.34	-1,258.19	1,257.98	0.00	0.00	0.00
10,200.00	91.90	269.24	8,982.40	6.02	-1,358.13	1,357.93	0.00	0.00	0.00
10,300.00	91.90	269.24	8,979.08	4.70	-1,458.06	1,457.87	0.00	0.00	0.00
10,400.00	91.90	269.24	8,975.75	3.38	-1,558.00	1,557.82	0.00	0.00	0.00
10,500.00	91.90	269.24	8,972.43	2.05	-1,657.94	1,657.76	0.00	0.00	0.00



Pro Directional Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WXY #2H
Project:	Eddy County, NM	TVD Reference:	well @ 3183.00usft
Site:	Crossbow Fed 23-27-8 (2-4-8-10)	MD Reference:	well @ 3183.00usft
Well:	WXY #2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Prelim Plan A	Database:	WellPlanner1

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,600.00	91.90	269.24	8,969.11	0.73	-1,757.87	1,757.71	0.00	0.00	0.00
10,700.00	91.90	269.24	8,965.79	-0.59	-1,857.81	1,857.65	0.00	0.00	0.00
10,800.00	91.90	269.24	8,962.47	-1.91	-1,957.74	1,957.60	0.00	0.00	0.00
10,900.00	91.90	269.24	8,959.15	-3.24	-2,057.68	2,057.54	0.00	0.00	0.00
11,000.00	91.90	269.24	8,955.83	-4.56	-2,157.62	2,157.49	0.00	0.00	0.00
11,100.00	91.90	269.24	8,952.51	-5.88	-2,257.55	2,257.43	0.00	0.00	0.00
11,156.51	91.90	269.24	8,950.63	-6.63	-2,314.03	2,313.91	0.00	0.00	0.00
[CrossbowWXY#2H]PPP-1									
11,157.00	91.90	269.24	8,950.62	-6.64	-2,314.52	2,314.40	0.00	0.00	0.00
PPP-1: 11157' MD, 8951' TVD									
11,200.00	91.90	269.24	8,949.19	-7.20	-2,357.49	2,357.38	0.00	0.00	0.00
11,300.00	91.90	269.24	8,945.87	-8.53	-2,457.43	2,457.32	0.00	0.00	0.00
11,400.00	91.90	269.24	8,942.55	-9.85	-2,557.36	2,557.27	0.00	0.00	0.00
11,500.00	91.90	269.24	8,939.23	-11.17	-2,657.30	2,657.21	0.00	0.00	0.00
11,600.00	91.90	269.24	8,935.91	-12.50	-2,757.23	2,757.16	0.00	0.00	0.00
11,700.00	91.90	269.24	8,932.59	-13.82	-2,857.17	2,857.10	0.00	0.00	0.00
11,800.00	91.90	269.24	8,929.26	-15.14	-2,957.11	2,957.05	0.00	0.00	0.00
11,900.00	91.90	269.24	8,925.94	-16.46	-3,057.04	3,056.99	0.00	0.00	0.00
12,000.00	91.90	269.24	8,922.62	-17.79	-3,156.98	3,156.94	0.00	0.00	0.00
12,100.00	91.90	269.24	8,919.30	-19.11	-3,256.91	3,256.88	0.00	0.00	0.00
12,200.00	91.90	269.24	8,915.98	-20.43	-3,356.85	3,356.83	0.00	0.00	0.00
12,300.00	91.90	269.24	8,912.66	-21.75	-3,456.79	3,456.77	0.00	0.00	0.00
12,400.00	91.90	269.24	8,909.34	-23.08	-3,556.72	3,556.72	0.00	0.00	0.00
12,500.00	91.90	269.24	8,906.02	-24.40	-3,656.66	3,656.66	0.00	0.00	0.00
12,600.00	91.90	269.24	8,902.70	-25.72	-3,756.59	3,756.61	0.00	0.00	0.00
12,700.00	91.90	269.24	8,899.38	-27.04	-3,856.53	3,856.55	0.00	0.00	0.00
12,800.00	91.90	269.24	8,896.06	-28.37	-3,956.47	3,956.50	0.00	0.00	0.00
12,900.00	91.90	269.24	8,892.74	-29.69	-4,056.40	4,056.44	0.00	0.00	0.00
13,000.00	91.90	269.24	8,889.42	-31.01	-4,156.34	4,156.38	0.00	0.00	0.00
13,100.00	91.90	269.24	8,886.10	-32.33	-4,256.28	4,256.33	0.00	0.00	0.00
13,200.00	91.90	269.24	8,882.77	-33.66	-4,356.21	4,356.27	0.00	0.00	0.00
13,300.00	91.90	269.24	8,879.45	-34.98	-4,456.15	4,456.22	0.00	0.00	0.00
13,400.00	91.90	269.24	8,876.13	-36.30	-4,556.08	4,556.16	0.00	0.00	0.00
13,500.00	91.90	269.24	8,872.81	-37.62	-4,656.02	4,656.11	0.00	0.00	0.00
13,600.00	91.90	269.24	8,869.49	-38.95	-4,755.96	4,756.05	0.00	0.00	0.00
13,700.00	91.90	269.24	8,866.17	-40.27	-4,855.89	4,856.00	0.00	0.00	0.00
13,800.00	91.90	269.24	8,862.85	-41.59	-4,955.83	4,955.94	0.00	0.00	0.00
13,808.97	91.90	269.24	8,862.55	-41.71	-4,964.79	4,964.91	0.00	0.00	0.00
[CrossbowWXY#2H]PPP-2									
13,809.00	91.90	269.24	8,862.55	-41.71	-4,964.82	4,964.94	0.00	0.00	0.00
PPP-2: 13809' MD, 8863' TVD									
13,900.00	91.90	269.24	8,859.53	-42.91	-5,055.76	5,055.89	0.00	0.00	0.00
14,000.00	91.90	269.24	8,856.21	-44.24	-5,155.70	5,155.83	0.00	0.00	0.00
14,100.00	91.90	269.24	8,852.89	-45.56	-5,255.64	5,255.78	0.00	0.00	0.00



Pro Directional Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WXY #2H
Project:	Eddy County, NM	TVD Reference:	well @ 3183.00usft
Site:	Crossbow Fed 23-27-8 (2-4-8-10)	MD Reference:	well @ 3183.00usft
Well:	WXY #2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Prelim Plan A	Database:	WellPlanner1

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
14,200.00	91.90	269.24	8,849.57	-46.88	-5,355.57	5,355.72	0.00	0.00	0.00
14,300.00	91.90	269.24	8,846.25	-48.20	-5,455.51	5,455.67	0.00	0.00	0.00
14,400.00	91.90	269.24	8,842.93	-49.53	-5,555.44	5,555.61	0.00	0.00	0.00
14,500.00	91.90	269.24	8,839.61	-50.85	-5,655.38	5,655.56	0.00	0.00	0.00
14,600.00	91.90	269.24	8,836.29	-52.17	-5,755.32	5,755.50	0.00	0.00	0.00
14,700.00	91.90	269.24	8,832.96	-53.49	-5,855.25	5,855.45	0.00	0.00	0.00
14,800.00	91.90	269.24	8,829.64	-54.82	-5,955.19	5,955.39	0.00	0.00	0.00
14,900.00	91.90	269.24	8,826.32	-56.14	-6,055.12	6,055.34	0.00	0.00	0.00
15,000.00	91.90	269.24	8,823.00	-57.46	-6,155.06	6,155.28	0.00	0.00	0.00
15,100.00	91.90	269.24	8,819.68	-58.78	-6,255.00	6,255.23	0.00	0.00	0.00
15,200.00	91.90	269.24	8,816.36	-60.11	-6,354.93	6,355.17	0.00	0.00	0.00
15,300.00	91.90	269.24	8,813.04	-61.43	-6,454.87	6,455.12	0.00	0.00	0.00
15,400.00	91.90	269.24	8,809.72	-62.75	-6,554.81	6,555.06	0.00	0.00	0.00
15,500.00	91.90	269.24	8,806.40	-64.08	-6,654.74	6,655.01	0.00	0.00	0.00
15,600.00	91.90	269.24	8,803.08	-65.40	-6,754.68	6,754.95	0.00	0.00	0.00
15,700.00	91.90	269.24	8,799.76	-66.72	-6,854.61	6,854.90	0.00	0.00	0.00
15,800.00	91.90	269.24	8,796.44	-68.04	-6,954.55	6,954.84	0.00	0.00	0.00
15,900.00	91.90	269.24	8,793.12	-69.37	-7,054.49	7,054.79	0.00	0.00	0.00
16,000.00	91.90	269.24	8,789.80	-70.69	-7,154.42	7,154.73	0.00	0.00	0.00
16,100.00	91.90	269.24	8,786.47	-72.01	-7,254.36	7,254.68	0.00	0.00	0.00
16,200.00	91.90	269.24	8,783.15	-73.33	-7,354.29	7,354.62	0.00	0.00	0.00
16,300.00	91.90	269.24	8,779.83	-74.66	-7,454.23	7,454.56	0.00	0.00	0.00
16,400.00	91.90	269.24	8,776.51	-75.98	-7,554.17	7,554.51	0.00	0.00	0.00
16,500.00	91.90	269.24	8,773.19	-77.30	-7,654.10	7,654.45	0.00	0.00	0.00
16,600.00	91.90	269.24	8,769.87	-78.62	-7,754.04	7,754.40	0.00	0.00	0.00
16,700.00	91.90	269.24	8,766.55	-79.95	-7,853.97	7,854.34	0.00	0.00	0.00
16,800.00	91.90	269.24	8,763.23	-81.27	-7,953.91	7,954.29	0.00	0.00	0.00
16,900.00	91.90	269.24	8,759.91	-82.59	-8,053.85	8,054.23	0.00	0.00	0.00
17,000.00	91.90	269.24	8,756.59	-83.91	-8,153.78	8,154.18	0.00	0.00	0.00
17,100.00	91.90	269.24	8,753.27	-85.24	-8,253.72	8,254.12	0.00	0.00	0.00
17,200.00	91.90	269.24	8,749.95	-86.56	-8,353.66	8,354.07	0.00	0.00	0.00
17,300.00	91.90	269.24	8,746.63	-87.88	-8,453.59	8,454.01	0.00	0.00	0.00
17,400.00	91.90	269.24	8,743.31	-89.20	-8,553.53	8,553.96	0.00	0.00	0.00
17,500.00	91.90	269.24	8,739.98	-90.53	-8,653.46	8,653.90	0.00	0.00	0.00
17,600.00	91.90	269.24	8,736.66	-91.85	-8,753.40	8,753.85	0.00	0.00	0.00
17,700.00	91.90	269.24	8,733.34	-93.17	-8,853.34	8,853.79	0.00	0.00	0.00
17,800.00	91.90	269.24	8,730.02	-94.49	-8,953.27	8,953.74	0.00	0.00	0.00
17,900.00	91.90	269.24	8,726.70	-95.82	-9,053.21	9,053.68	0.00	0.00	0.00
18,000.00	91.90	269.24	8,723.38	-97.14	-9,153.14	9,153.63	0.00	0.00	0.00
18,100.00	91.90	269.24	8,720.06	-98.46	-9,253.08	9,253.57	0.00	0.00	0.00
18,200.00	91.90	269.24	8,716.74	-99.78	-9,353.02	9,353.52	0.00	0.00	0.00
18,300.00	91.90	269.24	8,713.42	-101.11	-9,452.95	9,453.46	0.00	0.00	0.00
18,400.00	91.90	269.24	8,710.10	-102.43	-9,552.89	9,553.41	0.00	0.00	0.00



Pro Directional Survey Report



Company:	Marathon Oil	Local Co-ordinate Reference:	Well WXY #2H
Project:	Eddy County, NM	TVD Reference:	well @ 3183.00usft
Site:	Crossbow Fed 23-27-8 (2-4-8-10)	MD Reference:	well @ 3183.00usft
Well:	WXY #2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Prelim Plan A	Database:	WellPlanner1

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
18,500.00	91.90	269.24	8,706.78	-103.75	-9,652.82	9,653.35	0.00	0.00	0.00
18,600.00	91.90	269.24	8,703.46	-105.07	-9,752.76	9,753.30	0.00	0.00	0.00
18,700.00	91.90	269.24	8,700.14	-106.40	-9,852.70	9,853.24	0.00	0.00	0.00
18,731.70	91.90	269.24	8,699.08	-106.82	-9,884.38	9,884.92	0.00	0.00	0.00
TD at 18732.70									
18,732.70	91.90	269.24	8,699.05	-106.83	-9,885.38	9,885.93	0.00	0.00	0.00
[CrossbowWXY#2H]LTP/BHL									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
[CrossbowWXY#2H]FTF - plan misses target center by 48.53usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	22.83	-42.83	478,307.57	539,873.66	32.3149	-104.2043
[CrossbowWXY#2H]KOI - plan hits target center - Point	0.00	0.00	8,535.00	24.42	32.15	478,309.16	539,948.64	32.3149	-104.2040
[CrossbowWXY#2H]LTP - plan hits target center - Point	0.00	0.00	8,699.05	-106.83	-9,885.38	478,177.91	530,031.11	32.3146	-104.2361
[CrossbowWXY#2H]PPF - plan misses target center by 12.07usft at 13808.97usft MD (8862.55 TVD, -41.71 N, -4964.79 E) - Point	0.00	0.00	8,863.00	-53.77	-4,964.65	478,230.97	534,951.85	32.3147	-104.2202
[CrossbowWXY#2H]PPF - plan misses target center by 5.91usft at 11156.51usft MD (8950.63 TVD, -6.63 N, -2314.03 E) - Point	0.00	0.00	8,951.00	-12.52	-2,313.96	478,272.22	537,602.53	32.3148	-104.2116

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1200	1200	0	0	Start Build 2.00
1500	1499	9	12	Start 85.96 hold at 1500.00 MD
1586	1585	15	20	Start Drop -2.00
1886	1884	24	32	Start 6650.60 hold at 1885.96 MD
8537	8535	24	32	Start DLS 12.00 TFO 269.24
9302	9012	18	-461	Start 9430.28 hold at 9302.43 MD
11,157	8951	-7	-2315	PPP-1: 11157' MD, 8951' TVD
13,809	8863	-42	-4965	PPP-2: 13809' MD, 8863' TVD
18,732	8699	-107	-9884	TD at 18732.70

Checked By: _____ Approved By: _____ Date: _____

MARATHON OIL PERMIAN LLC
DRILLING AND OPERATIONS PLAN

CROSSBOW FEDERAL 23 27 8 WXY 2H

SEC. 8, TWP. 23S, RNG. 27E
 EDDY COUNTY, NEW MEXICO

1. GEOLOGICAL FORMATIONS

Formation at Surface	Elevation
Rustler	3158

Formation	TVD	MD	Elevation	Lithology	Mineral Resources	Producing Formation
Rustler	0	0	3158	Anhydrite	Brine	No
Salado	120	120	3038	Salt/Anhydrite	Brine	No
Castile	487	487	2671	Salt/Anhydrite	Brine	No
Base of Salt (BX)	1969	1969	1189	Salt/Anhydrite	Brine	No
Lamar	1969	1969	1189	Sandstone/Shale	None	No
Bell Canyon	2108	2108	1050	Sandstone	Oil	No
Cherry Canyon	2881	2881	277	Sandstone	Oil	No
Brushy Canyon	3910	3910	-752	Sandstone	Oil	No
Bone Spring Lime	5401	5401	-2243	Limestone	None	No
Upper Avalon Shale	5722	5722	-2564	Shale	Oil	No
1st Bone Spring Sand	6453	6453	-3295	Sandstone	Oil	No
2nd Bone Spring Carbonate	6680	6680	-3522	Limestone	None	No
2nd Bone Spring Sand	6930	6930	-3772	Sandstone	Oil	No
3rd Bone Spring Carbonate	7139	7139	-3981	Limestone	Oil	No
3rd Bone Spring Sand	8526	8526	-5368	Sandstone	Oil	No
Wolfcamp	8887	8887	-5729	Sandstone/Shale/Carbonates	Natural Gas/Oil	Yes
Wolfcamp A	9039	9039	-5881	Sandstone/Shale/Carbonates	Natural Gas/Oil	Yes
Wolfcamp B	9204	N/A	-6046	Sandstone/Shale/Carbonates	Natural Gas/Oil	No
Wolfcamp C	9500	N/A	-6342	Sandstone/Shale/Carbonates	Natural Gas/Oil	No
Wolfcamp D	9752	N/A	-6594	Sandstone/Shale/Carbonates	Natural Gas/Oil	No

2. BLOWOUT PREVENTER TESTING PROCEDURE

BOP installed and tested before drilling which hole?	Size	Min. Required WP	Type	✓	Tested to:
12 1/4	13 5/8	5000	Annular	X	50% of working pressure
			Blind Ram		5000
			Pipe Ram		
			Double Ram		
			Other* BOP Stack	X	
8 3/4	13 5/8	5000	Annular	X	50% of working pressure
			Blind Ram		5000
			Pipe Ram		
			Double Ram		
			Other* BOP Stack	X	
			Blind Ram	X	5000
			Pipe Ram		
			Double Ram		
			Other* BOP Stack	X	

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, full opening safety valve / inside BOP and choke lines and choke manifold. See attached schematics.

Y	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.
Y	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?
Y	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. See attached schematic.

3. CASING PROGRAM

String Type	Hole Size	Csg Size	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Weight (lbs/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
Surface	17 1/2	13 3/8	0	400	0	400	3159	2759	54.5	J55	BTC	5.22	1.81	4.52
Intermediate	12 1/4	9 5/8	0	8436	0	8435	3159	1171	40	P110	BTC	1.20	1.42	2.44
Production	8 3/4	5 1/2	0	18732	0	8699	3159	-5540	23	P110	TLW	2.53	1.26	2.22

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?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3 rd string cement tied back 500' into previous casing?	

Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2 nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

4. CEMENT

String Type	Lead/Tail	Top MD	Bottom MD	Quantity (sks)	Yield (ft3/sks)	Density (ppg)	Slurry Volume (ft3)	Excess (%)	Cement Type	Additives
Surface	Lead	0	100	64	2.12	12.5	135	25	Class C	Extender, Accelerator, LCM
Surface	Tail	100	400	197	1.32	14.8	260	25	Class C	Accelerator
Intermediate	Lead	0	7936	1437	2.18	12.4	3132	25	Class C	Extender, Accelerator, LCM
Intermediate	Tail	7936	8436	147	1.33	14.8	196	25	Class C	Retarder
Production	Tail	8136	18732	2032	1.68	13	3414	25	Class H	Retarder, Extender, Fluid Loss, Suspension Agent

Stage tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. Stage tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Pilot hole depth: N/A TVD/MD

KOP: N/A TVD/MD

Plug top	Plug Bottom	Excess (%)	Quantity (sx)	Density (ppg)	Yield (ft3/sx)	Water gal/sk	Slurry Description and Cement Type

Attach plugging procedure for pilot hole: N/A

5. CIRCULATING MEDIUM

Top Depth	Bottom Depth	Mud Type	Min. Weight (ppg)	Max. Weight (ppg)
0	400	Water Based Mud	8.4	8.8
400	8436	Brine/Oil base	9.9	10.2
1770	18732	Oil Based mud	10.5	12.5

Losses or gains in the mud system will be monitored visually/manually as well as with an electronic PVT. The necessary mud products for additional weight and fluid loss control will be on location at all times.

6. TEST, LOGGING, CORING**List of production tests including testing procedures, equipment and safety measures:**

GR from TD to surface (horizontal well - vertical portion of hole)

List of open and cased hole logs run in the well:

GR while drilling from Intermediate casing shoe to TD.

Coring operation description for the well:

No coring is planned at this time.

Mud Logger: None.

DST's: None.

Open Hole Logs: GR while drilling from Intermediate casing shoe to TD.

7. PRESSURE

ANTICIPATED BOTTOM HOLE PRESSURE: 5654 psi

ANTICIPATED BOTTOM HOLE TEMPERATURE: 195°F

ANTICIPATED ABNORMAL PRESSURE: N

ANTICIPATED ABNORMAL TEMPERATURE: N

POTENTIAL HAZARDS:

- A. H2S detection equipment will be in operation after drilling out the surface casing shoe until the production casing has been cemented. Breathing equipment will be on location from drilling out the surface shoe until production casing is cemented. If H2S is encountered the operator will comply with Onshore Order #6.
- B. No abnormal temperatures or pressures are anticipated. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. Adequate flare lines will be installed off the mud/gas separator where gas may be flared safely.
- C. No losses are anticipated at this time.
- D. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well.
- E. Adequate flare lines will be installed off the mud/gas separator where gas may be flared safely.

8. OTHER

Other Well Information

1. AUXILIARY WELL CONTROL AND MONITORING EQUIPMENT

- a. A Kelly cock will be in the drill string at all times.
- b. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor unobstructed and readily accessible at all times.
- c. Hydrogen Sulfide detection equipment will be in operation after drilling out the surface casing shoe until the production casing is cemented. Breathing equipment will be on location upon drilling the surface casing shoe until total depth is reached. **If Hydrogen Sulfide is encountered , measured amounts and formations will be reported to the BLM**

2. ANTICIPATED STARTING DATE AND DURATION OF OPERATIONS

Road and location construction will begin after the BLM has approved the APD. Anticipated spud date will be as soon as possible after BLM approval and as soon as a rig will be available. Move in operations and drilling is expected to take 30 days.

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Marathon Oil
LEASE NO.:	NMNM0540701A
LOCATION:	Section 8, T.23 S., R.27 E., NMPM
COUNTY:	Eddy County, New Mexico

WELL NAME & NO.:	Crossbow Fed 23 27 8 WXY 2H
SURFACE HOLE FOOTAGE:	1029'/S & 288'/E
BOTTOM HOLE FOOTAGE:	990'/S & 330'/W

COA

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

A. HYDROGEN SULFIDE

Hydrogen Sulfide (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values and formations to the BLM.

B. CASING

1. The **13-3/8** inch surface casing shall be set at approximately **400** feet (a minimum of **70 feet (Eddy County)** into the Rustler Anhydrite and above the salt) and cemented to the surface.
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8**

hours or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)

- c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
- d. If cement falls back, remedial cementing will be done prior to drilling out that string.

Intermediate casing must be kept 1/3rd fluid filled to meet BLM minimum collapse requirement.

2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above.

Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst.

Contingency:

Operator is approved to use a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The Operator shall contact BLM within 4 hrs before running the DV tool operation.

- ❖ In Medium 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.

C. 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. 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 surface 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.

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)
689-5981

- 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. **Operator is approved 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. **Operator is approved 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.

ZS030722

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 Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

COMMENTS

Action 121704

COMMENTS

Operator: MARATHON OIL PERMIAN LLC 990 Town & Country Blvd. Houston, TX 77024	OGRID: 372098
	Action Number: 121704
	Action Type: [C-101] BLM - Federal/Indian Land Lease (Form 3160-3)

COMMENTS

Created By	Comment	Comment Date
kpickford	KP GEO review6/30/2022	6/30/2022

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 Rd., Aztec, NM 87410
 Phone:(505) 334-6178 Fax:(505) 334-6170

District IV

1220 S. St Francis Dr., Santa Fe, NM 87505
 Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 121704

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CONDITIONS

Created By	Condition	Condition Date
dmcclure	Notify OCD 24 hours prior to casing & cement	8/23/2022
dmcclure	Notify OCD 24 hours prior to Spudding	8/23/2022
dmcclure	Will require a File As Drilled C-102 and a Directional Survey with the C-104	8/23/2022
dmcclure	Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string	8/23/2022
dmcclure	Cement is required to circulate on both surface and intermediate1 strings of casing	8/23/2022
dmcclure	Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system	8/23/2022
dmcclure	Submit a change of plans with an updated directional plan which has a proposed lateral that remains within the Wolfcamp formation	8/23/2022