

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.
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.<br>2. A Drilling Plan.<br>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).<br>5. Operator certification.<br>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.

(Continued on page 2)

\*(Instructions on page 2)



Approval Date: 04/15/2019

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

<sup>1</sup> API Number	<sup>2</sup> Pool Code 98220	<sup>3</sup> Pool Name PURPLE SAGE (WOLFCAMP)
<sup>4</sup> Property Code	<sup>5</sup> Property Name BLUE STEEL 21 WD FEE	<sup>6</sup> Well Number 3H
<sup>7</sup> OGRID No. 372098	<sup>8</sup> Operator Name MARATHON OIL PERMIAN LLC	<sup>9</sup> Elevation 3001'

<sup>10</sup> Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	28	23S	29E		270	NORTH	1135	WEST	EDDY

<sup>11</sup> Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	16	23S	29E		330	NORTH	330	WEST	EDDY

<sup>12</sup> Dedicated Acres 640.0	<sup>13</sup> Joint or Infill	<sup>14</sup> Consolidation Code	<sup>15</sup> Order No.
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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.

<p><b>CORNER COORDINATES NAD 83, SPCS NM EAST</b> A - X: 644867.18' / Y: 477568.44' B - X: 647506.95' / Y: 477578.03' C - X: 647475.03' / Y: 466934.71' D - X: 644816.72' / Y: 466932.98'</p> <p><b>CORNER COORDINATES NAD 27, SPCS NM EAST</b> A - X: 603684.20' / Y: 477508.77' B - X: 606323.97' / Y: 477518.36' C - X: 606291.75' / Y: 466875.28' D - X: 603633.45' / Y: 466873.55'</p> <p><b>LAST TAKE POINT/BOTTOM HOLE LOCATION</b> 330' FNL 330' FWL, SECTION 16 NAD 83, SPCS NM EAST X: 645194.51' / Y: 477239.63' LAT: 32.31155687N / LON: -103.99715691W NAD 27, SPCS NM EAST X: 604011.52' / Y: 477179.97' LAT: 32.31143503N / LON: -103.99666447W</p> <p><b>FIRST TAKE POINT</b> 330' FSL 330' FWL, SECTION 21 NAD 83, SPCS NM EAST X: 645147.17' / Y: 467263.19' LAT: 32.28413378N / LON: -103.99741132W NAD 27, SPCS NM EAST X: 603963.90' / Y: 467203.76' LAT: 32.28401169N / LON: -103.99691992W</p> <p><b>KICK OFF POINT</b> 100' FSL 330' FWL, SECTION 21 NAD 83, SPCS NM EAST X: 645146.88' / Y: 467033.19' LAT: 32.28350155N / LON: -103.99741465W NAD 27, SPCS NM EAST X: 603963.58' / Y: 466973.76' LAT: 32.28337945N / LON: -103.99692328W</p> <p><b>SURFACE HOLE LOCATION</b> 270' FNL 1135' FWL, SECTION 28 NAD 83, SPCS NM EAST X: 645953.71' / Y: 466663.66' LAT: 32.28247880N / LON: -103.99480756W NAD 27, SPCS NM EAST X: 604770.42' / Y: 466604.24' LAT: 32.28235669N / LON: -103.99431629W</p> <p>SHEET 1 OF 3 JOB No. R3942_002 REV 1 BM 09/26/2018</p>	<p><b><sup>17</sup> OPERATOR CERTIFICATION</b> 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.</p> <p>Signature:  Date: 10/22/2018 Printed Name: Melissa Szudera E-mail Address: mszudera@marathonoil.com</p> <p><b><sup>18</sup> SURVEYOR CERTIFICATION</b> 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.</p> <p>OCTOBER 17, 2018 Date of Survey Signature and Seal of Professional Surveyor: </p> <p>Certificate Number: LLOYD P. SHORT 21653</p>
---	---

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1625 N. French Dr., Hobbs, NM 88240  
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District III  
1000 Rio Brazos Road, Aztec, NM 87410  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505

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

Submit Original  
to Appropriate  
District Office

### GAS CAPTURE PLAN

Date: October 22, 2018

☒ Original Operator & OGRID No.: MARATHON OIL PERMIAN, LLC  
☐ Amended - Reason for Amendment: OGRID: 372098

This Gas Capture Plan outlines actions to be taken by the Operator to reduce well/production facility flaring/venting for new completion (new drill, recomple to new zone, re-frac) activity.

*Note: Form C-129 must be submitted and approved prior to exceeding 60 days allowed by Rule (Subsection A of 19.15.18.12 NMAC).*

#### Well(s)/Production Facility – Name of facility

The well(s) that will be located at the production facility are shown in the table below.

Well Name	API	Well Location (ULSTR)	Footages	Expected MCF/D	Flared or Vented	Comments
Blue Steel 21 FB Fee 21H		D-28-T23S-R29E	270' FNL 1165' FWL	2200	Flared	
Blue Steel 21 WA Fee 2H		D-28-T23S-R29E	270' FNL 1105' FWL	3200	Flared	
Blue Steel 21 WA Fee 9H		D-28-T23S-R29E	270' FNL 1225' FWL	3200	Flared	
Blue Steel 21 WD Fee 3H		D-28-T23S-R29E	270' FNL 1135' FWL	3200	Flared	
Blue Steel 21 WXY Fee 6H		D-28-T23S-R29E	270' FNL 1195' FWL	3200	Flared	
Blue Steel 21 WXY Fee 8H		D-28-T23S-R29E	270' FNL 1255' FWL	3200	Flared	
Blue Steel 21 SB Fee 4H		D-28-T23S-R29E	470' FNL 1104' FWL	2200	Flared	
Blue Steel 21 SB Fee 7H		D-28-T23S-R29E	470' FNL 1224' FWL	2200	Flared	
Blue Steel 21 FB Fee 25H		D-28-T23S-R29E	470' FNL 1194' FWL	2200	Flared	
Blue Steel 21 WD Fee 5H		D-28-T23S-R29E	470' FNL 1134' FWL	3200	Flared	
Blue Steel 21 WD Fee 10H		D-28-T23S-R29E	470' FNL 1164' FWL	3200	Flared	
Blue Steel 21 WD Fee 23H		D-28-T23S-R29E	470' FNL 1254' FWL	3200	Flared	

#### Gathering System and Pipeline Notification

Well(s) will be connected to a production facility after flowback operations are complete, if gas transporter system is in place. The gas produced from production facility is dedicated to Lucid and will be connected to Lucid's low pressure gathering system located in Lea County, New Mexico. It will require about 1 mile of pipeline to connect the facility to low pressure gathering system. Marathon provides (periodically) to Lucid a drilling, completion and estimated first production date for wells that are scheduled to be drilled in the foreseeable future. In addition, Marathon and Lucid have periodic conference calls to discuss changes to drilling and completion schedules. Gas from these wells will be processed at Red Hills Processing Plant located in Sec.13, Twn. 24S, Rng. 33E, Lea County, New Mexico. The actual flow of the gas will be based on compression operating parameters and gathering system pressures.

#### Flowback Strategy

After the fracture treatment/completion operations, well(s) will be produced to temporary production tanks and gas will be flared or vented. During flowback, the fluids and sand content will be monitored. When the produced fluids contain minimal sand, the wells will be turned to production facilities. Gas sales should start as soon as the wells start flowing through the production facilities, unless there are operational issues on Lucid system at that time. Based on current information, it is Marathon's belief the system can take this gas upon completion of the well(s).

Safety requirements during cleanout operations from the use of underbalanced air cleanout systems may necessitate that sand and non-pipeline quality gas be vented and/or flared rather than sold on a temporary basis.

#### **Alternatives to Reduce Flaring**

Below are alternatives considered from a conceptual standpoint to reduce the amount of gas flared.

- Power Generation – On lease
  - Only a portion of gas is consumed operating the generator, remainder of gas will be flared
- Compressed Natural Gas – On lease
  - Gas flared would be minimal, but might be uneconomical to operate when gas volume declines
- NGL Removal – On lease
  - Plants are expensive, residue gas is still flared, and uneconomical to operate when gas volume declines



## **MARATHON OIL COMPANY**

### **BLUE STEEL 21 FEE**

**WA Well # 2H**

**WD Well # 3H**

**FB Well # 21H**

**WXY Well # 6H**

**WA Well # 9H**

**WXY Well # 8H**

**SHL: 270' FNL & 1135' FWL of Unit Letter 'D', Section 28, T-23S, R-29E**

**BHL: 330' FNL & 330' FWL of Unit Letter 'D', Section 16, T-23S, R-29E**

## **EDDY County, New Mexico**

**Rig: PRECISION 582**

**9/26/2018**

## EMERGENCY MEDICAL PROCEDURES DO NOT PANIC REMAIN CALM-THINK

1. HOLD YOUR BREATH. (DO NOT INHALE, STOP BREATHING)
2. PUT ON BREATHING APPARATUS. (NOTE: DO NOT ATTEMPT RESCUE UNTIL YOU HAVE PUT ON BREATHING APPARATUS.)
3. REMOVE VICTIM (S) TO FRESH AIR AS QUICKLY AS POSSIBLE.
4. BE SURE YOU HAVE MOVED VICTIM OUT OF CONTAMINATED AREA BEFORE REMOVING YOUR RESPIRATOR.
5. APPLY MOUTH-TO-MOUTH ARTIFICIAL RESPIRATION, WHICH IS MORE EFFECTIVE, WHILE SOMEONE ELSE GETS THE OXYGEN RESUSCITATOR. RENDER OXYGEN RESUSCITATION ONLY IF PORPERLY TRAINED IN ITS USE.
6. PROVIDE FOR PROMPT TRANSPORTATION TO HOSPITAL AND CONTUNUE GIVING ARTIFICIAL RESPIRATION IF NEEDED.
7. HOSPITAL (S) OR MEDICAL FACILITIES NEED TO BE INFORMED BEFOREHAND, OF THE POSSIBILITY OF H2S GAS POISONING, NO MATTER HOW REMOTE THE POSSIBLITY IS.

Lea Regional Medical Center  
5419 N Lovington Hwy, Hobbs, NM 88240  
AMBULANCE  
FIRE DEPARTMENT- HOBBS, NM  
POLICE - HOBBS, NM

(575)492-5000

911

(575) 397-9308

(575) 397-9265

8. NOTIFY EMERGENCY-ROOM PERSONEL THAT THE VICTIM (S) HAVE POSSIBLY BEEN EXPOSED TO H2S GAS POISONING.

\*\*\*\*\*  
\*\*\*\*\*

**TOTAL SAFETY INC  
1420 East Greene St.  
Carlsbad, NM 88220**



THIS H2S DRILLING OPERATIONS PLAN WAS  
PREPARED BY: Sean Chamblee  
Strategic Account Manager  
Cell: 713-703-6295

TOTAL SAFETY INC  
1420 East Greene St  
Carlsbad, NM 88220  
Phone: 432-561-5049

## H2S DRILLING OPERATIONS PLAN INDEX

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# **INTRODUCTION**

## **H2S DRILLING OPERATIONS PLAN**

This Drilling Operations Plan was written specifically for:

**MARATHON OIL COMPANY  
3122 NATIONAL PARKS HIGHWAY  
CALRSBAD, NM 88220**

Action Plan for Accidental Release of H2S

## **BLUE STEEL 21 FEE**

**WA Well # 2H**

**WD Well # 3H**

**FB Well # 21H**

**WXY Well # 6H**

**WA Well # 9H**

**WXY Well # 8H**

**EDDY COUNTY, NM**

Information, provisions and practices, as set forth in this plan, may be subject to revision and/or updating.

9/26/2018

MARATHON OIL COMPANY  
3122 NATIONAL PARKS HIGHWAY  
CARLSBAD, NM 88220

**BLUE STEEL 21 FEE**  
**WA Well # 2H**  
**WD Well # 3H**  
**FB Well # 21H**  
**WXY Well # 6H**  
**WA Well # 9H**  
**WXY Well # 8H**

EDDY COUNTY, NM

**Directions:**

From the Marathon Office at 4111 Tidwell, Carlsbad, NM head south on Tidwell Rd toward US Hwy 285N for 0.2 miles. Turn left onto US Hwy 285S, heading south for 5.1 miles to NM-Hwy 31. Turn left onto NM-Hwy 31, heading east, for 7.7 miles to NM-Hwy 128E. Turn right onto NM-Hwy 128E, heading east, for 4.5 miles to Rawhide Road. Turn right onto Rawhide Road, heading south, for 4.1 miles to a caliche road. Turn right onto caliche road, heading west, for 4.3 miles to the proposed lease road for the BLUE STEEL 21 FEE WA#2H-WD#3H-FB#21H- WXY#6H-WA#9H-WXY#8H well pad location. Turn North onto said proposed lease road, heading north, for 0.2 miles entering the southwest corner of said well pad location.

**GPS Coordinates: 32.28247880, -103.99480756**

**EDDY COUNTY, NEW MEXICO**

PURPOSE OF PLAN: The purpose of this plan is to safeguard the lives of the public, contract personnel and company personnel in the event of equipment failure or disasters during drilling or completion operations in formations that may contain Hydrogen Sulfide Gas, H<sub>2</sub>S.

As a precautionary measure, this Drilling Plan has been prepared to assure the safety of all concerned, should a disaster occur. However, the Oil Company Representative may have specified materials and practices for the drilling or completion of this well, which supercede the minimum requirements as outlined in this plan.

**Definitions:** For the purpose of this plan the following definitions are to be referred to:

**Controlled Release** – Any release that is planned and occurs during normal operations. A controlled release is managed per the procedures outlined in this section.

**Uncontrolled Release** – Any release that is unplanned and not immediately contained utilizing established shut-in procedures. An uncontrolled release is normally associated with a loss of well control.

**SCBA – (Self Contained Breathing Apparatus)** – A full-face mask respirator with a supplied positive pressure air source.

**Donned SCBA** – When it is required per this plan to “**don**” a SCBA, personnel will be 100% masked up and be on supplied breathing air.

**SCBA On Person** – When it is required per this plan to have SCBA “on person”, personnel will be required to wear the SCBA equipment - but not be masked up.

**“Qualified Buddy”** – Person who has been fit tested and is trained and is familiar with the requirements of donning an SCBA. This person will provide immediate assistance to another person who may be utilizing an SCBA or SkaPack in an IDLH atmosphere in the event of an emergency situation.

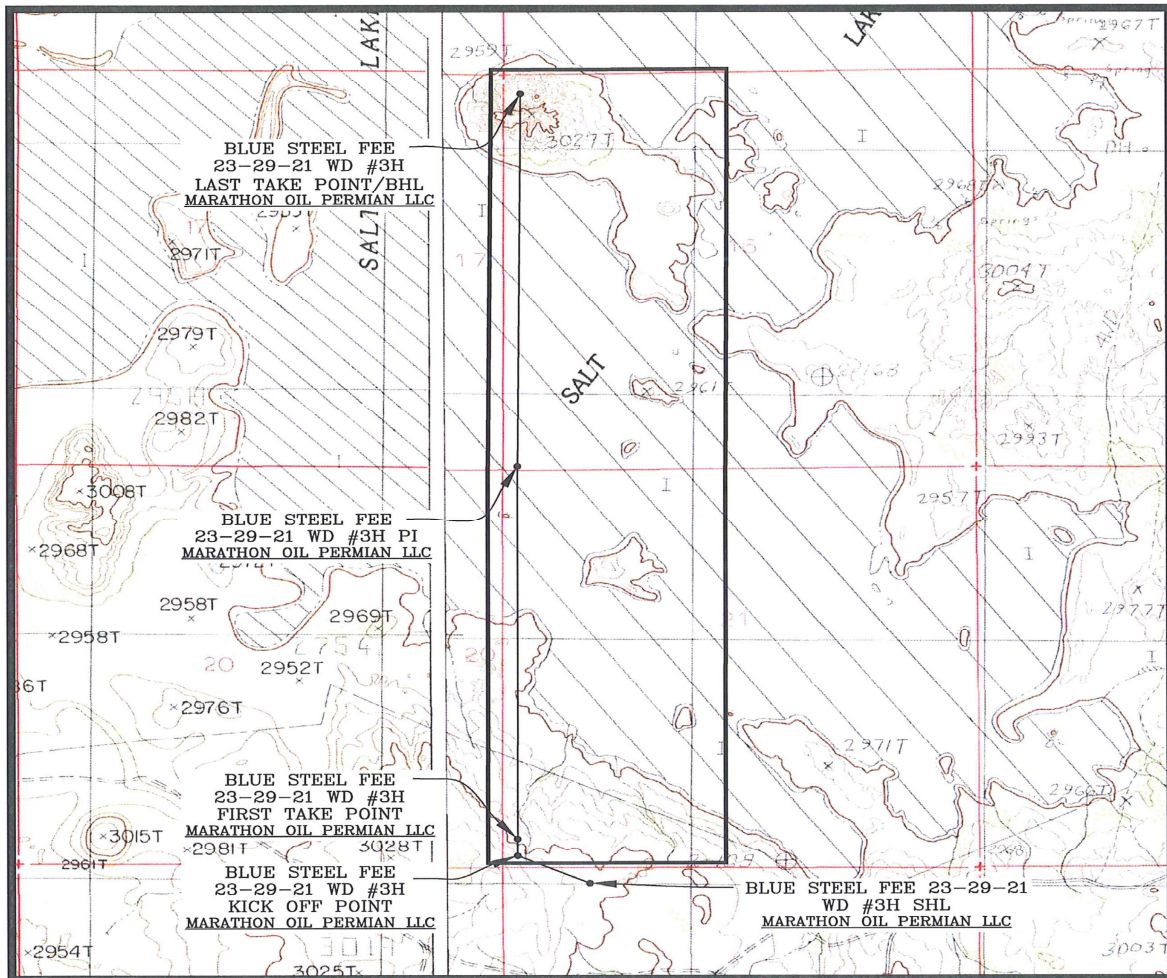
**In Scope Personnel** – Rig Personnel who will be working or otherwise present in potential H<sub>2</sub>S release areas, including the rig floor, cellar, pits, and shaker areas. This would not include 3rd party contractors who do not have a function, besides evacuating the rig, during an emergency condition such as during a well control event or H<sub>2</sub>S / LEL alarm. All qualified personnel that have a function to shut a well in during an emergency will be considered In-Scope per this plan

**Out of Scope Personnel** –. All personnel that are not in scope will be Out of Scope per the definition of this plan

**H<sub>2</sub>S Office** – Onsite office trailer space or vehicle that will be designated as the H<sub>2</sub>S office

**Marathon H2S Plan Custodian** – Marathon HES Advisor, Supervisor or Technician that has been specifically assigned per the authorization page of this plan to maintain this document.

# LOCATION VERIFICATION MAP



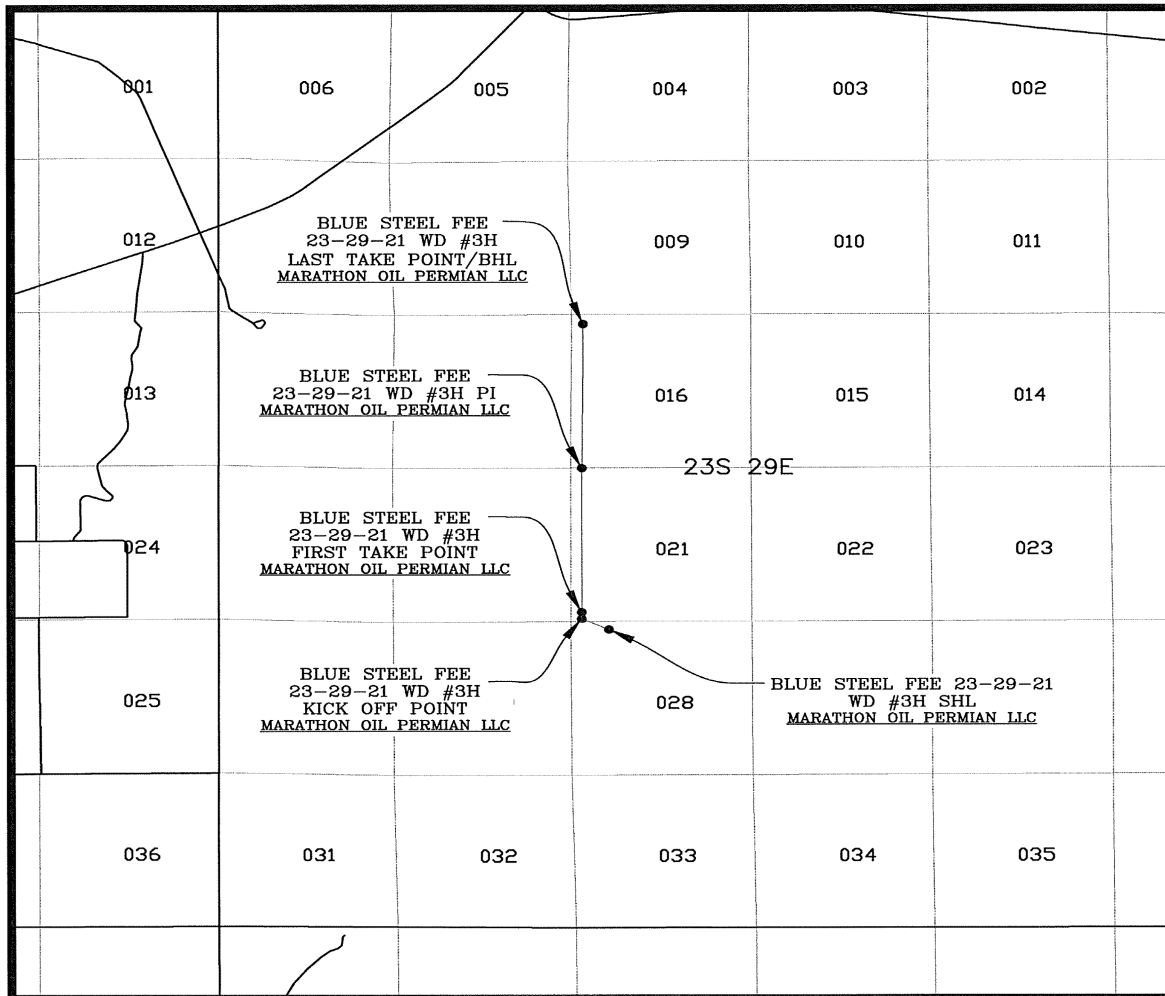
SEC. 28 TWP. 23-S RGE. 29-E  
 SURVEY: N.M.P.M.  
 COUNTY: EDDY  
 DESCRIPTION: 270' FNL & 1135' FWL  
 ELEVATION: 3001'  
 OPERATOR: MARATHON OIL PERMIAN LLC  
 LEASE: BLUE STEEL FEE 23-29-21  
 U.S.G.S. TOPOGRAPHIC MAP: REMUDA BASIN, N.M.

SCALE: 1" = 2000'  
 CONTOUR INTERVAL = 10'

SHEET 2 OF 3

PREPARED BY:  
 R-SQUARED GLOBAL, LLC  
 1309 LOUISVILLE AVENUE, MONROE, LA 71201  
 318-323-6900 OFFICE  
 JOB No. R3942\_002

## VICINITY MAP



SEC. 28 TWP. 23-S RGE. 29-E  
 SURVEY: N.M.P.M.  
 COUNTY: EDDY  
 DESCRIPTION: 270' FNL & 1135' FWL  
 ELEVATION: 3001'  
 OPERATOR: MARATHON OIL PERMIAN LLC  
 LEASE: BLUE STEEL FEE 23-29-21  
 U.S.G.S. TOPOGRAPHIC MAP: REMUDA BASIN, N.M.

SCALE: 1" = 1 MILE

SHEET 3 OF 3

PREPARED BY:  
 R-SQUARED GLOBAL, LLC  
 1309 LOUISVILLE AVENUE, MONROE, LA 71201  
 318-323-6900 OFFICE  
 JOB No. R3942\_002



## SAFETY EQUIPMENT

All H2S related Safety Equipment must be installed, tested and Operational at a depth of 500 feet above, or 3 days prior to penetrating the first zone expected to contain H2S.

### SAFETY EQUIPMENT PROVIDED BY TOTAL SAFETY INC.

<u>QTY</u>	<u>EQUIPMENT</u>
6 each	30-minute self-contained breathing apparatus
6 each	ELSA Escape Packs
1 Lot	Sufficient low-pressure airline hose with quick connects
1	6 Channel fixed H2S monitor
4	H2S Sensors (Loc determined at rig up – General: Cellar, Shale Shaker, floor/driller area)
4	Explosion proof Alarm Station (1-Drill Floor, 1- Pits/Shakers, 1- Generators, 1 Quarters area)
10	Personal H2S Monitors
1	Gastec pump type gas detector
Set	Various range of H2s & SO2 detector tubes
2 each	Windsocks w/frames and poles
1 Set	H2S and briefing area signs
1 Set	Well condition signs and flags
1	Flare Gun & Flares

## TYPE OF EQUIPMENT AND STORAGE LOCATIONS

1. There will be six 30-minute self-contained breathing apparatus on location. They will be positioned as follows: Two at Briefing Area #1 Two at Briefing Area #2, Two at rig dog house. SCBA Facepieces will be equipped with voice amplifiers for effective means of communication when using protective breathing apparatus.
2. There will be six Escape-type packs on location. One for the Derrickman. One on the Shaker. One at the bottom of rig dog house stairway and spares.
3. A Gastec, pump type, gas detector with low and high range detector tubes for H<sub>2</sub>S and SO<sub>2</sub> will be located in the doghouse
4. Two Briefing Areas will be designated at opposite ends of the location.
5. The Briefing Area most upwind is designated as the Safety Briefing Area #1. In an emergency, personnel must assemble at this upwind area for instructions from their supervisor.
6. The H<sub>2</sub>S 'Safety' trailer provided by Total Safety, Inc. will contain a cascade system of at least 5 each -300 C.F. air cylinders that will provide a continuous air supply to air lines located on the rig. Note: This trailer will **Only** be provided if H<sub>2</sub>S conditions require the use of the Air Trailer. (If Required)
7. Two windsocks will be installed so as to be visible from all parts of the location.
8. A well condition warning sign will be displayed at the location entrance to advise of current operating conditions. The condition signs must be at least 200' from the entrance but not more than 500' away.
9. A list of emergency telephone numbers will be kept on rig floor, tool pusher's trailer, the Oil Company's trailer and in the "safety" trailer (if Provided).
10. The primary means of communication will be cell phones.

11. A barricade will be available to block the entrance to location should an emergency occur. In most cases the use of a vehicle is used to block the entrance.
12. A 6-channel H<sub>2</sub>S monitor will be located in the doghouse. The 3 sensors will be installed: one on the shale shaker, one at the Cellar, one at the rig floor.
13. An undulating high and low pitch siren and light will be installed on the derrick "A" leg.
14. If H<sub>2</sub>S concentration reach 10 ppm an explosion-proof bug blower (fan) will be installed under the rig floor to disperse possible accumulations of H<sub>2</sub>S.
15. Any time it is necessary to flare gas containing H<sub>2</sub>S, a Sulfur Dioxide monitor or Detector tubes will be used to determine SO<sub>2</sub> concentrations.
16. A flare gun with flares will also be provided in the event it is necessary to ignite the well from a safe distance.

## OPERATING PROCEDURES

### BLOWOUT PREVENTION MEASURES DURING DRILLING

1. Blowout Prevention Requirements:

All BOP equipment shall meet the American Petroleum Institute specifications as to materials acceptable for H<sub>2</sub>S service and tested accordingly (or to BLM specifications).

2. Drilling String Requirements:

All drill string components are to be of material that meets the American Petroleum Institute's specifications for H<sub>2</sub>S service. All drill string components should be inspected to IADC critical service specifications prior to running in well.

### GAS MONITORING EQUIPMENT

1. A continuous H<sub>2</sub>S detection system, consisting of three H<sub>2</sub>S detectors and an audible/visual warning system will be in operating during all phases of this H<sub>2</sub>S Drilling Operations Plan. The detection system will be adjusted and calibrated such that an H<sub>2</sub>S exposure of 10 ppm or higher (at any sensor) will trigger the audible and visual portion (wailing or yelping siren) of the warning system (i.e. H<sub>2</sub>S continually present at or above threshold levels) a trained operator or H<sub>2</sub>S supervisor will monitor the H<sub>2</sub>S detection system.

2. When approaching or completing H<sub>2</sub>S formations, crewmembers may attach personnel H<sub>2</sub>S monitors to their person.

3. Hand held H<sub>2</sub>S sampling gas detectors will be used to check areas not covered by automatic monitoring equipment.

## CREW TRAINING AND PROTECTION

1. All personal working at the well site will be properly trained in accordance with the general training requirements outlined in the API Recommended Practices for Safe Drilling of Wells Containing H<sub>2</sub>S. The training will cover, but will not be limited to, the following:
  - a. General information of H<sub>2</sub>S AND SO<sub>2</sub> GAS
  - b. Hazards of these gases
  - c. Safety equipment on location
  - d. Proper use and care of personal protective equipment
  - e. Operational procedures in dealing with H<sub>2</sub>S gas
  - f. Evacuation procedures
  - g. First aid, reviving an H<sub>2</sub>S victim, toxicity, etc.
  - h. Designated Safe Briefing Areas
  - i. Buddy System
  - j. Regulations
  - k. Review of Drilling Operations Plan
2. Initial training shall be completed when drilling reaches, a depth of 500' above or 3 days prior to penetrating (whichever comes first) the first zone containing or expected to contain H<sub>2</sub>S. It must also include a review of the site specific Drilling Operations Plan and, if applicable, the Public Protections Plan.
3. Weekly H<sub>2</sub>S and well control drills for all personnel on each working crew shall be conducted.
4. All training sessions and drills shall be recorded on the driller's log or its equivalent.
5. Safety Equipment:

As outlined in the Safety Equipment index, H<sub>2</sub>S safety protection equipment will be available to/or assigned each person on location.
6. One person (by job title) shall be designated and identified to all on-site personnel as the person primarily responsible for the overall operation of the on-site safety and training programs. This will be the PIC

## METALLURGICAL CONSIDERATIONS

1. Steel drill pipe used in H<sub>2</sub>S environments should have yield strength of 95,000psi or less because of potential embrittlement problems. Must conform to the current National Association of Corrosion Engineers (NACE) Standard MR-0175-90, Material Requirement, Sulfide Stress Cracking Resistant Metallic Material for Oil Field Equipment. Drill stem joints near the top of the drill string are normally under the highest stress levels during drilling and do not have the protection of elevated down hole temperatures. These factors should be considered in design of the drill string. Precautions should be taken to minimize drill string stress caused by conditions such as excessive dogleg severity, improper torque, whip, abrasive wear or tool joints and joint imbalance. American Petroleum Institute, Bulletin RR 7G, will be used as a guideline for drill string precautions.
2. Corrosion inhibitors may be applied to the drill pipe or to the mud system as an additional safeguard.
3. Blowout preventors should meet or exceed the recommendations for H<sub>2</sub>S service as set forth in the latest edition of API RI 53.

## MUD PROGRAM AND TREATING

1. It is of utmost importance that the mud be closely monitored for detection of H<sub>2</sub>S and reliability of the H<sub>2</sub>S treating chemicals.
2. Identification and analysis of sulfides in the mud and mud filtrates will be carried out per operators prescribed procedures.
3. The mud system will be pre-treated with Zinc Carbonate, Ironite Sponge or similar chemicals of H<sub>2</sub>S control prior to drilling into the H<sub>2</sub>S bearing formation. Sufficient quantities of corrosion inhibitor should be on location to treat the drill string during Drill Stem Test Operations. Additionally, Aqua Ammonia should be on hand to treat the drill string for crew protection, should H<sub>2</sub>S be encountered while tripping string following drill stem testing

## WELL CONTROL EQUIPMENT

### 1. Flare System

- a. A flare system shall be designed and installed to safely gather and burn H<sub>2</sub>S Bearing gas.
  1. Flare lines shall be located as far from the operating site as feasible and in a manner to compensate for wind changes.
  2. The flare line mouth shall be located not less than 150' from wellbore.
  3. Flare lines shall be straight unless targeted with running tees.
  4. Flare Gun & Flares to ignite the well

### 2. Remote Controlled Choke

- a. A remote controlled choke shall be installed for all H<sub>2</sub>S drilling and where feasible for completion operations. A remote controlled valve may be used in lieu of this requirement for completions operations.

### 3. Mud-gas separators and rotating heads shall be installed and operable for all exploratory wells.



## OPERATING CONDITIONS

A Well Condition Sign and Flag will be posted on all access roads to the location. The sign shall be legible and large enough to be read by all persons entering the well site and be placed a minimum of 200' but no more than 500' from the well site which allows vehicles to turn around at a safe distance prior to reaching the site.

### DEFINITION OF WARNING FLAGS

1. Condition:  
**GREEN-NORMAL OPERATIONS**  
Any operation where the possibility of encountering H<sub>2</sub>S exists but no H<sub>2</sub>S has been detected.
2. Condition:  
**YELLOW-POTENTIAL DANGER, CAUTION**  
Any operation where the possibility of encountering H<sub>2</sub>S exists and in all situations where concentrations of H<sub>2</sub>S are detected in the air below the threshold level (10ppm)
  - a. Cause of condition:
    - \*Circulating up drill breaks
    - \*Trip gas after trip
    - \*Circulating out gas on choke
    - \*Poisonous gas present, but below threshold concentrations
    - \*Drill stem test
  - b. Safety Action:
    - \*Check safety equipment and keep it with you
    - \*Be alert for a change in condition
    - \*Follow instructions
3. Condition:  
**RED-EXTREME DANGER**  
Presence of H<sub>2</sub>S at or greater than 10ppm. Breathing apparatus must be worn.
  - a. Safety action:

\*MASK UP. All personal will have protective breathing equipment with them. All nonessential personnel will move to the Safe Briefing Area and stay there until instructed to do otherwise. All essential Qualified Personnel, using the "Buddy System" (those necessary to maintain control of the well) will don breathing apparatus to perform operations related to well control.

The decision to ignite the well is the responsibility of the operator's on-site representative and should be made only as a last resort, when it is clear that:

- \*human life is endangered
- \*there is no hope of controlling the well under prevailing conditions

Order evacuation of local people within the danger zone. Request help from local authorities, State Police, Sheriff's Dept. and Service Representative.

### CIRCULATING OUT KICK (WAIT AND WEIGHT METHOD)

If it is suspected that H<sub>2</sub>S is present with the gas whenever a kick is taken, the wait and weight method of eliminating gas and raising the mud will be followed.

1. Wait and Weight Method:

a. The wait and Weight Method is:

- \*increase density of mud in pits to 'kill' weight mud.
- \*open choke and bring pump to initial circulating pressure by holding casing pressure at original valve until pump is up to predetermined speed.
- \*when initial circulating pressure is obtained on drill pipe, zero pump stroke counter and record time.
- \*reduce drill pipe pressure from initial circulating pressure to final circulating pressure by using pump strokes and/or time according to graph
- \*when 'kill' weight mud is at the bit, hold final circulating pressure until kill weight mud is to surface.

b. If a kick has occurred, the standard blowout procedure will be followed and the wait and weight method will be used to kill the well. When the well has been put on the choke and circulation has been established, the following safety procedure must be established.

- \*determine when gas is anticipated to reach surface.

- \*all non-essential personnel must be moved to safe briefing area
- \*all remaining personnel will check out and keep with them their protective breathing apparatus.
- \*mud men will see that the proper amount of H<sub>2</sub>S scavenging chemical is in the mud and record times checked
- \*make sure ignition flare is burning and valves are open to designated flare stacks

### CORING OPERATIONS IN H<sub>2</sub>S BEARING ZONES

1. Personal protective breathing apparatus will be worn from 10 to 15 stands in advance of retrieving the core barrel. Cores to be transported should be sealed and marked to the presence of H<sub>2</sub>S.
  - a. Yellow Caution Flag will be flown at the well condition sign.
  - b. The "NO SMOKING" rule will be enforced

### DRILL STEM TESTING OF H<sub>2</sub>S ZONES

1. The DST subsurface equipment will be suitable for H<sub>2</sub>S service as recommended by the API
2. Drill stem testing of H<sub>2</sub>S zone will be conducted in daylight hours
3. All non-essential personnel will be moved to an established safe area or off location
4. The "NO SMOKING" rule will be enforced
5. DST fluids will be circulated through a remote controlled choke and a separator to permit flaring of gas. A continuous pilot light will be used.
6. A yellow or red flag will be flown at entrance to location depending on present gas condition
7. If warranted, the use of Aqua Ammonia for neutralizing the toxicity of H<sub>2</sub>S from drill string
  - a. During drill stem tests adequate Filming Amine for H<sub>2</sub>S corrosion and Aqua Ammonia for neutralizing H<sub>2</sub>S should be on location.
8. On completion of DST, if H<sub>2</sub>S contaminated formation fluids or gases are present in drill string, floor workers will be masked up before test valve is removed from drill string and continue "mask

on” conditions until such time that readings in the work area do not exceed 10ppm of H<sub>2</sub>S gas.

# EMERGENCY PROCEDURES

## SOUNDING ALARM

In case of an alarm the crews will muster up at the designated area. Total Safety will be dispatched with (2) HES Techs who are to go in under protective breathing air and check the alarm readings and sniff ambient air for the presence of H<sub>2</sub>S.

By no means are the Co. Rep or HES Advisor to go in under air with the HES Tech. If there is another method in place where the Rig Manager is to go in with the Tech we need to ensure that the rig company has cleared them and that they are properly trained.

1. The fact is to be instilled in the minds of all rig personnel that the sounding alarm means only one thing: H<sub>2</sub>S IS PRESENT. Everyone is to proceed to his assigned station and the contingency plan is put into effect.

## DRILLING CREW ACTIONS

1. All personnel will don their protective breathing apparatus. The driller will take necessary precautions as indicated in operating procedures.
2. The Buddy system will be implemented. All personnel will act upon directions from the operator's on-site representative.
3. If there are non-essential personnel on location, they will move off location.
4. Entrance to the location will be patrolled, and the proper well condition flag will be displayed at the entrance to the location.

## RESPONSIBILITIES OF PERSONNEL

In order to assure the proper execution of this plan, it is essential that one person be responsible for and in complete charge of implementing these procedures. The responsibility will be as follows:

1. The operator's on-site representative or his assistant
2. Contract Tool Pusher

## STEPS TO BE TAKEN

In the event of an accidental release of a potentially hazardous volume of H<sub>2</sub>S, the following steps will be taken:

1. Contact by the quickest means of communications: the main offices of Oil Company & Contractor as listed on the preceding page.
2. An assigned crewmember will blockade the entrance to the location. No unauthorized personnel will be allowed entry into the location.
3. The operator's on-site representative will remain on location and attempt to regain control of the well.
4. The drilling company's rig superintendent will begin evacuation of those persons in immediate danger. He will begin by telephoning residents in the danger zone. In the event of no contact by telephoning, the tool pusher will proceed at once to each dwelling for a person-to-person contact. In the event the tool pusher cannot leave the location, he will assign a responsible crewmember to proceed in the evacuation of local residents. Upon arrival, the Sheriff's Department and TOTAL SAFETY personnel will aid in further evacuation.

## LEAK IGNITION

Leak Ignition procedure: (used to ignite a leak in the event it becomes necessary to protect the public)

1. Two men, the operator's on-site representative and the contractor's rig superintendent or TOTAL SAFETY's representative(s), wearing self-contained pressure demand air masks must determine the perimeter of the flammable area. This should be done with one man using an H<sub>2</sub>S detector and the other one using a flammable gas detector. The flammable perimeter should be established at 30% to 40% of the lower flammable limits.
2. After the flammable perimeter has been established and all employees and citizens have been removed from the area, the ignition team should move to the up-wind area of the leak perimeter and fire a flare into the area if the leak isn't ignited on the first attempt, move in 20 to 30 feet and fire again. Continue moving in and firing until the leak is ignited or the flammable gas detector indicates the ignition

- team is moving into the hazardous area. If trouble is incurred in igniting the leak by firing toward the leak, try firing 40 degrees to 90 degrees to each side of the area where you have been firing. If still no ignition is accomplished ignite the copper line burner and push it into the leak area. This should accomplish ignition. If ignition is not possible due to the makeup of the gas, the toxic leak perimeter must be established and maintained to insure evacuation is completed and continue until the emergency is secure.
3. The following equipment and man-power will be required to support the ignition team:
    - a. one flare gun with flares
    - b. four pressure demand air packs
    - c. two nylon ropes tied to the ignition team
    - d. two men in a clear area equipped with air packs
    - e. portable propane bottle with copper line
  4. The person with the final authority to ignite the well.

### GENERAL EQUIPMENT

1. Two areas on the location will be designated as Briefing Areas. The one that is upwind from the well will be designated a the "Safe Briefing Area"
2. In the case of an emergency, personnel will assemble in the upwind area as per prior instructions from the operator's representative.
3. The H2S "Safety" trailer provide by TOTAL SAFETY will contain 10 air cylinders, a resuscitator, one 30-minute air pack and will have a windsock.
4. Two other windsocks will be installed.
5. A condition warning sign will be displayed at the location entrance.
6. A list of emergency telephone numbers will be kept on the rig floor, tool pusher's trailer and the Oil Company's trailer.
7. Two barricades will be available to block the entrance to location.
8. An undulating high and low pitch siren will be installed.
9. A telephone line or mobile phone will be available at the well site for incoming and outgoing communications.



## CRITICAL OPERATIONS

These guidelines will be implemented during H2S alarms on drilling locations with the intent of minimizing catastrophic damage of “**critical tasks**” ONLY and exposure of field personnel (e.g. cement in the stack).

We will wait on Total Safety (or H2S Safety Company) for all other alarm events that aren't defined as “critical”.

- 1.) H2S alarm sounds, crews secure well, and muster based off of wind direction. MOC Operation, MOC Safety, and H2S service company notification will be made and representative from the H2S Service Company is in route to location.
- 2.) Two qualified in scope personnel will don SCBA, utilizing the "buddy system", and respond to area of H2S alarm location to verify the presence of H2S utilizing hand held four gas analyzer or other approved and provided method.
- 3.) If no H2S is found, the “all clear” will be authorized by the Marathon Oil Drilling Superintendent and HES to resume operations. H2S service company will still be required to respond.

**Note:** Personnel will return to muster area awaiting H2S service company and additional equipment if H2S is verified.

**Note:** Personnel will be trained annually on H2S and the elements of this guideline. The MOC HES Advisor and Co Man will receive hands on training from a H2S service company field tech, on how to properly identify the location of the alarming sensor, and the proper method for checking the alarmed area.

# APPENDICES

## EMERGENCY & MEDICAL FACILITIES:

### Marathon Oil Corporation Emergency Numbers

Brent Evans	Drilling Manager	blevans@marathonoil.com	832 967-8474
Mark Bly	Drilling Superintendent	permiansuper@marathonoil.com	281-840-0467
Chad Butler	Drilling Superintendent	permiansuper@marathonoil.com	281-840-0467
Jacob Beaty	Drilling Engineer	jabeaty@marathonoil.com	713-296-1915
Noah Adams	HES Professional	<a href="mailto:njadams@marathonoil.com">njadams@marathonoil.com</a>	713-591-4068
Nick Rogers	Lead HES Advisor	<a href="mailto:permianndches@marathonoil.com">permianndches@marathonoil.com</a>	281-659-3734
Scott Doughty	Lead HES Advisor	<a href="mailto:permianndches@marathonoil.com">permianndches@marathonoil.com</a>	281-659-3734
H&P 480	Company Man	<a href="mailto:Hp480@marathonoil.com">Hp480@marathonoil.com</a>	281-768-9946
H&P 498	Company Man	<a href="mailto:Hp498@marathonoil.com">Hp498@marathonoil.com</a>	281-745-0771
H&P 441	Company Man	<a href="mailto:Hp441@marathonoil.com">Hp441@marathonoil.com</a>	
H&P 423	Company Man	<a href="mailto:Hp423@marathonoil.com">Hp423@marathonoil.com</a>	
PRECISION 594	Company Man		
H&P 480	HES Advisor	<a href="mailto:Hp480hes@marathonoil.com">Hp480hes@marathonoil.com</a>	
H&P 498	HES Advisor	<a href="mailto:Hp498hes@marathonoil.com">Hp498hes@marathonoil.com</a>	
H&P 441	HES Advisor	<a href="mailto:HP441hes@marathonoil.com">HP441hes@marathonoil.com</a>	
H&P 423	HES Advisor	<a href="mailto:Hp423hes@marathonoil.com">Hp423hes@marathonoil.com</a>	
PRECISION 594	HES Advisor		

### Emergency Services Area Numbers: Or Call 911

Sheriff (Eddy County, NM)	575-887-7551	New Mexico Poison Control	800-222-1222
Sheriff (Lea County, NM)	575-396-3611	Border Patrol (Las Cruces, NM)	575-528-6600
New Mexico State Police	575-392-5580/5588	Energy Minerals & Natural Resources Dept.	575-748-1283
Carlsbad Medical Center	575-887-4100	Environmental Health Dept.	505-476-8600
Lea Regional Medical Center	575-492-5000	OSHA (Santa Fe, NM)	505-827-2855
Police (Carlsbad, NM)	575-885-2111		
Police (Hobbs, NM)	575-392-9265		
Fire (Carlsbad, NM)	575-885-3124		
Fire (Hobbs, NM)	575-397-9308		
Ambulance Service	911	TOTAL SAFETY H2S – SAFETY SERVICES	432-561-5049

1. For Life Flight, 1<sup>st</sup> dial “911” They will determine nearest helicopter and confirm the need for helicopter.

# RESIDENTS AND LANDOWNERS

## RESIDENCE

THERE ARE NO RESIDENCE WITHIN ANY RADIUS OF EXPOSURE.



# ADDITIONAL INFORMATION

## A. HYDROGEN SULFIDE ESSAY

A deadly enemy of those people employed in the petroleum industry, this gas can paralyze or kill quickly. At least part of the answer lies in education in the hazards, symptoms, characteristics, safe practices, treatment, and the proper use of personal protective equipment.

## B. HYDROGEN SULFIDE HAZARDS

The principal hazard to personnel is asphyxiation or poisoning by inhalation. Hydrogen Sulfide is a colorless, flammable gas having an offensive odor and a sweetish taste. It is highly toxic and doubly hazardous because it is heavier than air (specific gravity = 1.19). It's offensive odor, like that of a rotten egg, has been used as an indicator by many old timers in the oil field, but is not a reliable warning of the presence of gas in a dangerous concentration because people differ greatly in their ability to detect smells. Where high concentrations are encountered, the olfactory nerves are rapidly paralyzed, diluting the sense of smell as a warning indicator. A concentration of a few hundredths of one percent higher than that causing irritation can cause asphyxia and death—in other words there is a very narrow margin between consciousness and unconsciousness, and between unconsciousness and death.

Where high concentrations cause respiratory paralysis, spontaneous breathing does not return unless artificial respiration is applied. Although breathing is paralyzed the heart may continue beating for ten minutes after the attack.

## C. PHYSIOLOGICAL SYSTEMS

ACUTE: results in almost instantaneous asphyxia, with seeming respiratory paralysis acute poisoning, or strangulation, may occur after even a few seconds inhalation of high concentration and results in panting respiration, pallor, cramps, paralysis and almost immediate loss of consciousness with extreme rapidity from respiratory and cardiac paralysis. One breath of a sufficiently high concentration may have this result.

SUBACUTE: RESULTS IN IRRITATION, PRINCIPALLY OF THE EYES, PERSISTENT COUGH, TIGHTENING OR BURNING IN THE CHEST AND SKIN IRRITATION FOLLOWS BY DEPRESSION OF THE CENTRAL NERVOUS SYSTEM. The eye irritation ranges in severity from mild conjunctivitis to swelling and bulging of the conjunctiva photophobia (abnormal intolerance of light) and temporary blindness.

#### D. TREATMENT

1. Victim should be removed to fresh air immediately by rescuers wearing respiratory protective equipment. Protect yourself while rescuing.
2. If the victim is not breathing, begin immediately to apply artificial respiration. (See other chart for the chances for life after breathing has stopped.) If a resuscitator is available let another employee get it and prepare for use.
3. Treat for shock, keep victim warm and comfortable
4. Call a doctor, in all cases, victims of poisoning should be attended by a physician.

#### E. CHARACTERISTICS OF H<sub>2</sub>S

1. Extremely Toxic (refer to chart for toxicity of Hydrogen Sulfide).
2. Heavier than air. Specific gravity= 1.19.
3. Colorless, has odor of rotten eggs.
4. Burns with a blue flame and produces sulfur Dioxide (SO<sub>2</sub>) gas, which is very irritating to eyes and lungs. The SO<sub>2</sub> is also toxic and can cause serious injury.
5. H<sub>2</sub>S is almost as toxic as hydrogen cyanide.
6. H<sub>2</sub>S forms explosive mixture, with air between 4.3% and 46% by volume.
7. Between 5 and 6 times as toxic as carbon monoxide.
8. Produces irritation to eyes, throat, and respiratory tract.
9. Threshold Limit Value (TLV) maximum of eight hours exposure without protective respiratory equipment-10ppm.

## F. SAFE PRACTICES

If you are faced with an H<sub>2</sub>S problem in your operations, the following safe practices are recommended:

1. Be absolutely sure all concerned are familiar with the hazards concerning H<sub>2</sub>S and how to avoid it.
2. All employees should know how to operate and maintain respiration equipment.
3. Be able to give and demonstrate artificial respiration.
4. Post areas where there is poisonous gas with suitable warning signs.
5. Be sure all new employees are thoroughly schooled before they are sent to the field-tomorrow may be too late.
6. Teach men to avoid gas whenever possible-work on the windward side, have fresh air mask available.
7. Never let bad judgment guide you-wear respiratory equipment when gauging tanks, etc. Never try to hold your breath in order to enter a contaminated atmosphere.
8. In areas of high concentration, a two-man operation is preferred.
9. Never enter a tank, cellar or other enclosed place where gas can accumulate without proper respiratory protective equipment and a safety belt secured to a lifeline held by another person outside.
10. Always check out danger areas first with H<sub>2</sub>S detectors before allowing anyone to enter. DO NOT TRY TO DETERMINE THE PRESENCE OF GAS BY its ODOR.
11. Wear proper respiratory equipment for the job at hand. Never take a chance with equipment with which you are unfamiliar. If in doubt, consult your supervisor.
12. Carry out practice drills every month with emergency and maintenance breathing air equipment. Telling or showing a group how to operate equipment is not enough-make them show you.
13. Maximum care should be taken to prevent the escape of fumes into the air of working places by leaks, etc.
14. Communication such as radio and telephones should be provided for those people employed where H<sub>2</sub>S may be present.



## TOXICITY OF HYDROGEN SULFIDE TO MEN

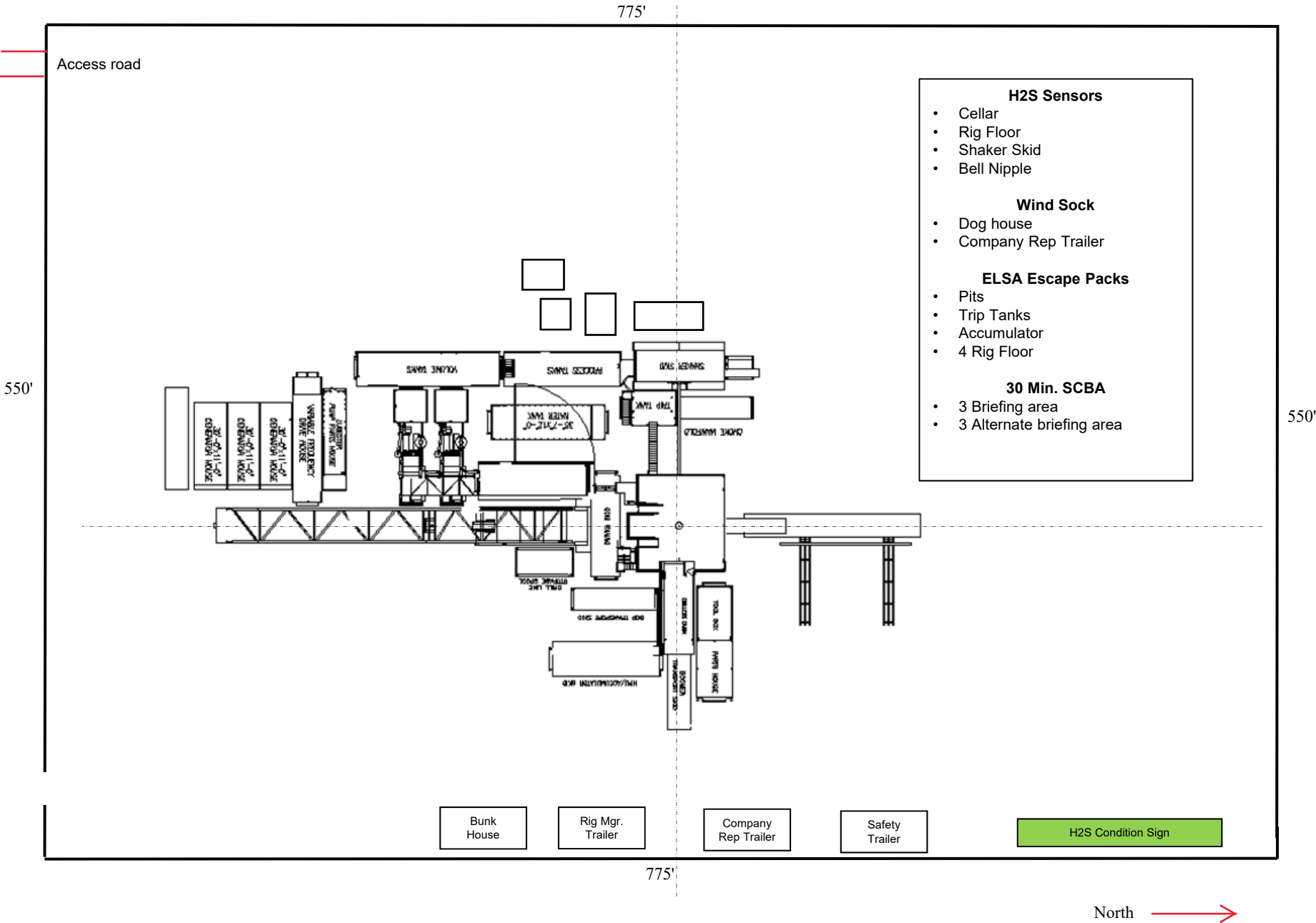
H2S Per Cent (PPM)**	0 - 2 Minutes	0 - 15 Minutes	15 - 30 Minutes	30 Minutes to 1 hour	1 - 4 Hours	4 - 8 Hours	4 - 48 Hours
0.005 (50)				Mild Conjunctiv- ities; respiratory tract irritation			
0.010 (100)				Throat			
0.010 (100)		Coughing; irritation of eyes; loss of sense of smell	Disturbed respiration; pain in eyes; sleepiness		Salivation & mucous dis- charge; sharp pain in eyes; coughing	Increased symptoms*	Hemorrhage & death*
0.015 (150)							
0.020 (200)		Loss of sense of smell	Throat & eye irritation	Throat & eye irritation	Difficult breathing; blurred vision; light & shy	Serious irritating effects	Hemorrhage & death*
0.025 (250)							
0.035 (350)	Irritation of eyes; loss of sense of smell	Irritation of eyes	Painful secretion of tears; weariness	Light & shy; nasal catarrh; pain in eyes; difficult breathing	Hemorrhage & death		
0.035 (350)		Irritation of eyes; loss of sense of smell	Difficult respiration coughing; irritation of eyes	Increased irritation of eyes and nasal tract; dull pain head; weariness; light shy	Dizziness weak- ness; increased irritation; death	Death*	
0.050 (500)	Coughing collapse & unconscious- ness	Respiratory disturbances; irritation of eyes; collapse	Serious eye irritation; palpitation of heart; few cases of death*	Severe pain in eyes and head dizziness; trem- bling of extre- mities; great weakness & death*			
0.060 (600)							
0.070 (700)	Collapse *	Collapse*					
0.080 (800)	unconscious- ness; death*	unconscious- ness; death*					
0.100 (1000)							
0.150 (1500)							

\*Data secured from experiments of dogs which have susceptibility similar to men. \*\*PPM - parts per million





MARATHON OIL - H2S Preparedness and Contingency Plan Summary







U.S. Department of the Interior  
BUREAU OF LAND MANAGEMENT

# Drilling Plan Data Report

05/08/2023

APD ID: 10400035588

Submission Date: 10/26/2018

Highlighted data  
reflects the most  
recent changes

Operator Name: MARATHON OIL PERMIAN LLC

Well Name: BLUE STEEL 21 WD FEE

Well Number: 3H

Well Type: OIL WELL

Well Work Type: Drill

[Show Final Text](#)

## Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical	Measured Depth	Lithologies	Mineral Resources	Producing Formatio
329434	SALADO	2627	374	374	ANHYDRITE, DOLOMITE, SALT	OTHER : Brine	N
329448	BASE OF SALT	-338	2964	2981	LIMESTONE, SANDSTONE	OTHER : Brine	N
329438	LAMAR	-384	3010	3028	OTHER : Sand/Shales	OIL	N
329439	BELL CANYON	-419	3045	3064	OTHER : Sands/Shale	OIL	N
329441	BRUSHY CANYON	-2448	5075	5109	OTHER : Sands/Carbonate	OIL	N
329442	BONE SPRING	-4077	6704	6738	OTHER : Sands/Carbonate	OIL	N
329449	WOLFCAMP	-7315	9942	10040	OTHER, SANDSTONE, SHALE : Carbonates	OIL	Y

## Section 2 - Blowout Prevention

Pressure Rating (PSI): 10M

Rating Depth: 15000

**Equipment:** 13 5/8 Annular, Double Ram and Blind Ram will be tested and installed before the 12 1/4", 8 3/4" and 6 1/8" holes. Minimum required WP for Annular is 70% of the working pressure for all casing strings and minimum required WP for Blind Ram and Double Ram is 10,000 for all casing strings.

**Requesting Variance?** YES

**Variance request:** 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. BOP variance is requested for the annular to be 5000 psi on a 10,000 psi BOP stack.

**Testing Procedure:** - BOP/BOPE will be tested by an independent service company to 250 PSI low and the high pressure indicated on drill plan attachment 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 attached. If the system is upgraded all the components installed will be functional and tested. The Annular will be tested to 70% of 5,000 working pressure (see attached BOP plan). The working pressure of 10,000 for the Blind Ram and Double Ram will be tested to 10,000 PSI. - 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. - 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. - 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

**Operator Name:** MARATHON OIL PERMIAN LLC**Well Name:** BLUE STEEL 21 WD FEE**Well Number:** 3H

a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. See attached schematic.

**Choke Diagram Attachment:**

DRILL\_2\_CHOKE\_Choke\_Line\_Flex\_III\_Rig\_20181022113630.pdf

DRILL\_2\_CHOKE\_Choke\_Line\_Test\_Chart\_SN\_63393\_20181022113642.pdf

DRILL\_2\_CHOKE\_Contitech\_Hose\_SN\_663393\_20181022113656.pdf

DRILL\_2\_CHOKE\_10M.THREE\_CHOKE\_MANIFOLD.BLM\_\_3H\_\_20181025125214.pdf

**BOP Diagram Attachment:**

DRILL\_2\_BOP\_10\_5M\_Flex.BOPE.BLM\_\_21H\_2H\_9H\_6H\_8H\_\_20181022113530.pdf

DRILL\_2\_BOP\_Well\_Control\_Plan\_\_Permian\_\_2H\_9H\_3H\_6H\_8H\_\_20181022113541.pdf

DRILL\_2\_BOP\_WH\_TH\_DESIGN\_\_2\_DRAWING\_9\_\_3H\_\_20181025125124.pdf

**Section 3 - Casing**

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	17.5	13.375	NEW	API	N	0	350	0	350	3001	2651	350	J-55	54.5	ST&C	5.52	2.5	BUOY	2.5	BUOY	2.5
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	3020	0	3002	3001	-1	3020	J-55	40	LT&C	1.74	1.15	BUOY	2.19	BUOY	2.19
3	INTERMEDIATE	8.75	7.0	NEW	API	N	0	10100	0	10035	3001	-7034	10100	P-110	29	BUTT	2.21	1.18	BUOY	1.9	BUOY	1.9
4	PRODUCTION	6.125	4.5	NEW	API	N	9800	21124	9735	11090	-6734	-8089	11324	P-110	13.5	BUTT	1.33	1.56	BUOY	1.88	BUOY	1.88

**Casing Attachments**

**Operator Name:** MARATHON OIL PERMIAN LLC**Well Name:** BLUE STEEL 21 WD FEE**Well Number:** 3H**Casing Attachments****Casing ID:** 1      **String**      SURFACE**Inspection Document:****Spec Document:****Tapered String Spec:****Casing Design Assumptions and Worksheet(s):**

Surface\_20181025130022.pdf

**Casing ID:** 2      **String**      INTERMEDIATE**Inspection Document:****Spec Document:****Tapered String Spec:****Casing Design Assumptions and Worksheet(s):**

Intermediate\_20181022113915.pdf

**Casing ID:** 3      **String**      INTERMEDIATE**Inspection Document:****Spec Document:****Tapered String Spec:****Casing Design Assumptions and Worksheet(s):**

Intermediate\_II\_20181022114009.pdf

Operator Name: MARATHON OIL PERMIAN LLC

Well Name: BLUE STEEL 21 WD FEE

Well Number: 3H

## Casing Attachments

Casing ID: 4 String PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Liner\_20181025130302.pdf

## Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	0	0	0	0	0	0	N/A, tail cement only.	N/A, tail cement only.
SURFACE	Tail		0	350	356	1.33	14.8	486	100	Class C	0.02 Gal/Sk Defoamer + 0.5% Extender + 1% Accelerator
PRODUCTION	Lead		0	0	0	0	0	0	0	N/A, tail only.	N/A, tail only.
PRODUCTION	Tail		9800	2112 4	1136	1.22	14.5	1386	30	Class H	0.1% retarder + 3.5% extender + 0.3% fluid loss + 0.1% Dispersant
INTERMEDIATE	Lead		0	2000	634	1.75	12.8	1096	75	Class C	0.02 Gal/Sk Defoamer + 0.5% Extender + 1% Accelerator
INTERMEDIATE	Tail		2000	3020	360	1.33	14.8	479	50	Class C	0.3 % Retarder
INTERMEDIATE	Lead		2720	9100	604	2.7	11	1631	70	Class C	0.85% retarder + 10% extender + 0.02 gal/sk defoamer + 2.0% Extender + 0.15% Viscosifier
INTERMEDIATE	Tail		9100	1010 0	179	1.09	15.6	195	30	Class H	3% extender + 0.15% Dispersant + 0.03 gal/sk retarder

Operator Name: MARATHON OIL PERMIAN LLC

Well Name: BLUE STEEL 21 WD FEE

Well Number: 3H

### Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

**Describe what will be on location to control well or mitigate other conditions:** The necessary mud products for additional weight and fluid loss control will be on location at all times.

**Describe the mud monitoring system utilized:** Losses or gains in the mud system will be monitored visually/manually as well as with an electronic PVT.

### Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
350	3020	OTHER : Brine	9.9	10.2							
0	350	WATER-BASED MUD	8.4	8.8							
3020	1010 0	OTHER : Cut Brine	8.8	9.4							
1010 0	2112 4	OIL-BASED MUD	11	13							

### Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

GRL

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

GR

Coring operation description for the well:

None Planned.



**Operator Name:** MARATHON OIL PERMIAN LLC

**Well Name:** BLUE STEEL 21 WD FEE

**Well Number:** 3H

## Section 7 - Pressure

**Anticipated Bottom Hole Pressure:** 7496

**Anticipated Surface Pressure:** 5056.2

**Anticipated Bottom Hole Temperature(F):** 195

**Anticipated abnormal pressures, temperatures, or potential geologic hazards?** NO

**Describe:**

**Contingency Plans geohazards description:**

**Contingency Plans geohazards**

**Hydrogen Sulfide drilling operations plan required?** YES

**Hydrogen sulfide drilling operations**

DRILL\_7\_Pad\_Flex\_III\_Rev1\_20181022120024.pdf

Drill\_7\_GCP\_Blue\_Steel\_21\_Fee\_2\_3\_4\_5\_6\_7\_8\_9\_10\_21\_23\_25\_10\_22\_2018\_20181022120043.pdf

DRILL\_7\_Marathon\_Carlsbad\_Blue\_Steel\_21\_Fee\_2h\_3h\_21h\_6h\_9h\_8h\_Contingency\_Plan\_092618\_20181022120009.pdf

DRILL\_7\_H2S\_Contiengency\_Plan\_Summary\_Rev1\_20181022115959.pdf

## Section 8 - Other Information

**Proposed horizontal/directional/multi-lateral plan submission:**

Drill\_8\_PD\_All\_Blue\_Steel\_Fee\_Fed\_Com\_Wells\_Federal\_Minerals\_20181025123222.pdf

DRILL\_8\_Marathon\_BlueSteelFeeWD\_3H\_PrelimA\_36x48WM\_20181025131440.pdf

DRILL\_8\_Marathon\_BlueSteelFeeWD\_3H\_PrelimA\_WPReport\_20181025131448.pdf

BLUE\_STEEL\_21\_WD\_FEE\_3H\_DRILLING\_PLANv2\_20190114085700.pdf

**Other proposed operations facets description:**

- Kelly cock will be in the drill string at all times.
- A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor unobstructed and readily accessible at all times.
- 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.

**Potential Hazards:**

- 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.
- 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.
- No losses are anticipated at this time.
- 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.

**Operator Name:** MARATHON OIL PERMIAN LLC

**Well Name:** BLUE STEEL 21 WD FEE

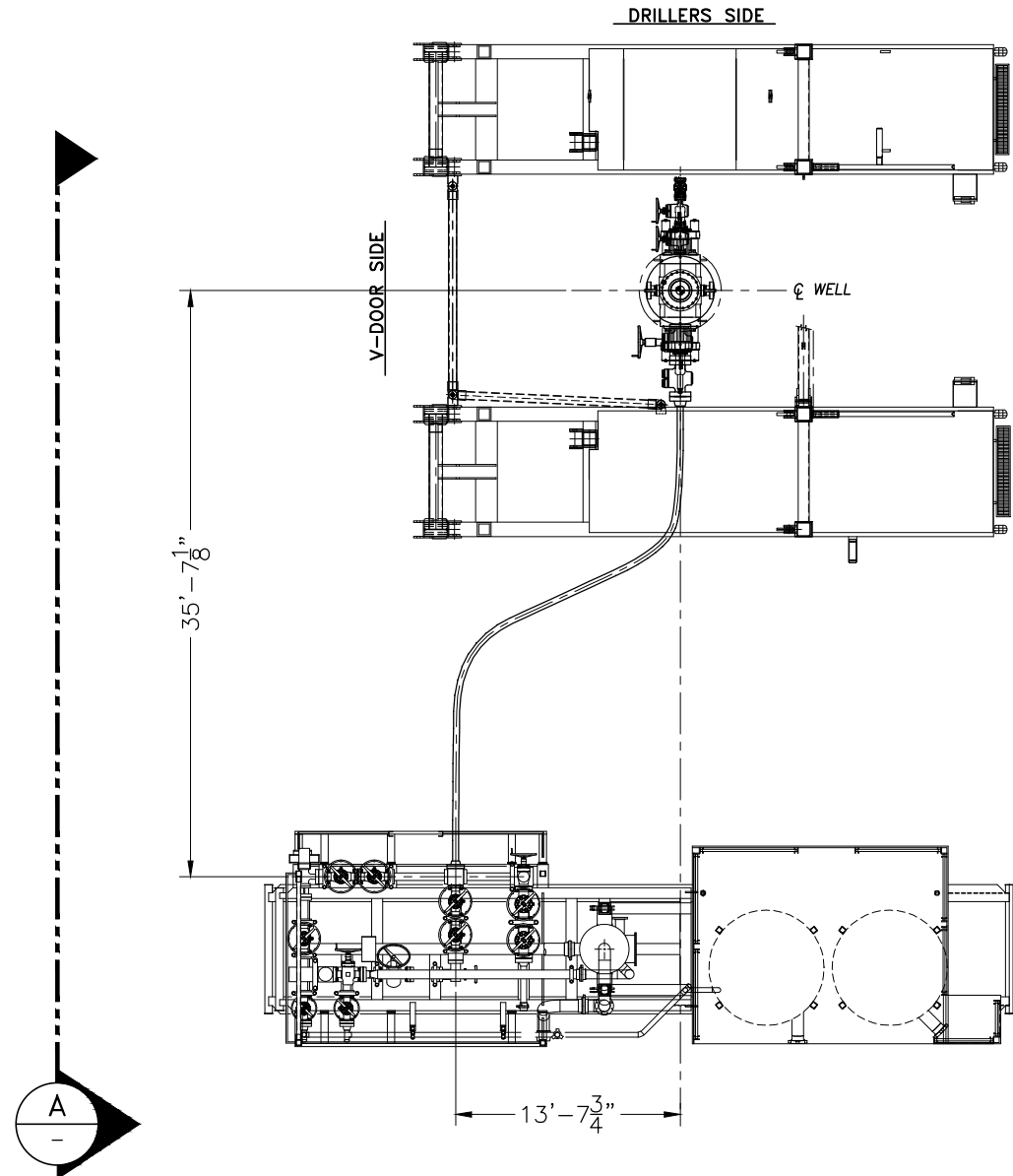
**Well Number:** 3H

**Other proposed operations facets attachment:**

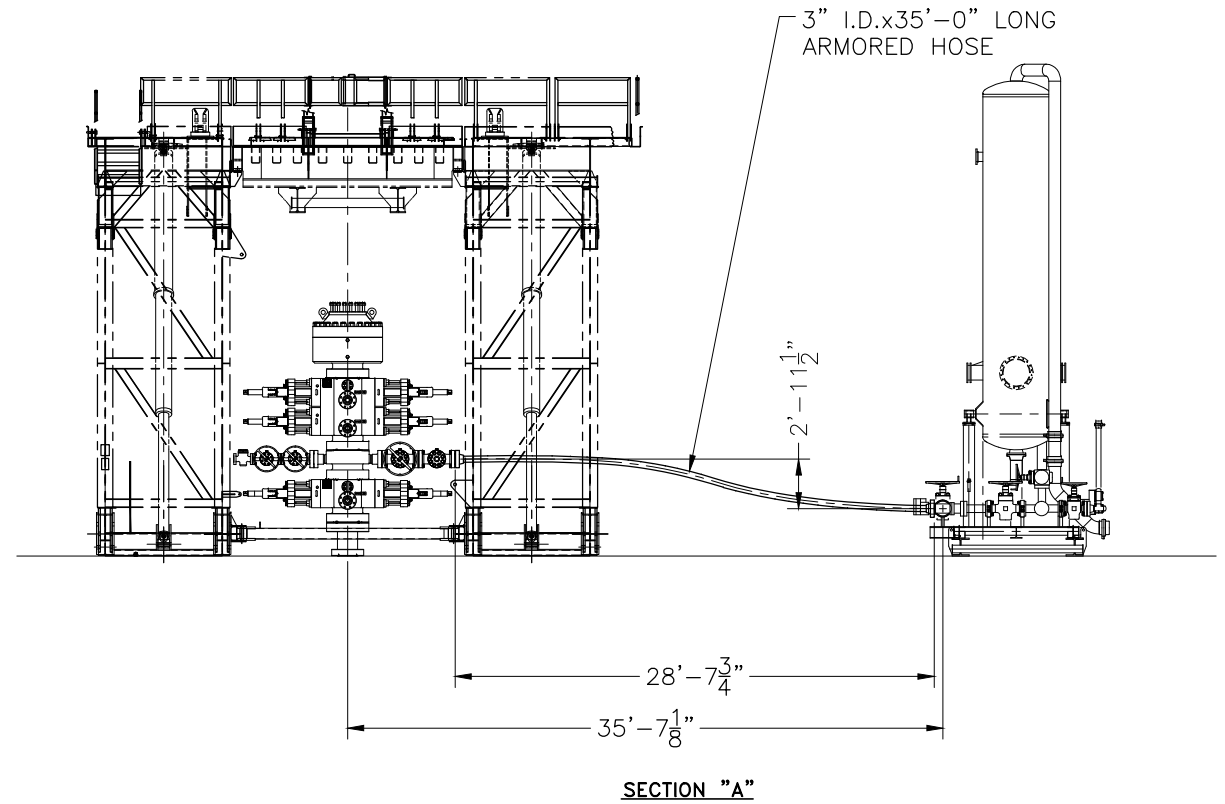
DRILL\_8\_Batch\_Drilling\_Plan\_and\_Surface\_Rig\_Request\_20181022120146.pdf

**Other Variance attachment:**

CONFIDENTIAL



PLAN VIEW



ISSUED FOR FABRICATION  
December-19-2007  
DRAFTSMAN \_\_\_\_\_  
ENGINEER \_\_\_\_\_

PROPRIETARY

THIS DRAWING AND THE IDEAS AND INFORMATION INCLUDED IN THIS DRAWING ARE PROPRIETARY AND ARE NOT TO BE REPRODUCED, DISTRIBUTED OR DISCLOSED IN ANY MANNER, WITHOUT THE PRIOR, WRITTEN CONSENT OF A DULY AUTHORIZED OFFICER OF HELMERICH & PAYNE INT'L DRILLING CO.

ENGINEERING APPROVAL		DATE
△		
△		
△		
△		
△	12/18/07	REMOVED SHEET TOTAL CALLOUT
REV	DATE	DESCRIPTION

		HELMERICH & PAYNE INTERNATIONAL DRILLING CO.	
TITLE: CHOKE LINE SYSTEM FLEXRIG3			
CUSTOMER:			
PROJECT:			
DRAWN: JBG	DATE: 4-10-07	DWG. NO.:	REV:
SCALE: 3/16"=1'	SHEET: 2 OF 3	210-P1-07	A

## 1. DRILLING WELL CONTROL PLAN

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### 1.1 WELL CONTROL - CERTIFICATIONS

#### Required IADC/IWCF Well Control Certifications Supervisor Level:

Any personnel who supervises or operates the BOP must possess a valid current IADC training certification and photo identification. This would include the onsite drilling supervisor, tool pusher/rig manager, driller, and any personnel that will be acting in these capacities. Another example of this may be a wireline or snubbing crew rigged up on the rig to assist the rig, the operator of each system must also have a valid control certification for their level of operation.

BLM recognizes IADC training as the industry approved accredited training. Online self-certifications will not be acceptable. Enforcement actions for the lack of a valid Supervisory Level certificate shall be prompt action to correct the deficiency. **Enforcement actions include but are not limited to immediate replacement of personnel lacking certifications, drilling operations being shut down or installment of a 10M annular.**

IADC Driller Level for all Drillers and general knowledge for the Assistant Driller, Derrick Hands, Floor Hands and Motor Hands is recognized by the BLM; however, a Driller Level certification will need to be presented only if acting in a temporary Driller Level certification capacity.

#### **Well Control-Position/Roles**

IADC Well control training and certification is targeted toward each role, e.g., Supervisor Level toward those who direct, Driller Level to those who act, Introductory to those who need to know.

- **Supervisor Level**
  - Specifies and has oversight that the correct actions are carried out
  - Role is to supervise well control equipment, training, testing, and well control events
  - Directs the testing of BOP and other well control equipment
  - Regularly direct well control crew drills
  - Land based rigs – usually runs the choke during a well kill operation
  - Due to role on the rig, training and certification is targeted more toward management of well control and managing an influx out of the well
- **Driller Level**
  - Performs an action to prevent or respond to well control accident
  - Role is to monitor the well via electronic devices while drilling and detect unplanned influxes
  - Assist with the testing of BOP and other well control equipment
  - Regularly assist with well control crew drills
  - When influx is detected, responsible to close the BOP
  - Due to role on the rig, training and certification is targeted more toward monitoring and shutting the well in (closing the BOP) when an influx is detected

**(Well Control-Positions/Roles Continued)**

- **Derrick Hand, Assistant Driller Introductory Level**
  - Role is to assist Driller with kick detection by physically monitoring the well at the mixing pits/tanks
  - Regularly record mud weights/viscosity for analysis by the Supervisor level and mud engineer so pre-influx signs can be detected
  - Mix required kill fluids as directed by Supervisor or Driller
  - Due to role on the rig, training and certification is targeted more toward monitoring for influxes, either via mud samples or visual signs on the pits/tanks
- **Motorman, Floor Hand Introductory Level**
  - Role is to assist the Supervisor, Driller, or Derrick Hand with detecting influxes
  - Be certain all valves are aligned for proper well control as directed by Supervisor
  - Perform Supervisor or Driller assigned tasks during a well control event
  - Due to role on the rig, training and certification is targeted more toward monitoring for influxes

**1.2 WELL CONTROL-COMPONENT AND PREVENTER COMPATIBILITY CHECKLIST**

The table below, which covers the drilling and casing of the 10M Stack portion of the well, outlines the tubulars and the compatible preventers in use. This table, combined with the mud program, documents that two barriers to flow can be maintained at all times, independent of the rating of the annular preventer.

- **Example 8-3/4" Production hole section, 10M requirement**

Component	OD	Preventer	RWP
Drill pipe	5"	Fixed lower 5" Upper 4.5-7" VBR	10M
HWDP	5"	Fixed lower 5" Upper 4.5-7" VBR	10M
Drill collars and MWD tools	6.25-6.75"	Upper 4.5-7" VBR	10M
Mud Motor	6.75"	Upper 4.5-7" VBR	10M
Production casing	5.5"	Upper 4.5-7" VBR	10M
ALL	0-13-5/8"	Annular	5M
Open-hole	-	Blind Rams	10M

- VBR = Variable Bore Ram. Compatible range listed in chart.

**1.3 WELL CONTROL-BOP TESTING**

BOP Test will be completed per Onshore Oil and Gas Order #2 Well Control requirements. The 5M Annular Preventer on a required 10M BOP stack will be tested to 70 % of rated working pressure including a 10 minute low pressure test. Pressure shall be maintained at least 10 minutes.

## 1.4 WELL CONTROL - DRILLS

The following drills are conducted and recorded in the Daily Drilling Report and the Contractor's reporting system while engaged in drilling operations:

Type	Frequency	Objective	Comments
Shallow gas kick drill - drilling	Once per well with crew on tour	Response training to a shallow gas influx	To be done prior to drilling surface hole if shallow gas is noted
Kick drill - drilling	Once per week per crew	Response training to an influx while drilling (bit on bottom)	Only one kick drill per week per crew is required, alternating between drilling and tripping.
Kick drill - tripping	Once per week per crew	Response training to an influx while tripping (bit off bottom). Practice stabbing TIW valve	
Choke drill	Once per well with crew on tour	Practice in operating the remotely operated choke with pressure in the well	Before drilling out of the last casing set above a prospective reservoir  Include the scenario of flowing well with gas on drill floor as a table top
H <sub>2</sub> S drill	Prior to drilling into a potential H <sub>2</sub> S zone/reservoir	Practice in use of respiratory equipment	

## 1.5 WELL CONTROL – MONITORING

- Drilling operations which utilize static fluid levels in the wellbore as the active barrier element, a means of accurately monitoring fill-up and displacement volumes during trips are available to the driller and operator. A recirculating trip tank is installed and equipped with a volume indicator easily read from the driller's / operator's position. This data is recorded on a calibrated chart recorder or digitally. The actual volumes are compared to the calculated volumes.
- The On-Site Supervisor ensures hole-filling and pit monitoring procedures are established and documented for every rig operation.
- The well is kept full of fluid with a known density and monitored at all times even when out of the hole.
- Flow checks are a minimum of 15 minutes.
- A flow check is made:
  - In the event of a drilling break.
  - After indications of down hole gains or losses.
  - Prior to all trips out of the hole.
  - After pulling into the casing shoe.
  - Before the BHA enters the BOP stack.
  - If trip displacement is incorrect.

**Well Control-Monitoring (Continued)**

- Prior to dropping a survey instrument.
- Prior to dropping a core ball.
- After a well kill operation.
- When the mud density is reduced in the well.
- Flow checks may be made at any time at the sole discretion of the driller or his designate. The Onsite Supervisor ensures that personnel are aware of this authority and the authority to close the well in immediately without further consultation.
- Record slow circulating rates ( SCR ) after each crew change, bit trip, and 500' of new hole drilled and after any variance greater than 0.2 ppg in MW. Slow pump rate recordings should include return flow percent, TVD, MD & pressure. SCR's will be done on all pumps at 30, 40 & 50 SPM. Pressures will be recorded at the choke panel. SCR will be recorded in the IADC daily report and MRO Wellview daily report
- Drilling blind (i.e. without returns) is permissible only in known lithology where the absence of hydrocarbons has been predetermined and written approval of the Drilling Manager.
- All open hole logs to be run with pack-off, lubricator or Drilling Manager approved alternative means.
- The Drilling Contractor has a fully working pit level totalizer / monitoring system with read out for the driller and an audible alarm set to 10 BBL gain / loss volume. Systems are selectable to enable monitoring of all pits in use. Pit volumes are monitored at all times, especially when transferring fluids. Both systems data is recorded on a calibrated chart recorder or electronically.
- The Drilling Contractor has a fully working return mud flow indicator with drillers display and an audible alarm, and is adjustable to record any variance in return volumes.

**1.6 WELL CONTROL – SHUT IN**

- The “hard shut in” method (i.e. against a closed choke using either an annular or ram type preventer) is the Company standard.
- The HCR(s) or failsafe valves are left closed during drilling to prevent any erosion and buildup of solids. The adjustable choke should also be left closed.
- The rig specific shut in procedure, the BOP configuration along with space-out position for the tool joints is posted in the Driller's control cabin or doghouse.
- No well kill operation commences until there is a plan agreed by the Superintendent, On-Site Supervisor and the Drilling Manager.
- During a well kill by circulation, constant bottom hole pressure is maintained throughout.
- Kill sheets are maintained by the Driller and posted in the Driller's control cabin or doghouse. The sheet is updated at a minimum every 500 feet.

## 2. SHUT-IN PROCEDURES:

---

### 2.1 PROCEDURE WHILE DRILLING

- Sound alarm (alert crew)
- Space out drill string – Stop rotating, pick the drill string up off bottom, and space out to ensure no tool joint is located in the BOP element selected for initial closure.
- Shut down pumps (stop pumps and observe well.)
- Shut-in Well - If flow is suspected or confirmed, close uppermost applicable BOP element. (HCR and choke will already be in the closed position.)
  - **Note:** Either the uppermost pipe ram or annular preventer can be used.
- Confirm shut-in
- Notify toolpusher/company representative
- Gather all relevant data required:
  - SIDPP and SICP
  - Hole Depth and Hole TVD
  - Pit gain
  - Time
  - Kick Volume
  - Pipe depth
  - MW in, MW out
  - SPR's (Slow Pump Rate's)
- Regroup and identify forward plan (let well stabilize, update kill sheet, inventory mud additives and mud volumes on location)
- Company Representative, Drilling Superintendent, Drilling Engineer and Drilling Manager will discuss well control kill method to be utilized. A verbal Risk Assessment and preferred kill method will be finalized. Initial Risk Assessment will be finalized within 1 hour of initial shut in.
- No well kill operation commences until there is a plan agreed by the Superintendent, On-Site Supervisor and the Drilling Contractor PIC.
- Recheck all pressures and fluid volume on accumulator unit
- If pressure has built or is anticipated during the kill to reach 2,500 psi or greater, the annular preventer CANNOT be used as per Oil Company Well Control Policy, swap to the upper BOP pipe ram.

### 2.2 PROCEDURE WHILE TRIPPING

- Sound alarm (alert crew)
- Stab full opening safety valve in the drill string and close.
- Space out drill string (ensure no tool joint is located in the BOP element selected for initial closure).
- Shut down pumps (stop pumps and observe well.)
- Shut-in Well - If flow is suspected or confirmed, close uppermost applicable BOP element. (HCR and choke will already be in the closed position.)
  - **Note:** Either the uppermost pipe ram or annular preventer can be used.
- Confirm shut-in
- Notify tool pusher/company representative
- Gather all relevant data required:
  - SIDPP and SICP
  - Hole Depth and Hole TVD
  - Pit gain



## Procedure While Tripping (Continued)

- Time
  - Kick Volume
  - Pipe depth
  - MW in, MW out
  - SPR's (Slow Pump Rate's)
- Regroup and identify forward plan (let well stabilize, update kill sheet, inventory mud additives and mud volumes on location)
- Company Representative, Drilling Superintendent, Drilling Engineer and Drilling Manager will discuss well control kill method to be utilized. A verbal Risk Assessment and preferred kill method will be finalized. Initial Risk Assessment will be finalized within 1 hour of initial shut in.
- No well kill operation commences until there is a plan agreed by the Superintendent, On-Site Supervisor and the Drilling Contractor PIC.
- Recheck all pressures and fluid volume on accumulator unit  
If pressure has built or is anticipated during the kill to reach X,XXX psi or greater, the annular preventer CANNOT be used as per Company Well Control Policy, swap to the upper BOP pipe ram.

## 2.3 PROCEDURE WHILE RUNNING CASING

- Sound alarm (alert crew)
- Stab crossover and full opening safety valve and close
- Space out casing (ensure no coupling is located in the BOP element selected for initial closure).
- Shut down pumps (stop pumps and observe well.)
- Shut-in Well - If flow is suspected or confirmed, close uppermost applicable BOP element. (HCR and choke will already be in the closed position.)
  - **Note:** Either the uppermost pipe ram or annular preventer can be used.
- Confirm shut-in
- Notify tool pusher/company representative
- Gather all relevant data required:
  - SIDPP and SICP
  - Hole Depth and Hole TVD
  - Pit gain
  - Time
  - Kick Volume
  - Pipe depth
  - MW in, MW out
  - SPR's (Slow Pump Rate's)
- Regroup and identify forward plan (let well stabilize, update kill sheet, inventory mud additives and mud volumes on location)
- Company Representative, Drilling Superintendent, Drilling Engineer and Drilling Manager will discuss well control kill method to be utilized. A verbal Risk Assessment and preferred kill method will be finalized. Initial Risk Assessment will be finalized within 1 hour of initial shut in.
- No well kill operation commences until there is a plan agreed by the Superintendent, On-Site Supervisor and the Drilling Contractor PIC.
- Recheck all pressures and fluid volume on accumulator unit  
If pressure has built or is anticipated during the kill to reach 2,500 psi or greater, the annular preventer CANNOT be used, swap to the upper BOP pipe ram.

## 2.4 PROCEDURE WITH NO PIPE IN HOLE (OPEN HOLE)

- Sound alarm (alert crew)
- Shut-in with blind rams or BSR. (HCR and choke will already be in the closed position.)
- Confirm shut-in
- Notify toolpusher/company representative
- Gather all relevant data required:
  - Shut-In Pressure
  - Hole Depth and Hole TVD
  - Pit gain
  - Time
  - Kick Volume
  - MW in, MW out
  - SPR's (Slow Pump Rate's)
- Regroup and identify forward plan (let well stabilize, update kill sheet, inventory mud additives and mud volumes on location)
- Company Representative, Drilling Superintendent, Drilling Engineer and Drilling Manager will discuss well control kill method to be utilized. A verbal Risk Assessment and preferred kill method will be finalized. Initial Risk Assessment will be finalized within 1 hour of initial shut in.
- No well kill operation commences until there is a plan agreed by the Superintendent, On-Site Supervisor and the Drilling Contractor PIC.
- Recheck all pressures and fluid volume on accumulator unit.

## 2.5 PROCEDURE WHILE PULLING BHA THRU STACK

- PRIOR to pulling last joint of drill pipe thru the stack.
- Perform flow check, if flowing.
- Sound alarm (alert crew).
- Stab full opening safety valve and close
- Space out drill string with tool joint just beneath the upper pipe ram.
- Shut-in using upper pipe ram. (HCR and choke will already be in the closed position).
- Confirm shut-in.
- Notify toolpusher/company representative
- Read and record the following:
  - SIDPP and SICP
  - Pit gain
  - Time
- Regroup and identify forward plan
- **With BHA in the stack and compatible ram preventer and pipe combo immediately available.**
  - Sound alarm (alert crew)
  - Stab crossover and full opening safety valve and close
  - Space out drill string with upset just beneath the compatible pipe ram.
  - Shut-in using compatible pipe ram. (HCR and choke will already be in the closed position.)
  - Confirm shut-in
  - Notify toolpusher/company representative
  - Read and record the following:
    - SIDPP and SICP
    - Pit gain

### Procedures While Pulling BHA thru Stack (Continued)

- Time
  - Regroup and identify forward plan
- **With BHA in the stack and NO compatible ram preventer and pipe combo immediately available.**
  - Sound alarm (alert crew)
  - If possible to pick up high enough, pull string clear of the stack and follow “Open Hole” scenario.
  - If impossible to pick up high enough to pull the string clear of the stack:
  - Stab crossover, make up one joint/stand of drill pipe, and full opening safety valve and close
  - Space out drill string with tool joint just beneath the upper pipe ram.
  - Shut-in using upper pipe ram. (HCR and choke will already be in the closed position.)
  - Confirm shut-in
  - Notify toolpusher/company representative
  - Read and record the following:
    - SIDPP and SICP
    - Pit gain
    - Time

# MARATHON OIL PERMIAN LLC

## DRILLING AND OPERATIONS PLAN

**WELL NAME / NUMBER:** BLUE STEEL 21 WD FEE 3H  
**STATE:** NEW MEXICO **COUNTY:** EDDY

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	TWSP	Range	Section	Aliquot/Lot/Trac	Latitude (NAD 83)	Longitude (NAD 83)	County	State	Meridian	Lease Type	Lease Number	Elevation (ft SS)	MD (RKB)	TVD (RKB)
SHL	270	FNL	1135	FWL	23S	29E	28	NW NW	32.2824788	-103.9948076	EDDY	NM	NMP	F	NMNM086024	3001	0	0
EXIT	0	FNL	548	FWL	23S	29E	28	NW NW	32.28322496	-103.9967096	EDDY	NM	NMP	F	NMNM086024	-1961	5010	4962
KOP	100	FSL	330	FWL	23S	29E	21	SW SW	32.28350155	-103.9974147	EDDY	NM	NMP			-7516	10582	10517
FTP	330	FSL	330	FWL	23S	29E	21	SW SW	32.28413378	-103.9974113	EDDY	NM	NMP			-7986	11119	10987
BHL	330	FNL	330	FWL	23S	29E	16	NW NW	32.31155687	-103.9971569	EDDY	NM	NMP			-8086	21124	11090

### 1. GEOLOGIC NAME OF SURFACE FORMATION

a. Permian/Quaternary Alluvium

### 2. ESTIMATED TOPS OF GEOLOGICAL MARKERS & DEPTHS OF ANTICIPATED FRESH WATER, OIL OR GAS

Formation	True Vertical Depth (ft)	Measured Depth (ft)	Lithologies	Mineral Resources	Producing Formation
Salado	374.0	374.0	Salt/Anhydrite	BRINE	N
Base of Salt	2964.0	2981.4	Limy Sands	BRINE	N
Lamar	3010.0	3028.2	Sand/Shales	OIL	Y
Bell Canyon	3045.0	3063.7	Sands/Shale	OIL	Y
Brushy Canyon	5075.0	5109.2	Sands/Carbonates	OIL	Y
Bone Spring	6704.0	6738.2	Sands/Carbonates	OIL	Y
Wolfcamp	9942.0	10039.5	Carbonates/Shales/Sands	OIL	Y

**DEEPEST EXPECTED FRESH WATER:** 275' TVD

**ANTICIPATED BOTTOM HOLE PRESSURE:** 7,496 psi

**ANTICIPATED BOTTOM HOLE TEMPERATURE:** 195°F

**ANTICIPATED ABNORMAL PRESSURE:** N

**ANTICIPATED ABNORMAL TEMPERATURE:** N

### 3. CASING PROGRAM

String Type	Hole Size	Csg Size	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Weight (lbs/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
Surface	17 1/2	13 3/8	<u>0</u>	<u>350</u>	<u>0</u>	<u>350</u>	54.5	J55	STC	5.52	2.5	2.5
Intermediate I	12 1/4	9 5/8	<u>0</u>	<u>3020</u>	<u>0</u>	<u>3002</u>	40	J55	LTC	1.74	1.15	2.19
Intermediate II	8 3/4	7	<u>0</u>	<u>10100</u>	<u>0</u>	<u>10035</u>	29	P110	BTC	2.21	1.18	1.9
Production Liner	6 1/8	4 1/2	<u>9800</u>	<u>21124</u>	<u>9735</u>	<u>11090</u>	13.5	P110	BTC	1.33	1.56	1.88

Minimum safety factors: Burst 1.125 Collapse 1.125 Tension 1.8 Wet/1.6 Dry

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 <sup>rd</sup> 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 <sup>nd</sup> 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 PROGRAM:

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity (sks)	Yield (ft3/sks)	Density (ppg)	Slurry Volume (ft3)	Excess (%)	Cement Type	Additives
Surface	Lead	--	0	0	0	1.75	13.5	0	100	Class C	
Surface	Tail	--	0	350	356	1.33	14.8	486	100	Class C	0.02 Gal/Sk Defoamer + 0.5% Extender + 1% Accelerator
Intermediate I	Lead	--	0	2000	634	1.75	12.8	1096	75	Class C	0.02 Gal/Sk Defoamer + 0.5% Extender + 1% Accelerator
Intermediate I	Tail	--	2000	3020	360	1.33	14.8	479	50	Class C	0.3 % Retarder
Intermediate II	Lead	--	2720	9100	604	2.7	11	1631	70	Class C	0.85% retarder + 10% extender + 0.02 gal/sk defoamer + 2.0% Extender + 0.15% Viscosifier
Intermediate II	Tail	--	9100	10100	179	1.09	15.6	195	30	Class H	3% extender + 0.15% Dispersant + 0.03 gal/sk retarder
Production Liner	Tail	--	9800	21124	1136	1.22	14.5	1386	30	Class H	0.1% retarder + 3.5% extender + 0.3% fluid loss + 0.1% Dispersant

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. PRESSURE CONTROL EQUIPMENT

BOP installed and tested before drilling	Size?	Min. Required WP	Type	✓	Tested to:
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which hole?					
12 ¼"	13 5/8	5000	Annular	x	70% of working pressure
		10000	Blind Ram		10000
			Pipe Ram	x	
			Double Ram	x	
			Other*		
8 ¾"	13 5/8	5000	Annular	x	70% of working pressure
		10000	Blind Ram		10000
			Pipe Ram	x	
			Double Ram	x	
			Other*		
6 1/8"	13 5/8	5000	Annular	x	70% of working pressure
		10000	Blind Ram		10000
			Pipe Ram	x	
			Double Ram	x	
			Other*		

\*Specify if additional ram is utilized.

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.		

## 6. MUD PROGRAM:

Top Depth	Bottom Depth	Mud Type	Min. Weight (ppg)	Max. Weight (ppg)	Additional Characteristics
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<u>0</u>	<u>350</u>	<u>Water Based Mud</u>	<u>8.4</u>	<u>8.8</u>	
<u>350</u>	<u>3020</u>	<u>Brine</u>	<u>9.9</u>	<u>10.2</u>	
<u>3020</u>	<u>10100</u>	<u>Cut Brine</u>	<u>8.8</u>	<u>9.4</u>	
<u>10100</u>	<u>21124</u>	<u>Oil Based mud</u>	<u>11.5</u>	<u>13.0</u>	

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.

## 7. 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**

## 8. LOGGING / CORING AND TESTING PROGRAM:

- A. Mud Logger: None.
- B. DST's: None.
- C. Open Hole Logs: GR while drilling from Intermediate casing shoe to TD.

## 9. 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.

## 10. 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.

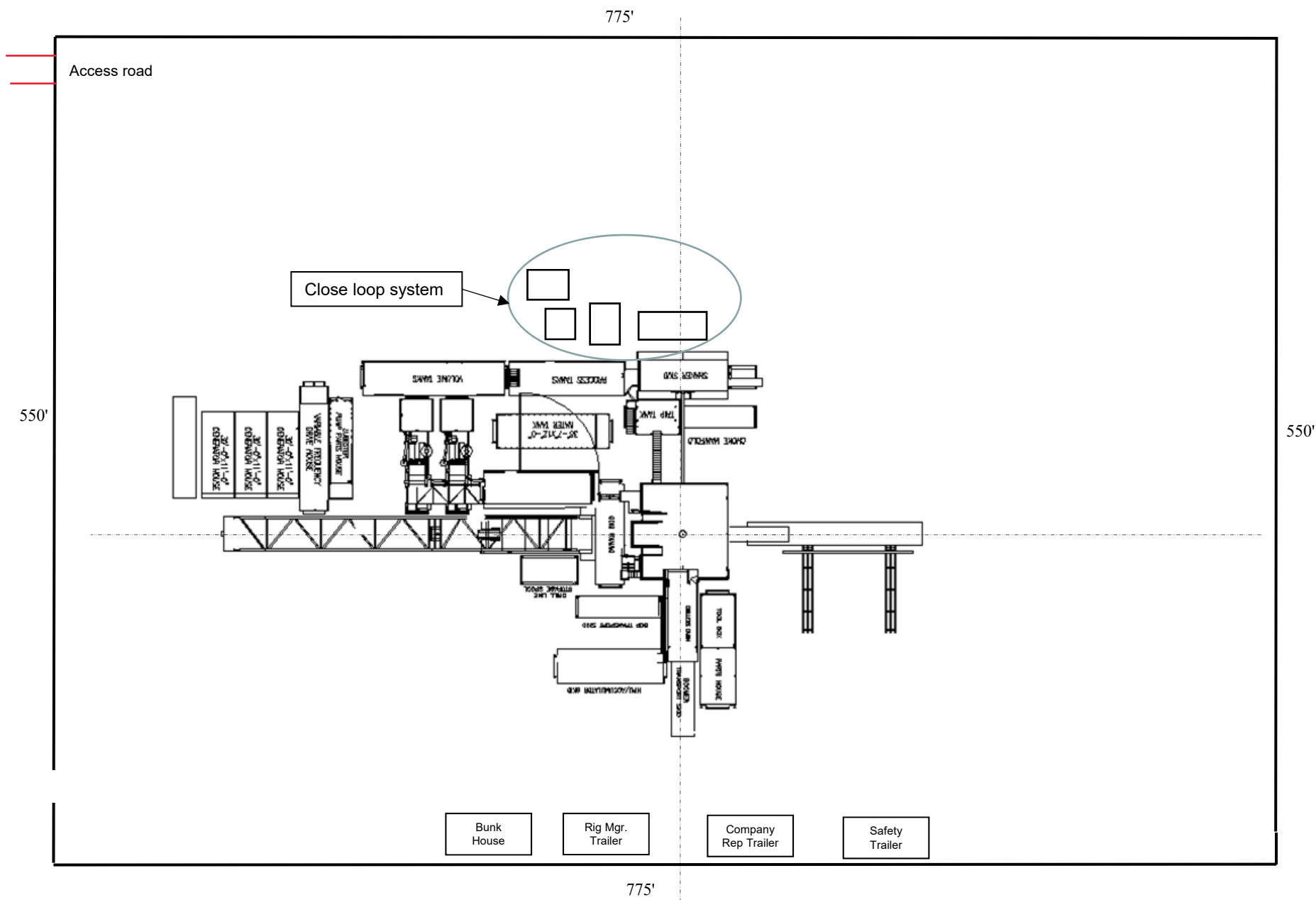
### Batch Drilling Plan

- Marathon Oil Permian LLC. respectfully requests the option to “batch” drill sections of a well with intentions of returning to the well for later completion.
- When it is determined that the use of a “batch” drilling process to increase overall efficiency and reduce rig time on location, the following steps will be utilized to ensure compliant well control before releasing drilling rig during the batch process.
- Succeeding a successful cement job, fluid levels will be monitored in both the annulus and casing string to be verified static.
- A mandrel hanger packoff will be ran and installed in the multi-bowl wellhead isolating and creating a barrier on the annulus. This packoff will be tested to 5,000 PSI validating the seals.
- At this point the well is secure and the drilling adapter will be removed from the wellhead.
- A 13-5/8” 5M temporary abandonment cap will be installed on the wellhead by stud and nut flange. The seals of the TA cap will then be pressure tested to 5,000 PSI.
- The drilling rig will skid to the next well on the pad to continue the batch drilling process.
- When returning to the well with the TA cap, the TA cap will be removed and the BOP will be nipped up on the wellhead.
- A BOP test will then be conducted according to Onshore Order #2 and drilling operations will resume on the subject well.

### Request for Surface Rig

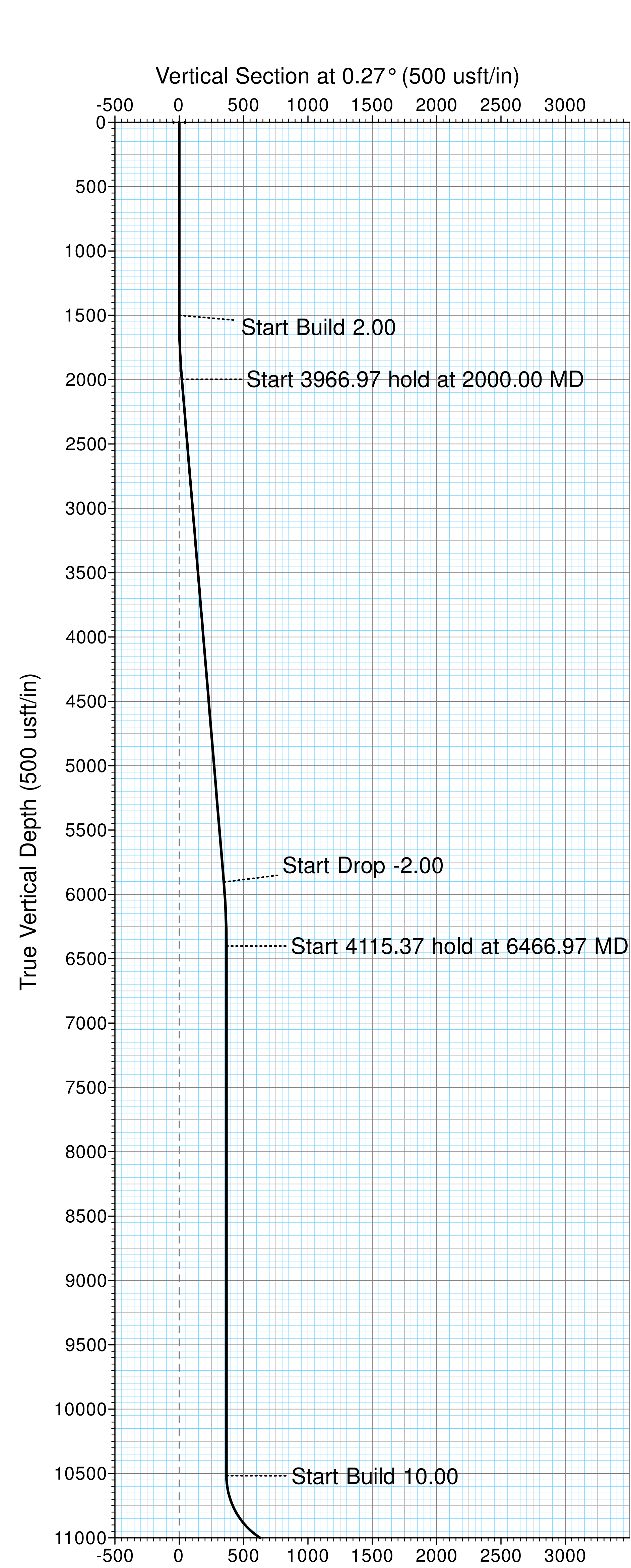
- Marathon Oil Permian LLC. Requests the option to contract a surface rig to drill, set surface casing and cement on the subject well. If the timing between rigs is such that Marathon Oil Permian LLC. would not be able to preset the surface section, the primary drilling rig will drill the well in its entirety per the APD.

## MARATHON OIL - FLEX III PAD (Closed Loop System)



North 





Marathon Oil  
Eddy County, NM  
Blue Steel 21 WD Fee #3H  
Prelim Plan A  
GL: 3001' + KB:  
27' (PD582)

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

RKB Elevation: Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))

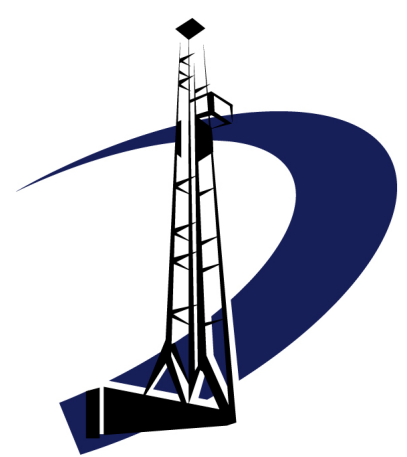
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	466604.24	604770.42	32.282357	-103.994316	

SECTION DETAILS

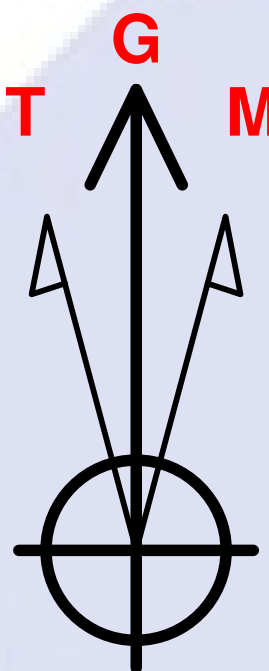
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	VSect
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00
3	2000.00	10.00	298.48	1997.47	20.75	-38.26	2.00	20.57
4	5966.97	10.00	298.48	5904.17	349.25	-643.74	0.00	346.21
5	6466.97	0.00	0.00	6401.63	370.00	-682.00	2.00	366.78
6	10582.34	0.00	0.00	10517.00	370.00	-682.00	0.00	366.78
7	11482.34	90.00	350.50	11089.96	935.10	-776.57	10.00	931.43
8	11807.99	90.00	0.27	11089.96	1259.30	-802.74	3.00	1255.51
9	21124.52	90.00	0.27	11090.00	10575.73	-758.90	0.00	10572.04

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting
[BlueSteelFeeWD#3H]FTP	0.00	599.52	-806.52	467203.76	603963.90
[BlueSteelFeeWD#3H]KOP	10517.00	369.52	-806.84	466973.76	603963.58
[BlueSteelFeeWD#3H]LTP/BHL	11090.00	10575.73	-758.90	477179.97	604011.52



PRODIRECTIONAL



Azimuths to Grid North  
True North: -0.18°  
Magnetic North: 6.94°

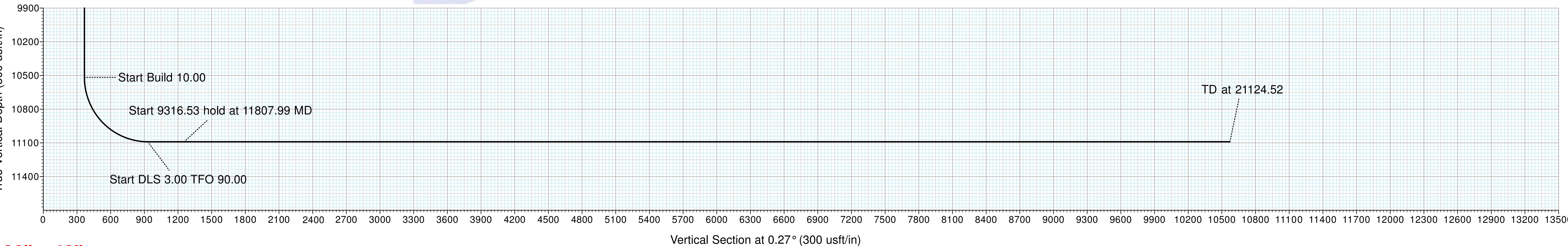
Magnetic Field  
Strength: 47987.0snT  
Dip Angle: 60.07°  
Date: 9/25/2018  
Model: HDGM

Azimuth Corrections

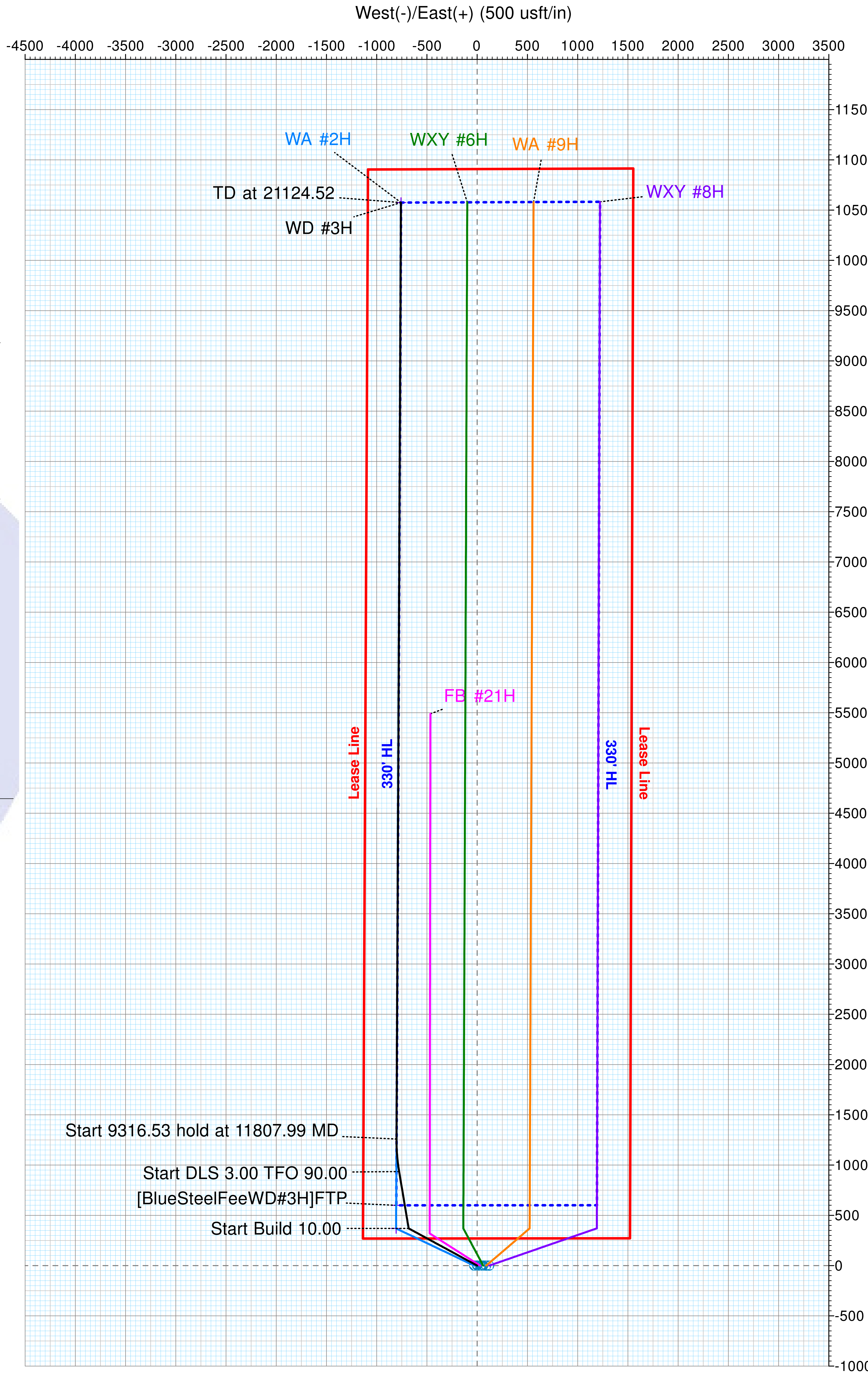
Total Magnetic Corr. (M to G): 6.94°

Declination (M to T): 7.12° East

Target Line: 11090' TVD @ 0' VS: 90° INC



36" x 48"







# Pro Directional Survey Report



<b>Company:</b>	Marathon Oil	<b>Local Co-ordinate Reference:</b>	Well #3H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Site:</b>	Blue Steel 21 WD Fee	<b>MD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Well:</b>	#3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Prelim Plan A	<b>Database:</b>	WellPlanner1

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

Site	Blue Steel 21 WD Fee				
Site Position:		Northing:	466,604.25 usft	Latitude:	32.282356
From:	Map	Easting:	604,860.40 usft	Longitude:	-103.994025
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.18 °

Well	#3H					
Well Position	+N/-S	0.00 usft	Northing:	466,604.24 usft	Latitude:	32.282357
	+E/-W	0.00 usft	Easting:	604,770.42 usft	Longitude:	-103.994317
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,001.00 usft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	9/25/2018	7.12	60.07	47,987.00

<b>Design</b>	Prelim Plan A				
<b>Audit Notes:</b>					
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.00	
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	0.27	

<b>Survey Tool Program</b>	<b>Date</b>	9/25/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
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	21,124.52	Prelim Plan A (OH)	MWD+IFR1	OWSG MWD + IFR1	

<b>Planned Survey</b>									
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>[BlueSteelFeeWD#3H]FTP</b>									
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



# Pro Directional Survey Report



<b>Company:</b>	Marathon Oil	<b>Local Co-ordinate Reference:</b>	Well #3H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Site:</b>	Blue Steel 21 WD Fee	<b>MD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Well:</b>	#3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Prelim Plan A	<b>Database:</b>	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)
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
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
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	2.00	298.48	1,599.98	0.83	-1.53	0.82	2.00	2.00	0.00
1,700.00	4.00	298.48	1,699.84	3.33	-6.13	3.30	2.00	2.00	0.00
1,800.00	6.00	298.48	1,799.45	7.48	-13.79	7.42	2.00	2.00	0.00
1,900.00	8.00	298.48	1,898.70	13.29	-24.51	13.18	2.00	2.00	0.00
2,000.00	10.00	298.48	1,997.47	20.75	-38.26	20.57	2.00	2.00	0.00
2,100.00	10.00	298.48	2,095.95	29.04	-53.52	28.78	0.00	0.00	0.00
2,200.00	10.00	298.48	2,194.43	37.32	-68.78	36.99	0.00	0.00	0.00
2,300.00	10.00	298.48	2,292.91	45.60	-84.05	45.20	0.00	0.00	0.00
2,400.00	10.00	298.48	2,391.39	53.88	-99.31	53.41	0.00	0.00	0.00
2,500.00	10.00	298.48	2,489.87	62.16	-114.57	61.62	0.00	0.00	0.00
2,600.00	10.00	298.48	2,588.35	70.44	-129.83	69.83	0.00	0.00	0.00
2,700.00	10.00	298.48	2,686.83	78.72	-145.10	78.03	0.00	0.00	0.00
2,800.00	10.00	298.48	2,785.31	87.00	-160.36	86.24	0.00	0.00	0.00
2,900.00	10.00	298.48	2,883.79	95.28	-175.62	94.45	0.00	0.00	0.00
3,000.00	10.00	298.48	2,982.27	103.56	-190.89	102.66	0.00	0.00	0.00
3,100.00	10.00	298.48	3,080.75	111.84	-206.15	110.87	0.00	0.00	0.00
3,200.00	10.00	298.48	3,179.23	120.12	-221.41	119.08	0.00	0.00	0.00
3,300.00	10.00	298.48	3,277.72	128.40	-236.68	127.29	0.00	0.00	0.00
3,400.00	10.00	298.48	3,376.20	136.68	-251.94	135.49	0.00	0.00	0.00
3,500.00	10.00	298.48	3,474.68	144.96	-267.20	143.70	0.00	0.00	0.00
3,600.00	10.00	298.48	3,573.16	153.24	-282.47	151.91	0.00	0.00	0.00
3,700.00	10.00	298.48	3,671.64	161.53	-297.73	160.12	0.00	0.00	0.00
3,800.00	10.00	298.48	3,770.12	169.81	-312.99	168.33	0.00	0.00	0.00
3,900.00	10.00	298.48	3,868.60	178.09	-328.26	176.54	0.00	0.00	0.00
4,000.00	10.00	298.48	3,967.08	186.37	-343.52	184.75	0.00	0.00	0.00
4,100.00	10.00	298.48	4,065.56	194.65	-358.78	192.96	0.00	0.00	0.00
4,200.00	10.00	298.48	4,164.04	202.93	-374.05	201.16	0.00	0.00	0.00
4,300.00	10.00	298.48	4,262.52	211.21	-389.31	209.37	0.00	0.00	0.00
4,400.00	10.00	298.48	4,361.00	219.49	-404.57	217.58	0.00	0.00	0.00
4,500.00	10.00	298.48	4,459.48	227.77	-419.84	225.79	0.00	0.00	0.00
4,600.00	10.00	298.48	4,557.97	236.05	-435.10	234.00	0.00	0.00	0.00





# Pro Directional Survey Report



<b>Company:</b>	Marathon Oil	<b>Local Co-ordinate Reference:</b>	Well #3H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Site:</b>	Blue Steel 21 WD Fee	<b>MD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Well:</b>	#3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Prelim Plan A	<b>Database:</b>	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)	
4,700.00	10.00	298.48	4,656.45	244.33	-450.36	242.21	0.00	0.00	0.00	
4,800.00	10.00	298.48	4,754.93	252.61	-465.63	250.42	0.00	0.00	0.00	
4,900.00	10.00	298.48	4,853.41	260.89	-480.89	258.62	0.00	0.00	0.00	
5,000.00	10.00	298.48	4,951.89	269.17	-496.15	266.83	0.00	0.00	0.00	
5,100.00	10.00	298.48	5,050.37	277.45	-511.42	275.04	0.00	0.00	0.00	
5,200.00	10.00	298.48	5,148.85	285.74	-526.68	283.25	0.00	0.00	0.00	
5,300.00	10.00	298.48	5,247.33	294.02	-541.94	291.46	0.00	0.00	0.00	
5,400.00	10.00	298.48	5,345.81	302.30	-557.21	299.67	0.00	0.00	0.00	
5,500.00	10.00	298.48	5,444.29	310.58	-572.47	307.88	0.00	0.00	0.00	
5,600.00	10.00	298.48	5,542.77	318.86	-587.73	316.09	0.00	0.00	0.00	
5,700.00	10.00	298.48	5,641.25	327.14	-603.00	324.29	0.00	0.00	0.00	
5,800.00	10.00	298.48	5,739.73	335.42	-618.26	332.50	0.00	0.00	0.00	
5,900.00	10.00	298.48	5,838.22	343.70	-633.52	340.71	0.00	0.00	0.00	
5,966.97	10.00	298.48	5,904.17	349.25	-643.74	346.21	0.00	0.00	0.00	
6,000.00	9.34	298.48	5,936.73	351.89	-648.62	348.83	2.00	-2.00	0.00	
6,100.00	7.34	298.48	6,035.67	358.81	-661.37	355.69	2.00	-2.00	0.00	
6,200.00	5.34	298.48	6,135.05	364.07	-671.07	360.91	2.00	-2.00	0.00	
6,300.00	3.34	298.48	6,234.76	367.68	-677.72	364.48	2.00	-2.00	0.00	
6,400.00	1.34	298.48	6,334.67	369.63	-681.31	366.41	2.00	-2.00	0.00	
6,466.97	0.00	0.00	6,401.63	370.00	-682.00	366.78	2.00	-2.00	0.00	
6,500.00	0.00	0.00	6,434.66	370.00	-682.00	366.78	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,534.66	370.00	-682.00	366.78	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,634.66	370.00	-682.00	366.78	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,734.66	370.00	-682.00	366.78	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,834.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,000.00	0.00	0.00	6,934.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,100.00	0.00	0.00	7,034.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,200.00	0.00	0.00	7,134.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,300.00	0.00	0.00	7,234.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,400.00	0.00	0.00	7,334.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,500.00	0.00	0.00	7,434.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,600.00	0.00	0.00	7,534.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,700.00	0.00	0.00	7,634.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,800.00	0.00	0.00	7,734.66	370.00	-682.00	366.78	0.00	0.00	0.00	
7,900.00	0.00	0.00	7,834.66	370.00	-682.00	366.78	0.00	0.00	0.00	
8,000.00	0.00	0.00	7,934.66	370.00	-682.00	366.78	0.00	0.00	0.00	
8,100.00	0.00	0.00	8,034.66	370.00	-682.00	366.78	0.00	0.00	0.00	
8,200.00	0.00	0.00	8,134.66	370.00	-682.00	366.78	0.00	0.00	0.00	
8,300.00	0.00	0.00	8,234.66	370.00	-682.00	366.78	0.00	0.00	0.00	
8,400.00	0.00	0.00	8,334.66	370.00	-682.00	366.78	0.00	0.00	0.00	
8,500.00	0.00	0.00	8,434.66	370.00	-682.00	366.78	0.00	0.00	0.00	
8,600.00	0.00	0.00	8,534.66	370.00	-682.00	366.78	0.00	0.00	0.00	



# Pro Directional Survey Report



<b>Company:</b>	Marathon Oil	<b>Local Co-ordinate Reference:</b>	Well #3H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Site:</b>	Blue Steel 21 WD Fee	<b>MD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Well:</b>	#3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Prelim Plan A	<b>Database:</b>	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)
8,700.00	0.00	0.00	8,634.66	370.00	-682.00	366.78	0.00	0.00	0.00
8,800.00	0.00	0.00	8,734.66	370.00	-682.00	366.78	0.00	0.00	0.00
8,900.00	0.00	0.00	8,834.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,000.00	0.00	0.00	8,934.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,100.00	0.00	0.00	9,034.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,200.00	0.00	0.00	9,134.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,300.00	0.00	0.00	9,234.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,400.00	0.00	0.00	9,334.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,500.00	0.00	0.00	9,434.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,600.00	0.00	0.00	9,534.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,700.00	0.00	0.00	9,634.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,800.00	0.00	0.00	9,734.66	370.00	-682.00	366.78	0.00	0.00	0.00
9,900.00	0.00	0.00	9,834.66	370.00	-682.00	366.78	0.00	0.00	0.00
10,000.00	0.00	0.00	9,934.66	370.00	-682.00	366.78	0.00	0.00	0.00
10,100.00	0.00	0.00	10,034.66	370.00	-682.00	366.78	0.00	0.00	0.00
10,200.00	0.00	0.00	10,134.66	370.00	-682.00	366.78	0.00	0.00	0.00
10,300.00	0.00	0.00	10,234.66	370.00	-682.00	366.78	0.00	0.00	0.00
10,400.00	0.00	0.00	10,334.66	370.00	-682.00	366.78	0.00	0.00	0.00
10,500.00	0.00	0.00	10,434.66	370.00	-682.00	366.78	0.00	0.00	0.00
10,582.34	0.00	0.00	10,517.00	370.00	-682.00	366.78	0.00	0.00	0.00
10,582.65	0.03	350.50	10,517.31	370.00	-682.00	366.78	10.00	10.00	0.00
[BlueSteelFeeWD#3H]KOP									
10,600.00	1.77	350.50	10,534.66	370.27	-682.04	367.05	10.00	10.00	0.00
10,650.00	6.77	350.50	10,584.51	373.94	-682.66	370.71	10.00	10.00	0.00
10,700.00	11.77	350.50	10,633.84	381.87	-683.99	378.65	10.00	10.00	0.00
10,750.00	16.77	350.50	10,682.28	394.02	-686.02	390.79	10.00	10.00	0.00
10,800.00	21.77	350.50	10,729.47	410.29	-688.74	407.04	10.00	10.00	0.00
10,850.00	26.77	350.50	10,775.03	430.55	-692.13	427.28	10.00	10.00	0.00
10,900.00	31.77	350.50	10,818.64	454.65	-696.17	451.37	10.00	10.00	0.00
10,950.00	36.77	350.50	10,859.95	482.41	-700.81	479.10	10.00	10.00	0.00
11,000.00	41.77	350.50	10,898.64	513.61	-706.03	510.28	10.00	10.00	0.00
11,050.00	46.77	350.50	10,934.44	548.02	-711.79	544.66	10.00	10.00	0.00
11,100.00	51.77	350.50	10,967.05	585.38	-718.04	581.99	10.00	10.00	0.00
11,150.00	56.77	350.50	10,996.25	625.39	-724.74	621.97	10.00	10.00	0.00
11,200.00	61.77	350.50	11,021.79	667.77	-731.83	664.31	10.00	10.00	0.00
11,250.00	66.77	350.50	11,043.49	712.18	-739.26	708.69	10.00	10.00	0.00
11,300.00	71.77	350.50	11,061.19	758.28	-746.98	754.76	10.00	10.00	0.00
11,350.00	76.77	350.50	11,074.74	805.74	-754.92	802.17	10.00	10.00	0.00
11,400.00	81.77	350.50	11,084.05	854.17	-763.02	850.57	10.00	10.00	0.00
11,450.00	86.77	350.50	11,089.05	903.22	-771.23	899.58	10.00	10.00	0.00
11,482.34	90.00	350.50	11,089.96	935.10	-776.57	931.43	10.00	10.00	0.00
11,500.00	90.00	351.03	11,089.96	952.53	-779.40	948.85	3.00	0.00	3.00



# Pro Directional Survey Report



<b>Company:</b>	Marathon Oil	<b>Local Co-ordinate Reference:</b>	Well #3H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Site:</b>	Blue Steel 21 WD Fee	<b>MD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Well:</b>	#3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Prelim Plan A	<b>Database:</b>	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)	
11,600.00	90.00	354.03	11,089.96	1,051.67	-792.40	1,047.93	3.00	0.00	3.00	
11,700.00	90.00	357.03	11,089.96	1,151.36	-800.19	1,147.58	3.00	0.00	3.00	
11,807.99	90.00	0.27	11,089.96	1,259.30	-802.74	1,255.51	3.00	0.00	3.00	
11,900.00	90.00	0.27	11,089.96	1,351.31	-802.30	1,347.52	0.00	0.00	0.00	
12,000.00	90.00	0.27	11,089.96	1,451.31	-801.83	1,447.52	0.00	0.00	0.00	
12,100.00	90.00	0.27	11,089.96	1,551.31	-801.36	1,547.52	0.00	0.00	0.00	
12,200.00	90.00	0.27	11,089.96	1,651.31	-800.89	1,647.52	0.00	0.00	0.00	
12,300.00	90.00	0.27	11,089.96	1,751.31	-800.42	1,747.52	0.00	0.00	0.00	
12,400.00	90.00	0.27	11,089.96	1,851.31	-799.95	1,847.52	0.00	0.00	0.00	
12,500.00	90.00	0.27	11,089.96	1,951.31	-799.48	1,947.52	0.00	0.00	0.00	
12,600.00	90.00	0.27	11,089.96	2,051.31	-799.01	2,047.52	0.00	0.00	0.00	
12,700.00	90.00	0.27	11,089.96	2,151.30	-798.54	2,147.52	0.00	0.00	0.00	
12,800.00	90.00	0.27	11,089.96	2,251.30	-798.07	2,247.52	0.00	0.00	0.00	
12,900.00	90.00	0.27	11,089.96	2,351.30	-797.60	2,347.52	0.00	0.00	0.00	
13,000.00	90.00	0.27	11,089.96	2,451.30	-797.13	2,447.52	0.00	0.00	0.00	
13,100.00	90.00	0.27	11,089.96	2,551.30	-796.66	2,547.52	0.00	0.00	0.00	
13,200.00	90.00	0.27	11,089.96	2,651.30	-796.19	2,647.52	0.00	0.00	0.00	
13,300.00	90.00	0.27	11,089.97	2,751.30	-795.72	2,747.52	0.00	0.00	0.00	
13,400.00	90.00	0.27	11,089.97	2,851.30	-795.25	2,847.52	0.00	0.00	0.00	
13,500.00	90.00	0.27	11,089.97	2,951.30	-794.78	2,947.52	0.00	0.00	0.00	
13,600.00	90.00	0.27	11,089.97	3,051.29	-794.30	3,047.52	0.00	0.00	0.00	
13,700.00	90.00	0.27	11,089.97	3,151.29	-793.83	3,147.52	0.00	0.00	0.00	
13,800.00	90.00	0.27	11,089.97	3,251.29	-793.36	3,247.52	0.00	0.00	0.00	
13,900.00	90.00	0.27	11,089.97	3,351.29	-792.89	3,347.52	0.00	0.00	0.00	
14,000.00	90.00	0.27	11,089.97	3,451.29	-792.42	3,447.52	0.00	0.00	0.00	
14,100.00	90.00	0.27	11,089.97	3,551.29	-791.95	3,547.52	0.00	0.00	0.00	
14,200.00	90.00	0.27	11,089.97	3,651.29	-791.48	3,647.52	0.00	0.00	0.00	
14,300.00	90.00	0.27	11,089.97	3,751.29	-791.01	3,747.52	0.00	0.00	0.00	
14,400.00	90.00	0.27	11,089.97	3,851.29	-790.54	3,847.52	0.00	0.00	0.00	
14,500.00	90.00	0.27	11,089.97	3,951.28	-790.07	3,947.52	0.00	0.00	0.00	
14,600.00	90.00	0.27	11,089.97	4,051.28	-789.60	4,047.52	0.00	0.00	0.00	
14,700.00	90.00	0.27	11,089.97	4,151.28	-789.13	4,147.52	0.00	0.00	0.00	
14,800.00	90.00	0.27	11,089.97	4,251.28	-788.66	4,247.52	0.00	0.00	0.00	
14,900.00	90.00	0.27	11,089.97	4,351.28	-788.19	4,347.52	0.00	0.00	0.00	
15,000.00	90.00	0.27	11,089.97	4,451.28	-787.72	4,447.52	0.00	0.00	0.00	
15,100.00	90.00	0.27	11,089.97	4,551.28	-787.25	4,547.52	0.00	0.00	0.00	
15,200.00	90.00	0.27	11,089.97	4,651.28	-786.78	4,647.52	0.00	0.00	0.00	
15,300.00	90.00	0.27	11,089.97	4,751.28	-786.31	4,747.52	0.00	0.00	0.00	
15,400.00	90.00	0.27	11,089.97	4,851.27	-785.84	4,847.52	0.00	0.00	0.00	
15,500.00	90.00	0.27	11,089.98	4,951.27	-785.36	4,947.52	0.00	0.00	0.00	
15,600.00	90.00	0.27	11,089.98	5,051.27	-784.89	5,047.52	0.00	0.00	0.00	
15,700.00	90.00	0.27	11,089.98	5,151.27	-784.42	5,147.52	0.00	0.00	0.00	



# Pro Directional Survey Report



<b>Company:</b>	Marathon Oil	<b>Local Co-ordinate Reference:</b>	Well #3H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Site:</b>	Blue Steel 21 WD Fee	<b>MD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Well:</b>	#3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Prelim Plan A	<b>Database:</b>	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)
15,800.00	90.00	0.27	11,089.98	5,251.27	-783.95	5,247.52	0.00	0.00	0.00
15,900.00	90.00	0.27	11,089.98	5,351.27	-783.48	5,347.52	0.00	0.00	0.00
16,000.00	90.00	0.27	11,089.98	5,451.27	-783.01	5,447.52	0.00	0.00	0.00
16,100.00	90.00	0.27	11,089.98	5,551.27	-782.54	5,547.52	0.00	0.00	0.00
16,200.00	90.00	0.27	11,089.98	5,651.27	-782.07	5,647.52	0.00	0.00	0.00
16,300.00	90.00	0.27	11,089.98	5,751.27	-781.60	5,747.52	0.00	0.00	0.00
16,400.00	90.00	0.27	11,089.98	5,851.26	-781.13	5,847.52	0.00	0.00	0.00
16,500.00	90.00	0.27	11,089.98	5,951.26	-780.66	5,947.52	0.00	0.00	0.00
16,600.00	90.00	0.27	11,089.98	6,051.26	-780.19	6,047.52	0.00	0.00	0.00
16,700.00	90.00	0.27	11,089.98	6,151.26	-779.72	6,147.52	0.00	0.00	0.00
16,800.00	90.00	0.27	11,089.98	6,251.26	-779.25	6,247.52	0.00	0.00	0.00
16,900.00	90.00	0.27	11,089.98	6,351.26	-778.78	6,347.52	0.00	0.00	0.00
17,000.00	90.00	0.27	11,089.98	6,451.26	-778.31	6,447.52	0.00	0.00	0.00
17,100.00	90.00	0.27	11,089.98	6,551.26	-777.84	6,547.52	0.00	0.00	0.00
17,200.00	90.00	0.27	11,089.98	6,651.26	-777.37	6,647.52	0.00	0.00	0.00
17,300.00	90.00	0.27	11,089.98	6,751.25	-776.90	6,747.52	0.00	0.00	0.00
17,400.00	90.00	0.27	11,089.98	6,851.25	-776.42	6,847.52	0.00	0.00	0.00
17,500.00	90.00	0.27	11,089.98	6,951.25	-775.95	6,947.52	0.00	0.00	0.00
17,600.00	90.00	0.27	11,089.98	7,051.25	-775.48	7,047.52	0.00	0.00	0.00
17,700.00	90.00	0.27	11,089.99	7,151.25	-775.01	7,147.52	0.00	0.00	0.00
17,800.00	90.00	0.27	11,089.99	7,251.25	-774.54	7,247.52	0.00	0.00	0.00
17,900.00	90.00	0.27	11,089.99	7,351.25	-774.07	7,347.52	0.00	0.00	0.00
18,000.00	90.00	0.27	11,089.99	7,451.25	-773.60	7,447.52	0.00	0.00	0.00
18,100.00	90.00	0.27	11,089.99	7,551.25	-773.13	7,547.52	0.00	0.00	0.00
18,200.00	90.00	0.27	11,089.99	7,651.24	-772.66	7,647.52	0.00	0.00	0.00
18,300.00	90.00	0.27	11,089.99	7,751.24	-772.19	7,747.52	0.00	0.00	0.00
18,400.00	90.00	0.27	11,089.99	7,851.24	-771.72	7,847.52	0.00	0.00	0.00
18,500.00	90.00	0.27	11,089.99	7,951.24	-771.25	7,947.52	0.00	0.00	0.00
18,600.00	90.00	0.27	11,089.99	8,051.24	-770.78	8,047.52	0.00	0.00	0.00
18,700.00	90.00	0.27	11,089.99	8,151.24	-770.31	8,147.52	0.00	0.00	0.00
18,800.00	90.00	0.27	11,089.99	8,251.24	-769.84	8,247.52	0.00	0.00	0.00
18,900.00	90.00	0.27	11,089.99	8,351.24	-769.37	8,347.52	0.00	0.00	0.00
19,000.00	90.00	0.27	11,089.99	8,451.24	-768.90	8,447.52	0.00	0.00	0.00
19,100.00	90.00	0.27	11,089.99	8,551.23	-768.43	8,547.52	0.00	0.00	0.00
19,200.00	90.00	0.27	11,089.99	8,651.23	-767.96	8,647.52	0.00	0.00	0.00
19,300.00	90.00	0.27	11,089.99	8,751.23	-767.48	8,747.52	0.00	0.00	0.00
19,400.00	90.00	0.27	11,089.99	8,851.23	-767.01	8,847.52	0.00	0.00	0.00
19,500.00	90.00	0.27	11,089.99	8,951.23	-766.54	8,947.52	0.00	0.00	0.00
19,600.00	90.00	0.27	11,089.99	9,051.23	-766.07	9,047.52	0.00	0.00	0.00
19,700.00	90.00	0.27	11,089.99	9,151.23	-765.60	9,147.52	0.00	0.00	0.00
19,800.00	90.00	0.27	11,089.99	9,251.23	-765.13	9,247.52	0.00	0.00	0.00
19,900.00	90.00	0.27	11,089.99	9,351.23	-764.66	9,347.52	0.00	0.00	0.00



# Pro Directional Survey Report



<b>Company:</b>	Marathon Oil	<b>Local Co-ordinate Reference:</b>	Well #3H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Site:</b>	Blue Steel 21 WD Fee	<b>MD Reference:</b>	Well @ 3028.00usft (GL: 3001' + KB: 27' (PD582))
<b>Well:</b>	#3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Prelim Plan A	<b>Database:</b>	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)	
20,000.00	90.00	0.27	11,090.00	9,451.22	-764.19	9,447.52	0.00	0.00	0.00	
20,100.00	90.00	0.27	11,090.00	9,551.22	-763.72	9,547.52	0.00	0.00	0.00	
20,200.00	90.00	0.27	11,090.00	9,651.22	-763.25	9,647.52	0.00	0.00	0.00	
20,300.00	90.00	0.27	11,090.00	9,751.22	-762.78	9,747.52	0.00	0.00	0.00	
20,400.00	90.00	0.27	11,090.00	9,851.22	-762.31	9,847.52	0.00	0.00	0.00	
20,500.00	90.00	0.27	11,090.00	9,951.22	-761.84	9,947.52	0.00	0.00	0.00	
20,600.00	90.00	0.27	11,090.00	10,051.22	-761.37	10,047.52	0.00	0.00	0.00	
20,700.00	90.00	0.27	11,090.00	10,151.22	-760.90	10,147.52	0.00	0.00	0.00	
20,800.00	90.00	0.27	11,090.00	10,251.22	-760.43	10,247.52	0.00	0.00	0.00	
20,900.00	90.00	0.27	11,090.00	10,351.21	-759.96	10,347.52	0.00	0.00	0.00	
21,000.00	90.00	0.27	11,090.00	10,451.21	-759.49	10,447.52	0.00	0.00	0.00	
21,100.00	90.00	0.27	11,090.00	10,551.21	-759.02	10,547.52	0.00	0.00	0.00	
21,124.52	90.00	0.27	11,090.00	10,575.73	-758.90	10,572.04	0.00	0.00	0.00	
[BlueSteelFeeWD#3H]LTP/BHL										

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
[BlueSteelFeeWD#3H]F	0.00	0.00	0.00	599.52	-806.52	467,203.76	603,963.90	32.284012	-103.996920	
- plan misses target center by 1004.94usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)										
- Point										
[BlueSteelFeeWD#3H]K	0.00	0.00	10,517.00	369.52	-806.84	466,973.76	603,963.58	32.283380	-103.996924	
- plan misses target center by 124.84usft at 10582.34usft MD (10517.01 TVD, 370.00 N, -682.00 E)										
- Point										
[BlueSteelFeeWD#3H]L	0.00	0.00	11,090.00	10,575.73	-758.90	477,179.97	604,011.52	32.311435	-103.996665	
- plan hits target center										
- Point										

Checked By: _____	Approved By: _____	Date: _____
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## PECOS DISTRICT DRILLING OPERATIONS CONDITIONS OF APPROVAL

<b>OPERATOR'S NAME:</b>	<b>Marathon Oil Permian LLC</b>
<b>LEASE NO.:</b>	<b>NMNM086024</b>
<b>WELL NAME &amp; NO.:</b>	<b>Blue Steel 21 WD Fee 3H</b>
<b>SURFACE HOLE FOOTAGE:</b>	<b>270' FNL &amp; 1135' FWL</b>
<b>BOTTOM HOLE FOOTAGE:</b>	<b>330' FNL &amp; 330' FWL</b>
<b>LOCATION:</b>	<b>Section 28, T 23S, R 29E, NMPM</b>
<b>COUNTY:</b>	<b>Eddy County, New Mexico</b>

H2S	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Potash	<input type="radio"/> None	<input type="radio"/> Secretary	<input checked="" type="radio"/> R-111-P
Cave/Karst Potential	<input type="radio"/> Low	<input checked="" type="radio"/> Medium	<input type="radio"/> High
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 type="checkbox"/> Fluid Filled	<input type="checkbox"/> Cement Squeeze	<input type="checkbox"/> Pilot Hole
Special Requirements	<input type="checkbox"/> Water Disposal	<input checked="" type="checkbox"/> COM	<input type="checkbox"/> Unit

### A. HYDROGEN SULFIDE

1. A Hydrogen Sulfide (H2S) Drilling Plan shall be activated **500 feet** prior to drilling into the **Bone Spring** formation. As a result, the Hydrogen Sulfide area must meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, please provide measured values and formations to the BLM.

### B. CASING

1. **The 13-3/8" surface casing shall be set at approximately 325'** (a minimum of 25' into the Rustler Anhydrite and above the salt) and cemented to surface.
  - a. **If cement does not circulate to 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 **6 hours** after pumping cement, 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 **24 hours in the Potash Area** or **500 psi** compressive strength, whichever is greater. This is to include the lead cement.
  - c. If cement falls back, remedial cementing will be done prior to drilling out that string.

- d. WOC time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 psi compressive strength, whichever is greater.
2. **The 9-5/8" intermediate casing shall be set at approximately 2900'** and cemented to surface.
  - a. **If cement does not circulate to surface**, see B.1.a, c & d.
  - b. Wait On Cement (WOC) time for a primary cement job is to include the lead cement slurry due to potash.
3. The **7"** intermediate casing shall be cemented to surface:
  - a. **If cement does not circulate to surface**, see B.1.a, c & d.
4. The minimum required fill of cement behind the **4-1/2** inch production liner is:
  - a. Cement should tie back 100' into the previous casing. 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. 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.

#### **D. SPECIAL REQUIREMENTS**

1. 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.
2. The well sign on location shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.
3. Abnormal pressure can be expected when penetrating the Wolfcamp Formation at approximate depth of 9960'.

**DR 4/8/2019**



## GENERAL REQUIREMENTS

1. The BLM is to be notified in advance for a representative to witness:
  - a. Spudding well (minimum of 24 hours)
  - b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
  - c. BOPE tests (minimum of 4 hours)
    - ☒ Chaves and Roosevelt Counties  
Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.  
During office hours call (575) 627-0272.  
After office hours call (575)
    - ☒ Eddy County  
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,  
(575) 361-2822
    - ☒ Lea County  
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575)  
393-3612
2. 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 2<sup>nd</sup> 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.
3. 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.
4. The record of the drilling rate along with the GR/N well log (one log per well pad is acceptable) 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. 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.
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. The results of the test shall be reported to the appropriate BLM office.
- 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. 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.
- f. 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. This test shall be performed prior to the test at full stack pressure.
- g. 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**

- 1. 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**

- 2. 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.
- 3. Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

**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 214466

CONDITIONS

Operator: MARATHON OIL PERMIAN LLC 990 Town & Country Blvd. Houston, TX 77024	OGRID: 372098
	Action Number: 214466
	Action Type: [C-101] BLM - Federal/Indian Land Lease (Form 3160-3)

CONDITIONS

Created By	Condition	Condition Date
john.harrison	Notify OCD 24 hours prior to casing & cement	5/10/2023
john.harrison	Will require a File As Drilled C-102 and a Directional Survey with the C-104	5/10/2023
john.harrison	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	5/10/2023
john.harrison	Cement is required to circulate on both surface and intermediate1 strings of casing	5/10/2023
john.harrison	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	5/10/2023