Form 3160-5
(June 2019)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0137
Expires: October 31, 2021

SUNDRY NOTICES AND REPORTS ON WELLS

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

SUBMIT IN TRIPLICATE *- Other instructions on page 2*

5. Lease Serial No. NMNM113970

6. If Indian, Allottee or Tribe Name

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

1. Type of Well
☑ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No. MAMMOTH FEDERAL 26 34 1 WXY

2. Name of Operator MARATHON OIL PERMIAN LLC

9. API Well No. 3002546134

3a. Address 990 TOWN & COUNTRY BLVD, HOUSTON, TX

3b. Phone No. *(include area code)* (000) 000-0000

10. Field and Pool or Exploratory Area WC 025 G 09 S263504N/WOLFCAMP

4. Location of Well *(Footage, Sec., T.,R.,M., or Survey Description)* SEC 1/T26S/R34E/NMP

11. Country or Parish, State LEA/NM

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

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

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be perfonned or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has detennined that the site is ready for final inspection.)

Marathon Oil Permian LLC. respectfully requests to make changes to the Approved APD for the above listed well. See attachment for a summary of the requested changes along with update well information such as a Revised C-102 Well Plat, Revised Directional Drilling Well Plan and Revised Drilling and Operations Plan.

Note: NO SURFACE CHANGES are being requested.

14. I hereby certify that the foregoing is true and correct. Name *(Printed/Typed)* MELISSA SZUDERA / Ph: (713) 296-3179

Title REGULATORY COMPLIANCE REPRESENTATIVE

Signature

Date 01/24/2022

THE SPACE FOR FEDERAL OR STATE OFICE USE

Approved by CHRISTOPHER WALLS / Ph: (575) 234-2234 / Approved

Title Petroleum Engineer

Date 03/07/2022

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

Office CARLSBAD

Title 18 U.S.C Section 1001 and Title 43 U.S.C Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

GENERAL INSTRUCTIONS

This form is designed for submitting proposals to perform certain well operations and reports of such operations when completed as indicated on Federal and Indian lands pursuant to applicable Federal law and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local area or regional procedures and practices, are either shown below, will be issued by or may be obtained from the local Federal office.

SPECIFIC INSTRUCTIONS

Item 4 - Locations on Federal or Indian land should be described in accordance with Federal requirements. Consult the local Federal office for specific instructions.

Item 13: Proposals to abandon a well and subsequent reports of abandonment should include such special information as is required by the local Federal office. In addition, such proposals and reports should include reasons for the abandonment; data on any former or present productive zones or other zones with present significant fluid contents not sealed off by cement or otherwise; depths (top and bottom) and method of placement of cement plugs; mud or other material placed below, between and above plugs; amount, size, method of parting of any casing, liner or tubing pulled and the depth to the top of any tubing left in the hole; method of closing top of well and date well site conditioned for final inspection looking for approval of the abandonment. If the proposal will involve **hydraulic fracturing operations**, you must comply with 43 CFR 3162.3-3, including providing information about the protection of usable water. Operators should provide the best available information about all formations containing water and their depths. This information could include data and interpretation of resistivity logs run on nearby wells. Information may also be obtained from state or tribal regulatory agencies and from local BLM offices.

NOTICES

The privacy Act of 1974 and the regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.
AUTHORITY: 30 U.S.C. 181 et seq., 351 et seq., 25 U.S.C. 396; 43 CFR 3160.
PRINCIPAL PURPOSE: The information is used to: (1) Evaluate, when appropriate, approve applications, and report completion of subsequent well operations, on a Federal or Indian lease; and (2) document for administrative use, information for the management, disposal and use of National Resource lands and resources, such as: (a) evaluating the equipment and procedures to be used during a proposed subsequent well operation and reviewing the completed well operations for compliance with the approved plan; (b) requesting and granting approval to perform those actions covered by 43 CFR 3162.3-2, 3162.3-3, and 3162.3-4; (c) reporting the beginning or resumption of production, as required by 43 CFR 3162.4-1(c)and (d) analyzing future applications to drill or modify operations in light of data obtained and methods used.
ROUTINE USES: Information from the record and/or the record will be transferred to appropriate Federal, State, local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecutions in connection with congressional inquiries or to consumer reporting agencies to facilitate collection of debts owed the Government.
EFFECT OF NOT PROVIDING THE INFORMATION: Filing of this notice and report and disclosure of the information is mandatory for those subsequent well operations specified in 43 CFR 3162.3-2, 3162.3-3, 3162.3-4.

The Paperwork Reduction Act of 1995 requires us to inform you that:
The BLM collects this information to evaluate proposed and/or completed subsequent well operations on Federal or Indian oil and gas leases.
Response to this request is mandatory.
The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 8 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect ofthis form to U.S. Department ofthe Interior, Bureau ofLand Management (1004-0137), Bureau Information Collection Clearance Officer (WO-630), 1849 C St., N.W., Mail Stop 401 LS, Washington, D.C. 20240

Additional Information

Location of Well

0. SHL: SESE / 835 FSL / 1255 FEL / TWSP: 26S / RANGE: 34E / SECTION: 1 / LAT: 32.0674346 / LONG: -103.4191776 (TVD: 0 feet, MD: 0 feet)

PPP: SWSE / 150 FSL / 1982 FEL / TWSP: 26S / RANGE: 34E / SECTION: 1 / LAT: 32.0655584 / LONG: -103.4215256 (TVD: 12602 feet, MD: 13055 feet)

BHL: NWNE / 150 FNL / 1986 FEL / TWSP: 26S / RANGE: 34E / SECTION: 1 / LAT: 32.0792422 / LONG: -103.4215409 (TVD: 12563 feet, MD: 17513 feet)

Well Name: THUNDERBIRD 1-36 TB FED

Well Location: T26S / R34E / SEC 1 / SESE / 32.0674346 / -103.4191776

County or Parish/State: LEA / NM

Well Number: 14H

Type of Well: OIL WELL

Allottee or Tribe Name:

Lease Number: NMNM113970

Unit or CA Name:

Unit or CA Number:

US Well Number: 300254613400X1

Well Status: Approved Application for Permit to Drill

Operator: MARATHON OIL PERMIAN LLC

Notice of Intent

Sundry ID: 2653899

Type of Submission: Notice of Intent

Type of Action: APD Change

Date Sundry Submitted: 01/26/2022

Time Sundry Submitted: 08:03

Date proposed operation will begin: 02/01/2022

Procedure Description: Marathon Oil Permian LLC. respectfully requests to make changes to the Approved APD for the above listed well. See attachment for a summary of the requested changes along with update well information such as a Revised C-102 Well Plat, Revised Directional Drilling Well Plan and Revised Drilling and Operations Plan. Note: NO SURFACE CHANGES are being requested.

NOI Attachments

Procedure Description

BLM_SN_Sub_Att_Thunderbird_1_36_TB_Federal_14H_sub_01.26.2022_20220126080337.pdf

Conditions of Approval

Additional Reviews

Thunderbird_1_36_TB__Fed_14H_COA_20220307053236.pdf

Well Name: THUNDERBIRD 1-36 TB FED

Well Location: T26S / R34E / SEC 1 / SESE / 32.0674346 / -103.4191776

County or Parish/State: LEA / NM

Well Number: 14H

Type of Well: OIL WELL

Allottee or Tribe Name:

Lease Number: NMNM113970

Unit or CA Name:

Unit or CA Number:

US Well Number: 300254613400X1

Well Status: Approved Application for Permit to Drill

Operator: MARATHON OIL PERMIAN LLC

Operator Certification

I certify that the foregoing is true and correct. 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. Electronic submission of Sundry Notices through this system satisfies regulations requiring a submission of Form 3160-5 or a Sundry Notice.

Operator Electronic Signature: MELISSA SZUDERA

Signed on: JAN 24, 2022 02:18 PM

Name: MARATHON OIL PERMIAN LLC

Title: REGULATORY COMPLIANCE REPRESENTATIVE

Street Address: 990 TOWN & COUNTRY BLVD

City: Houston **State:** TX

Phone: (713) 296-3179

Email address: mszudera@marathonoil.com

Field Representative

Representative Name:

Street Address:

City: **State:** **Zip:**

Phone:

Email address:

BLM Point of Contact

BLM POC Name: CHRISTOPHER WALLS

BLM POC Title: Petroleum Engineer

BLM POC Phone: 5752342234

BLM POC Email Address: cwalls@blm.gov

Disposition: Approved

Disposition Date: 03/07/2022

Signature: Chris Walls

PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**Marathon Oil**
LEASE NO.:	**NMNM065441**
LOCATION:	Section 1, T.26 S., R.34 E., NMPM
COUNTY:	Lea County, New Mexico

WELL NAME & NO.:	Thunderbird 1-36 TB Fed 14H
SURFACE HOLE FOOTAGE:	852'/S & 1230'/E
BOTTOM HOLE FOOTAGE	100'/N & 1883'/E

COA

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

A. HYDROGEN SULFIDE

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

B. CASING

- The **13-3/8** inch surface casing shall be set at approximately **1141** feet (a minimum of 25 feet (Lea County) into the Rustler Anhydrite and above the salt) and cemented to the surface.
  a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
  b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to

include the lead cement)

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

Intermediate casing must be kept 50% fluid filled to meet BLM minimum collapse requirement.

1. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:
   - Cement to surface. If cement does not circulate see B.1.a, c-d above. **Excess calculate to 20 %. Additional cement maybe required.**

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

Opeator shall contact BLM before commencing

2. The minimum required fill of cement behind the **5-1/2** inch production casing is:
   - Cement should tie-back at least **200 feet** into previous casing string. Operator shall provide method of verification. **Excess calculate to -30 %. Additional cement maybe required.**

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).

2. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **10,000 (10M)** psi. **Variance is approved to use a 5000 (5M) Annular which shall be tested to 5000 (5M) psi.**

   a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
   b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
   c. Manufacturer representative shall install the test plug for the initial BOP test.
   d. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

D. SPECIAL REQUIREMENT (S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Santa Fe Office, 301 Dinosaur Trail Santa Fe, New Mexico 87508, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

GENERAL REQUIREMENTS

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

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

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

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

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.

a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like

pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).

b. When the operator proposes to set surface casing with Spudder Rig
- **Notify the BLM when moving in and removing the Spudder Rig.**
- **Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.**
- **BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.**

2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log. The casing intergrity 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 intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.
8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: The flex line must meet the requirements of API 16C. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:

a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
c. Manufacturer representative shall install the test plug for the initial BOP test.
d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

    a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

    b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).

    c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

e. The results of the test shall be reported to the appropriate BLM office.

f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.

g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

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

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.
ZS 022522

Marathon Oil Permian, LLC.

Summary of Changes for NOI Change to AAPD Sundry Submittal

Well Name: **Thunderbird 1-36 TB Federal 14H**
APD ID Num: **10400032717**
API Num: **3002546134**

		Approved NOI Sundry	NEW NOI Sundry
Well Name & Number		Thunderbird 1 TB Federal 14H	Thunderbird 1-36 TB Federal 14H
Lateral Length		SL	XXL
Target Formation		TB	TB
TVD		12442	12453
MD		17342	22703
Pool Name		Hardin Tank; Bone Spring	Hardin Tank; Bone Spring
Pool Code		96661	96661
Dedicated Acreage		160	320
SHL	FOOTAGE	852 FSL 1230 FEL	852 FSL 1230 FEL
	UL	P	P
	Q/Q	SESE	SESE
	S-T-R	1-26S-34E	1-26S-34E
	Latitude (NAD83)	32.06748203	32.06748203
	Longitude (NAD83)	-103.4190982	-103.4190982
FTP	FOOTAGE	100 FSL 1883 FEL	100 FSL 1883 FEL
	UL	O	O
	Q/Q	SWSE	SWSE
	S-T-R	1-26S-34E	1-26S-34E
	Latitude (NAD83)	32.06542013	32.06542013
	Longitude (NAD83)	-103.4212039	-103.4212039
LTP	FOOTAGE	100 FNL 1883 FEL	100 FNL 1883 FEL
	UL	B	B
	Q/Q	NWNE	NWNE
	S-T-R	1-26S-34E	36-26S-34E
	Latitude (NAD83)	32.07937945	32.09388872
	Longitude (NAD83)	-103.4212081	-103.4212195
Casing Stages		3	3
Surf Csg	Top MD	0	0
	Bottom MD	1200	1200
	Size, Weight, Grade Connection	10.75" 40.5# J55 STC	13.375" 54.5# J55 BTC
Int 1 Csg	Top MD	0	0
	Bottom MD	11500	11869
	Size, Weight, Grade Connection	7.625" 29.7# P110 BTC	9.625" 40# P110HC
Prod Csg	Top MD	0	0
	Bottom MD	17342	22703
	Size, Weight, Grade Connection	5.5" 20# P110 BTC	5.5" 23# P110 TLW

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

[X] AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
30-025-46134	96661	HARDIN TANK; BONE SPRING

[4] Property Code	[5] Property Name	[6] Well Number
	THUNDERBIRD 1-36 TB FEDERAL	14H

[7] OGRID No.	[8] Operator Name	[9] Elevation
372098	MARATHON OIL PERMIAN LLC	3281'

[10] Surface Location

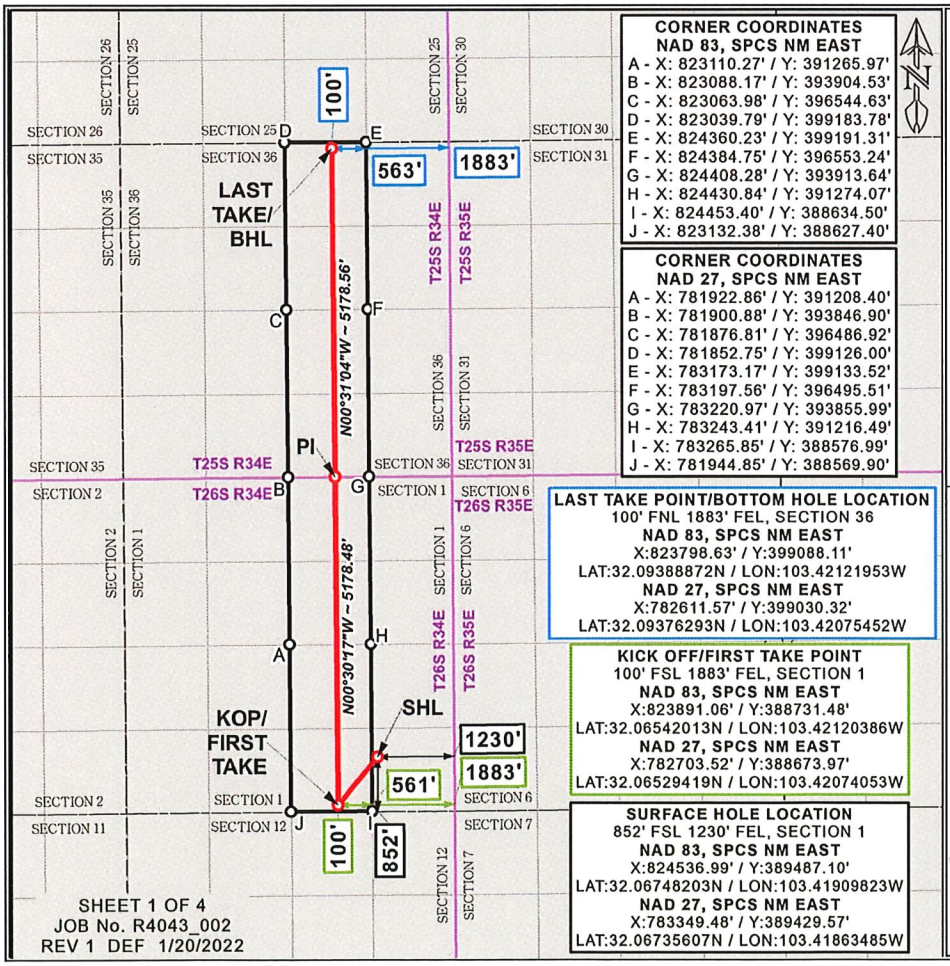
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	1	26S	34E		852	SOUTH	1230	EAST	LEA

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	36	25S	34E		100	NORTH	1883	EAST	LEA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
320.0			

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.



CORNER COORDINATES NAD 83, SPCS NM EAST
A - X: 823110.27' / Y: 391265.97'
B - X: 823088.17' / Y: 393904.53'
C - X: 823063.98' / Y: 396544.63'
D - X: 823039.79' / Y: 399183.78'
E - X: 824360.23' / Y: 399191.31'
F - X: 824384.75' / Y: 396553.24'
G - X: 824408.28' / Y: 393913.64'
H - X: 824430.84' / Y: 391274.07'
I - X: 824453.40' / Y: 388634.50'
J - X: 823132.38' / Y: 388627.40'

CORNER COORDINATES NAD 27, SPCS NM EAST
A - X: 781922.86' / Y: 391208.40'
B - X: 781900.88' / Y: 393846.90'
C - X: 781876.81' / Y: 396486.92'
D - X: 781852.75' / Y: 399126.00'
E - X: 783173.17' / Y: 399133.52'
F - X: 783197.56' / Y: 396495.51'
G - X: 783220.97' / Y: 393855.99'
H - X: 783243.41' / Y: 391216.49'
I - X: 783265.85' / Y: 388576.99'
J - X: 781944.85' / Y: 388569.90'

LAST TAKE POINT/BOTTOM HOLE LOCATION
100' FNL 1883' FEL, SECTION 36
NAD 83, SPCS NM EAST
X:823798.63' / Y:399088.11'
LAT:32.09388872N / LON:103.42121953W
NAD 27, SPCS NM EAST
X:782611.57' / Y:399030.32'
LAT:32.09376293N / LON:103.42075452W

KICK OFF/FIRST TAKE POINT
100' FSL 1883' FEL, SECTION 1
NAD 83, SPCS NM EAST
X:823891.06' / Y:388731.48'
LAT:32.06542013N / LON:103.42120386W
NAD 27, SPCS NM EAST
X:782703.52' / Y:388673.97'
LAT:32.06529419N / LON:103.42074053W

SURFACE HOLE LOCATION
852' FSL 1230' FEL, SECTION 1
NAD 83, SPCS NM EAST
X:824536.99' / Y:389487.10'
LAT:32.06748203N / LON:103.41909823W
NAD 27, SPCS NM EAST
X:783349.48' / Y:389429.57'
LAT:32.06735607N / LON:103.41863485W

[17] OPERATOR CERTIFICATION

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

01/25/2022
Signature Date

Melissa Szudera
Printed Name

mszudera@marathonoil.com
E-mail Address

[18] SURVEYOR CERTIFICATION

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

JANUARY 25, 2022
Date of Survey

Signature and Seal of Professional Surveyor

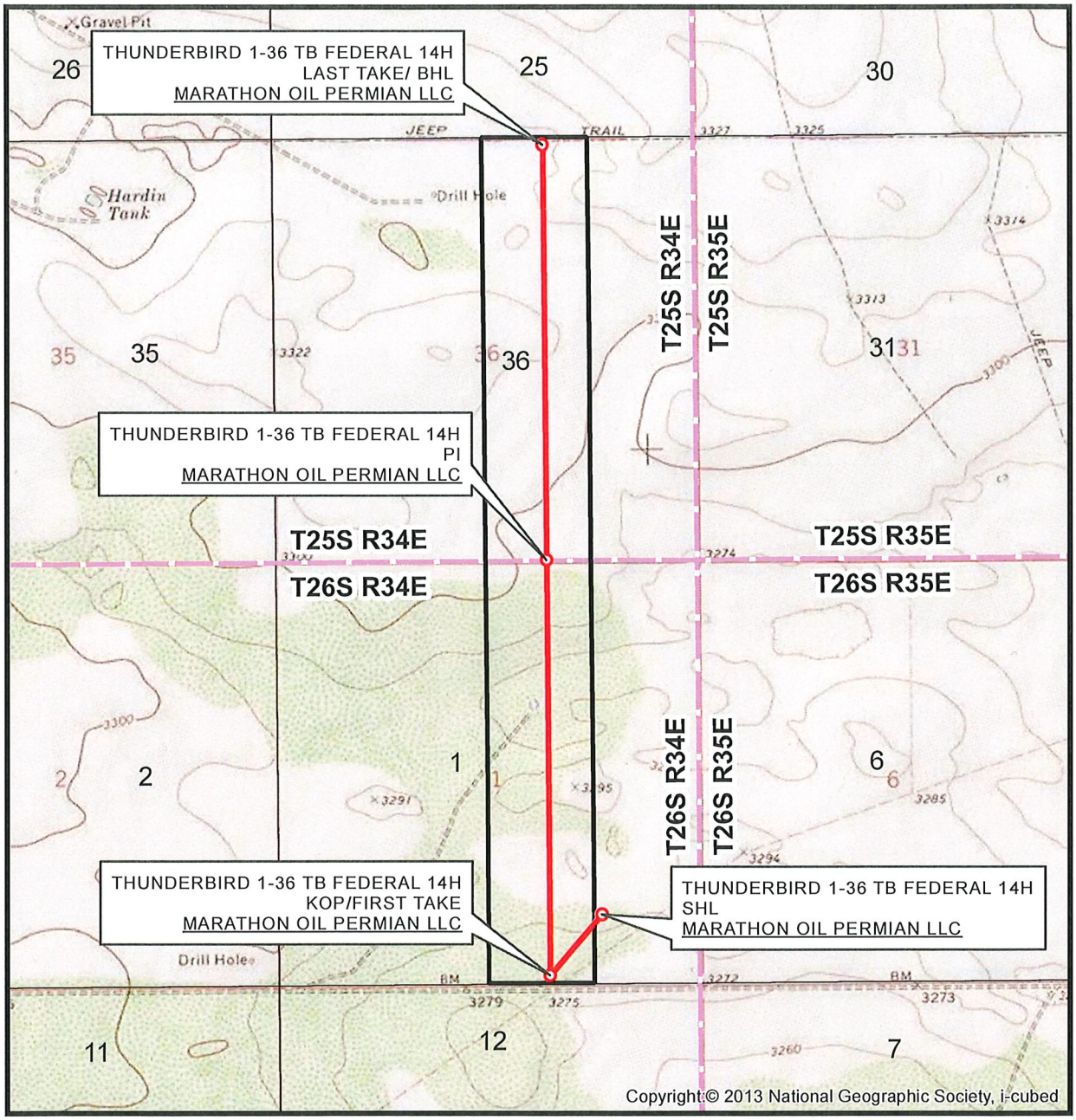
DAVID W. MYERS NEW MEXICO 11403 PROFESSIONAL SURVEYOR

Certificate Number
DAVID W. MYERS 11403

Distances/areas relative to NAD 83 Combined Scale Factor: 0.99985058 Convergence Angle: 00°29'34.80475"

Horizontal Spacing Unit

LOCATION VERIFICATION MAP



SEC. 1 TWP. 26-S RGE. 34-E
SURVEY: N.M.P.M.
COUNTY: LEA
OPERATOR: MARATHON OIL PERMIAN LLC
DESCRIPTION: 852' FSL & 1230' FEL
ELEVATION: 3281'
LEASE: THUNDERBIRD 1-36 FEDERAL
U.S.G.S. TOPOGRAPHIC MAP: ANDREWS PLACE, NM,TX.

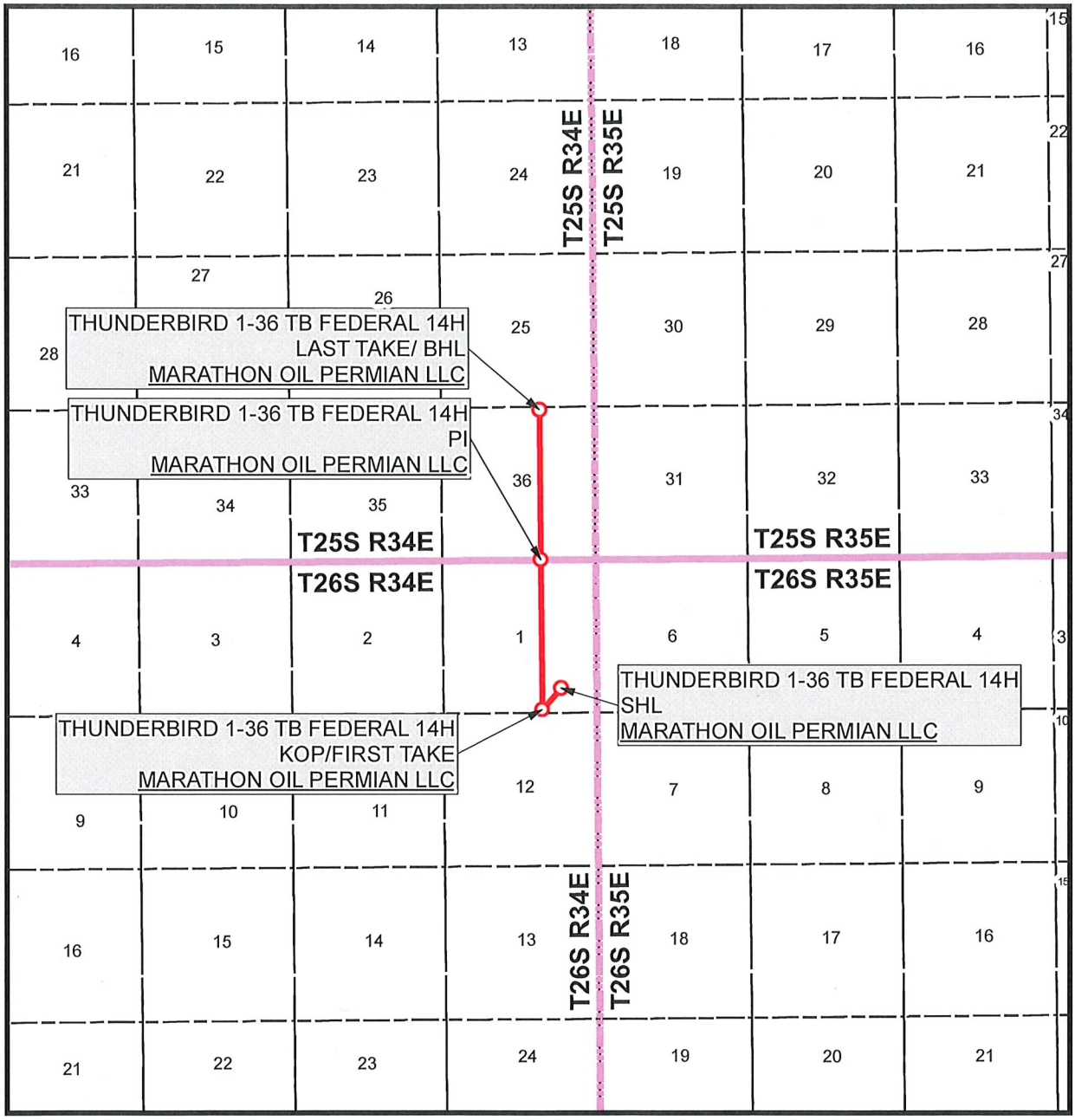
1 " = 2,000 '
CONTOUR INTERVAL = 10'

R-SQUARED GLOBAL LLC

PREPARED BY:
R-SQUARED GLOBAL, LLC
510 TRENTON ST., UNIT B,
WEST MONROE, LA 71291
318-323-6900 OFFICE

JOB No. R4043_002

VICINITY MAP



SEC. 1 TWP. 26-S RGE. 34-E
SURVEY: N.M.P.M.
COUNTY: LEA
OPERATOR: MARATHON OIL PERMIAN LLC
DESCRIPTION: 852' FSL & 1230' FEL
ELEVATION: 3281'
LEASE: THUNDERBIRD 1-36 FEDERAL
U.S.G.S. TOPOGRAPHIC MAP: ANDREWS PLACE, NM,TX.

1 " = 1 MILE

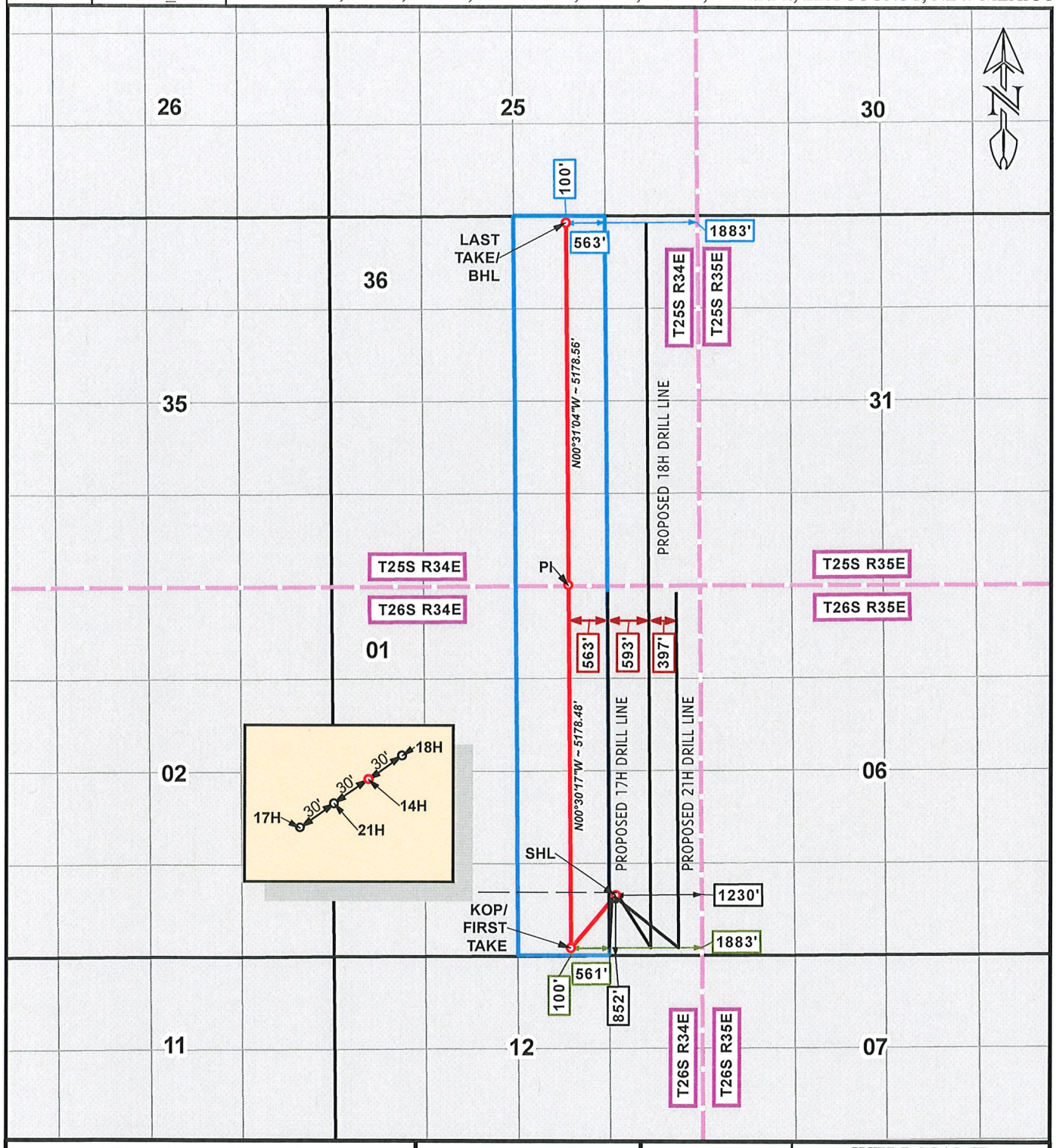
R-SQUARED GLOBAL LLC

SHEET 3 OF 4

PREPARED BY:
R-SQUARED GLOBAL, LLC
510 TRENTON ST., UNIT B,
WEST MONROE, LA 71291
318-323-6900 OFFICE

JOB No. R4043_002

JOB No.	R4043_002	SECTION 36, T-25-S, R-34-E; SECTION 1, T-26-S, R-34-E, N.M.P.M., LEA COUNTY, NEW MEXICO



1,000 0 1,000 2,000

1 inch = 2,000 feet

LEGEND

- SUBJECT WELL / DRILL LINE
- SURVEY/SECTION LINE
- LEASE LINE
- OTHER WELLS / DRILL LINES
- TOWNSHIP / RANGE LINE
- DRILL LINE HOLES

R-SQUARED GLOBAL LLC

Marathon Oil Permian LLC

WELL NAME

THUNDERBIRD 1-36
TB FEDERAL 14H

REV.	DATE	DESCRIPTION	BY	CHKD
1	01/18/2022	DRILL LINE CHANGE	DEF	MWS

SHEET 4 OF 4

DRAWN BY: DEF
DATE DRAWN: 1/20/2022
CHECKED BY: MWS

510 TRENTON ST., UNIT B,
WEST MONROE, LA 71291
(318) 323-6900

MARATHON OIL PERMIAN, LLC.

DRILLING AND OPERATIONS PLAN

WELL NAME / NUMBER: **THUNDERBIRD 1-36 TB FEDERAL 14H**

COUNTY: **LEA**

STATE: **NEW MEXICO**

1. GEOLOGIC FORMATIONS

Formation	TVD (ft)	MD (ft)	Elevation (ft)	Lithologies	Mineral Resources	Producing Formation?
Rustler	816	846	2465	Anhydrite	Brine	No
Salado	1211	1241	2070	Salt/Anhydrite	Brine	No
Castile	3526	3556	-245	Salt/Anhydrite	Brine	No
Base of Salt (BX)	5096	5126	-1815	Anhydrite	Brine	No
Lamar	5279	5309	-1998	Sandstone/Shale	None	No
Bell Canyon	5303	5333	-2022	Sandstone	Oil	No
Cherry Canyon	6306	6336	-3025	Sandstone	Oil	No
Brushy Canyon	7832	7862	-4551	Sandstone	Oil	No
Bone Spring Lime	9392	9422	-6111	Limestone	None	No
Upper Avalon Shale	9427	9457	-6146	Shale	Oil	Yes
1st Bone Spring Sand	10424	10454	-7143	Sandstone	Oil	Yes
2nd Bone Spring Carbonate	10653	10683	-7372	Limestone/Shale	None	No
2nd Bone Spring Sand	10971	11001	-7690	Sandstone	Oil	Yes
3rd Bone Spring Carbonate	11505	11535	-8224	Limestone	Oil	No
3rd Bone Spring Sand	12072	12102	-8791	Sandstone	Oil	Yes
Wolfcamp	12513	12543	-9232	Sandstone/Shale/Carbonates	Natural Gas / Oil	Yes
Wolfcamp A	12688	12718	-9407	Sandstone/Shale/Carbonates	Natural Gas / Oil	Yes

2. BLOWOUT PREVENTION

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	✓	Tested to:
12.25	13 5/8"	5000	Annular	X	70% of working pressure
			BOP Stack	X	5000
8.75	13 5/8"	10000	Annular	X	70% of working pressure
			BOP Stack	X	10000

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 and Blind rams will be operationally checked on each trip out of the hole. Not to exceed more than once per day 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.	
Y	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and	
	N	Are anchors required by manufacturer?
Y	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. See attached schematic.	

3. CASING PROGRAM

String Type	Hole Size	Csg Size	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Weight (lbs/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
Surface	17.5	13.375	0	1200	0	1200	3281	2081	54.5	J-55	BTC	2.5	1.76	4.34
Intermediate	12.25	9.625	0	11869	0	11780	3281	-8499	40	P-110HC	BTC	1.16	1.15	2.18
Production	8.75	5.500	0	22703	0	12453	3281	-9172	23	P-110	TLW	1.91	1.24	1.98

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

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 3rd 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 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	**N**
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	**N**
If yes, are there three strings cemented to surface?	

4. CEMENT

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity (sks)	Yield (ft3/sks)	Density (ppg)	Slurry Volume (ft3)	Excess (%)	Cement Type	Additives
Surface	Lead	--	0	960	393	2.12	12.5	834	25	Class C	LCM
Surface	Tail	--	960	1200	157	1.33	14.8	208	25	Class C	Accelerator
Intermediate	Lead	--	0	10800	757	5.53	10.2	4185	25	Class C	Extender, Accelerator
Intermediate	Tail	--	10800	11869	303	1.38	13.8	419	25	Class H	Retarder
Production	Tail	--	11200	22703	1340	1.45	13.5	1942	25	Class H	Extender, Fluid Loss, 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/sks)	Water gal/sk	Slurry Description and Cement Type

Attach plugging procedure for pilot hole: N/A

5. CIRCULATING MEDIUM

Top Depth	Bottom Depth	Mud Type	Min. Weight (ppg)	Max Weight (ppg)
0	1200	Water Based Mud	8.4	8.8
1200	11869	Brine or Oil Based Mud	9.2	10.2
11869	22703	Oil Based Mud	10.5	12.5

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

6. TEST, LOGGING, CORING

List of production tests including testing procedures, equipment and safety measures:
GR from TD to surface (horizontal well - vertical portion of hole)
List of open and cased hole logs run in the well:
GR while drilling from Intermediate casing shoe to TD.
Coring operation description for the well:
No coring is planned at this time.

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

7. PRESSURE

ANTICIPATED BOTTOM HOLE PRESSURE:	**8,094 psi**
ANTICIPATED BOTTOM HOLE TEMPERATURE:	**195 °F**
ANTICIPATED ABNORMAL PRESSURE:	**N**
ANTICIPATED ABNORMAL TEMPERATURE:	**N**

POTENTIAL HAZARDS:

A. H2S detection equipment will be in operation after drilling out the surface casing shoe until the production casing has been cemented. Breathing equipment will be on location from drilling out the surface shoe until production casing is cemented. If H2S is encountered the operator will comply with Onshore Order #6.

B. No abnormal temperatures or pressures are anticipated. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. Adequate flare lines will be installed off the mud/gas separator where gas may be flared safely.

C. No losses are anticipated at this time.

D. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well.

8. OTHER

AUXILIARY WELL CONTROL AND MONITORING EQUIPMENT

A 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**

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.

TEC-LOCK WEDGE

5.500" 23 LB/FT (.415"Wall)
BENTELER P110 CY

Pipe Body Data

Nominal OD:	5.500	in
Nominal Wall:	.415	in
Nominal Weight:	23.00	lb/ft
Plain End Weight:	22.56	lb/ft
Material Grade:	P110 CY	
Mill/Specification:	BENTELER	
Yield Strength:	125,000	psi
Tensile Strength:	130,000	psi
Nominal ID:	4.670	in
API Drift Diameter:	4.545	in
Special Drift Diameter:	None	in
RBW:	87.5 %	
Body Yield:	829,000	lbf
Burst:	16,510	psi
Collapse:	16,910	psi

Connection Data

Standard OD:	5.950	in
Pin Bored ID:	4.670	in
Critical Section Area:	6.457	in²
Tensile Efficiency:	97.4 %	
Compressive Efficiency:	100 %	
Longitudinal Yield Strength:	807,000	lbf
Compressive Limit:	829,000	lbf
Internal Pressure Rating:	16,510	psi
External Pressure Rating:	16,910	psi
Maximum Bend:	101.5	°/100ft

Operational Data

Minimum Makeup Torque:	16,400	ft*lbf
Optimum Makeup Torque:	20,500	ft*lbf
Maximum Makeup Torque:	44,300	ft*lbf
Minimum Yield:	49,200	ft*lbf
Makeup Loss:	5.97	in

Notes

Operational Torque is equivalent to the Maximum Make-Up Torque

HUNTING

Generated on Mar 12, 2019

Technical Data Sheet

9 5/8" 40.00 lbs/ft. P110HC - BTC

Mechanical Properties

Minimum Yield Strength	psi.	110,000
Maximum Yield Strength	psi.	140,000
Minimum Tensile Strength	psi.	125,000

Dimensions

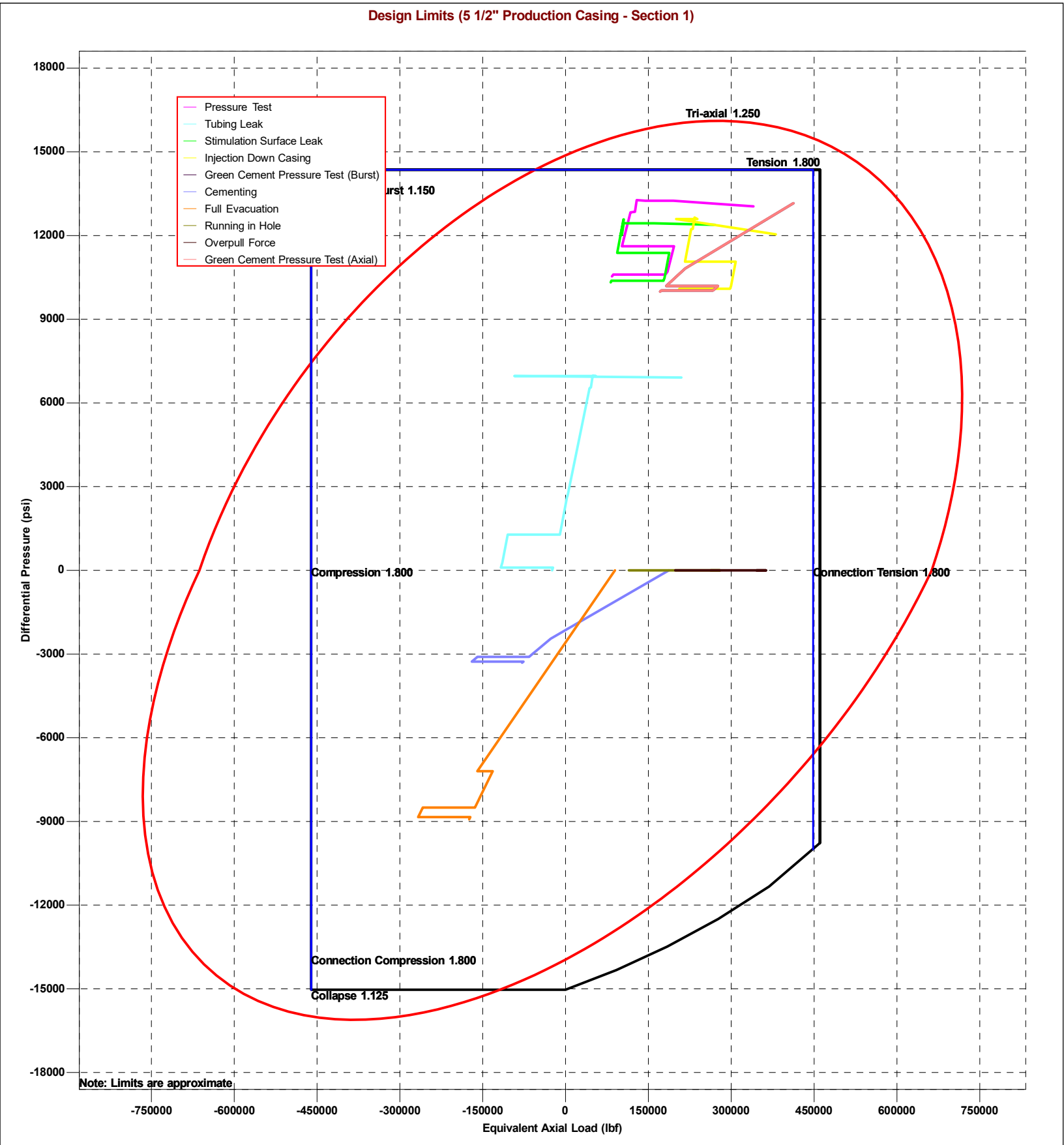
		Pipe	BTC	LTC	STC
Outside Diameter	in.	9.625	10.625	-	-
Wall Thickness	in.	0.395	-	-	-
Inside Diameter	in.	8.835	-	-	-
Standard Drift	in.	-	-	-	-
Alternate Drift	in.	8.750	-	-	-
Plain End Weight	lbs/ft.	-	-	-	-
Nominal Linear Weight	lbs/ft.	40.00	-	-	-

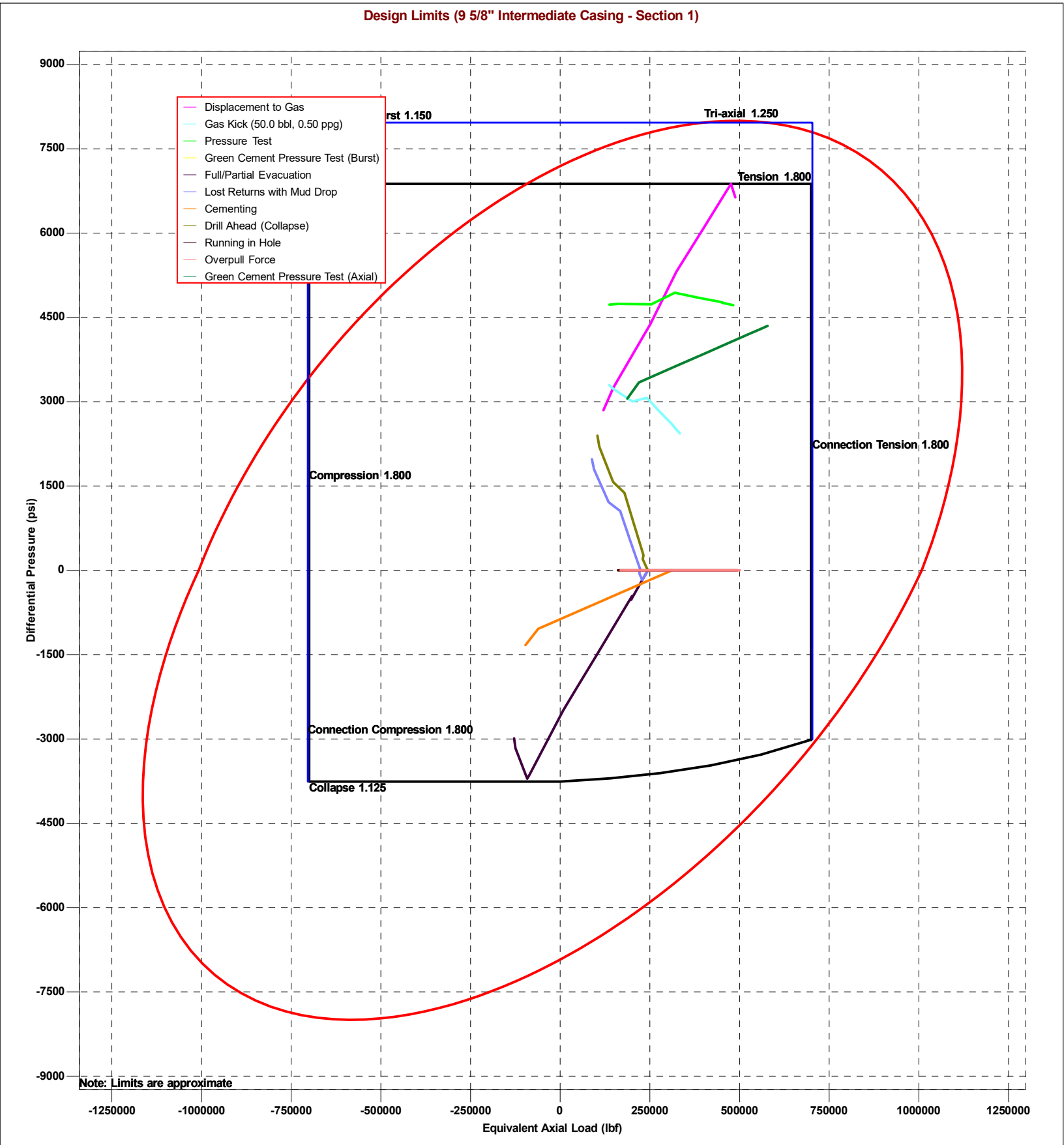
Performance

		Pipe	BTC	LTC	STC
Minimum Collapse Pressure	psi.	4,230	-	-	-
Minimum Internal Yield Pressure	psi.	7,910	7,910	-	-
Minimum Pipe Body Yield Strength	lbs.	1,260 x 1,000	-	-	-
Joint Strength	lbs.	-	1,266 x 1,000	-	-

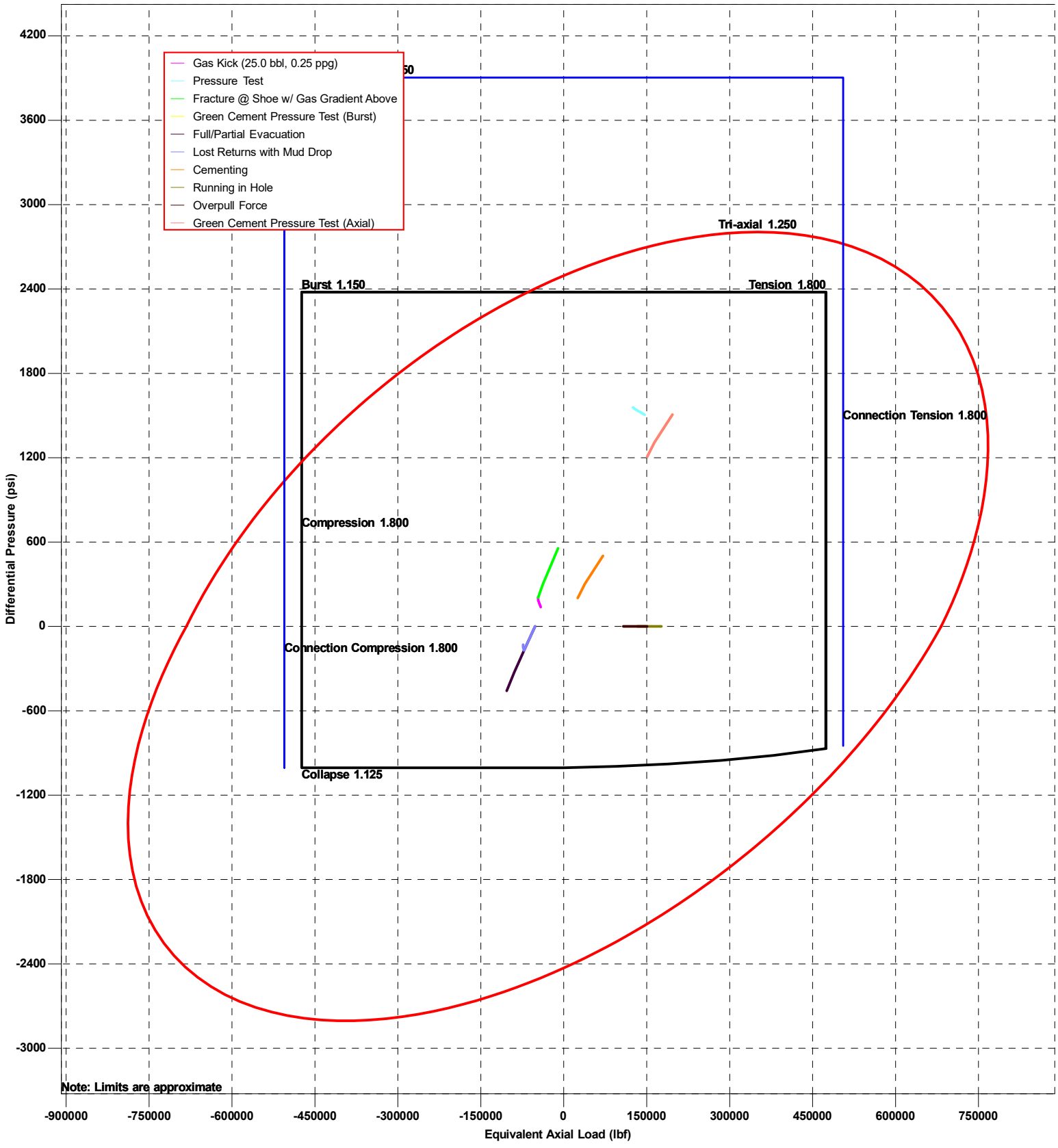
Make-Up Torques

		Pipe	BTC	LTC	STC
Make-Up Loss	in.	-	4.81	-	-
Optimum Make-Up Torque	ft/lbs.	-	-	-	-
Maximum Operational Make-Up Torque	ft/lbs.	-	-	-	-


Design Limits (5 1/2" Production Casing - Section 1)
Pressure Test
Tubing Leak
Stimulation Surface Leak
Injection Down Casing
Green Cement Pressure Test (Burst)
Cementing
Full Evacuation
Running in Hole
Overpull Force
Green Cement Pressure Test (Axial)
Tri-axial 1.250
Tension 1.800
Burst 1.150
Compression 1.800
Connection Tension 1.800
Connection Compression 1.800
Collapse 1.125
Note: Limits are approximate
Differential Pressure (psi)
Equivalent Axial Load (lbf)
18000
15000
12000
9000
6000
3000
0
-3000
-6000
-9000
-12000
-15000
-18000
-750000
-600000
-450000
-300000
-150000
0
150000
300000
450000
600000
750000


Design Limits (9 5/8" Intermediate Casing - Section 1)
Displacement to Gas
Gas Kick (50.0 bbl, 0.50 ppg)
Pressure Test
Green Cement Pressure Test (Burst)
Full/Partial Evacuation
Lost Returns with Mud Drop
Cementing
Drill Ahead (Collapse)
Running in Hole
Overpull Force
Green Cement Pressure Test (Axial)
rst 1.150
Tri-axial 1.250
Tension 1.800
Connection Tension 1.800
Compression 1.800
Connection Compression 1.800
Collapse 1.125
Note: Limits are approximate
Differential Pressure (psi)
Equivalent Axial Load (lbf)
9000
7500
6000
4500
3000
1500
0
-1500
-3000
-4500
-6000
-7500
-9000
-1250000
-1000000
-750000
-500000
-250000
0
250000
500000
750000
1000000
1250000

Design Limits (13 3/8" Surface Casing - Section 1)



Marathon Oil Corporation

Project:	Lea County, NM (NAD27 NME)
Site:	Thunderbird 1
Well:	Thunderbird 1 TB Federal 14H
Wellbore:	OH
Design:	Plan 1 01-25-22
Rig:	Est GL

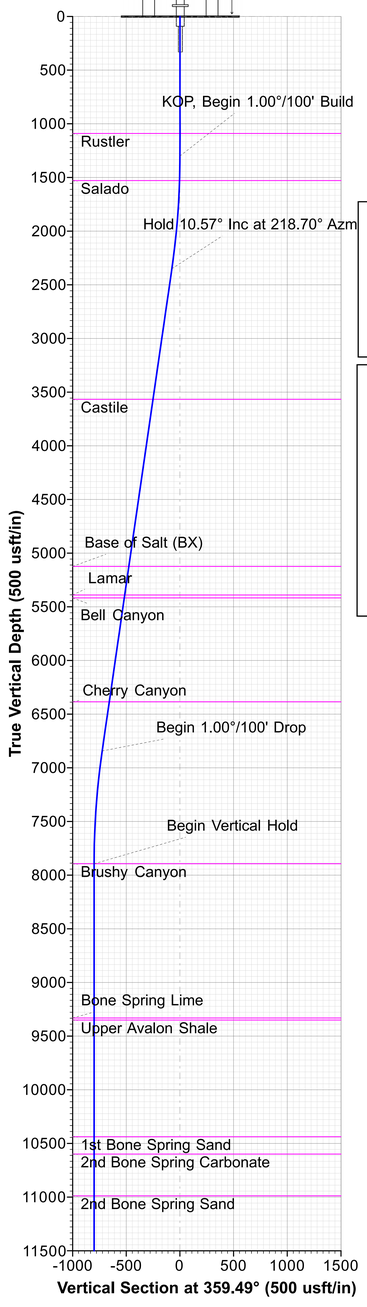
PHOENIX TECHNOLOGY SERVICES

T G M

Azimuths to Grid North
True North: -0.49°
Magnetic North: 5.80°

Magnetic Field
Strength: 47412.9nT
Dip Angle: 59.63°
Date: 2/28/2022
Model: MVHD

RKB @ 3311.00usft (Est GL)
Ground Level: 3281.00



WELL DETAILS

3281.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	389429.57	783349.48	32° 4' 2.481898 N	103° 25' 7.085457 W

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL - Thunderbird 1 TB Federal 14H	12453.00	9600.76	-737.91	399030.33	782611.57	32° 5' 37.546604 N	103° 25' 14.716271 W
FTP - Thunderbird 1 TB Federal 14H	12453.00	-755.60	-645.97	388673.97	782703.52	32° 3' 55.059084 N	103° 25' 14.665908 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	1300.00	0.00	0.00	1300.00	0.00	0.00	0.00	0.00	0.00		KOP, Begin 1.00°/100' Build
3	2356.58	10.57	218.70	2350.60	-75.81	-60.75	1.00	218.70	-75.27		Hold 10.57° Inc at 218.70° Azm
4	6926.86	10.57	218.70	6843.40	-729.79	-584.77	0.00	0.00	-724.56		Begin 1.00°/100' Drop
5	7983.45	0.00	0.00	7894.00	-805.60	-645.52	1.00	180.00	-799.82		Begin Vertical Hold
6	11969.49	0.00	0.00	11880.04	-805.60	-645.52	0.00	0.00	-799.82		KOP2, Begin 10.00°/100' Build
7	12869.49	90.00	359.49	12453.00	-232.66	-650.61	10.00	359.49	-226.86		LP, Hold 90.00° Inc at 359.49° Azm
8	22703.30	90.00	359.49	12453.00	9600.76	-737.91	0.00	0.00	9606.95	BHL - Thunderbird 1 TB Federal 14H	TD at 22703.30

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

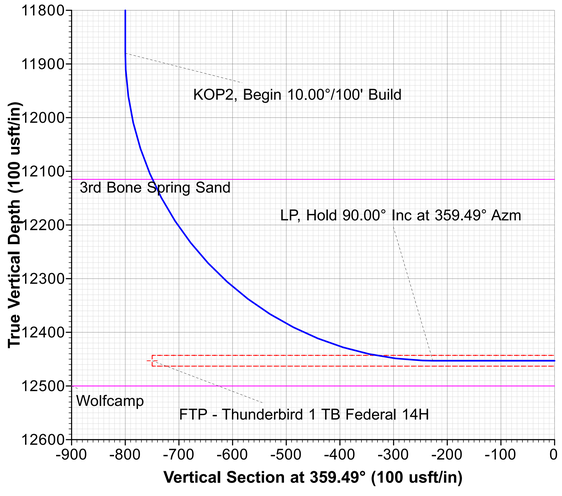
Local Origin: Well Thunderbird 1 TB Federal 14H, Grid North

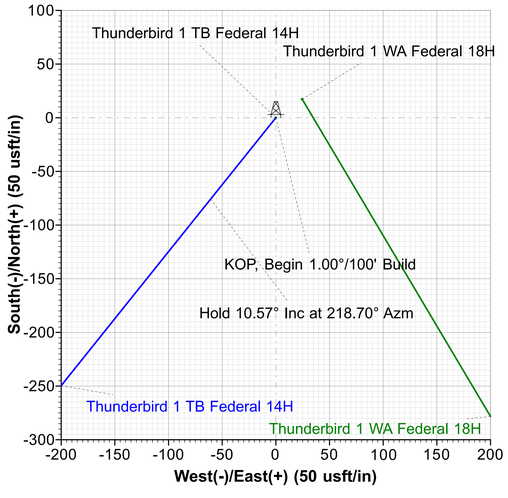
Latitude: 32° 4' 2.481898 N
Longitude: 103° 25' 7.085457 W

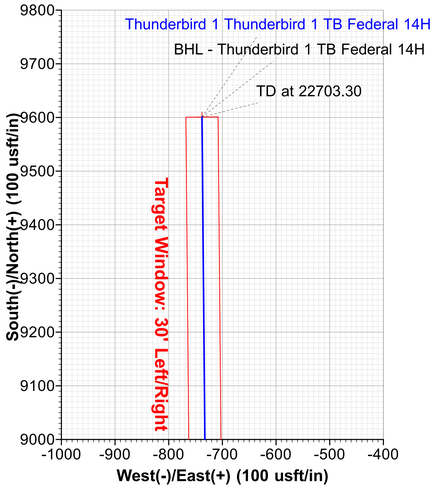
Grid East: 783349.48
Grid North: 389429.57
Scale Factor: 1.000

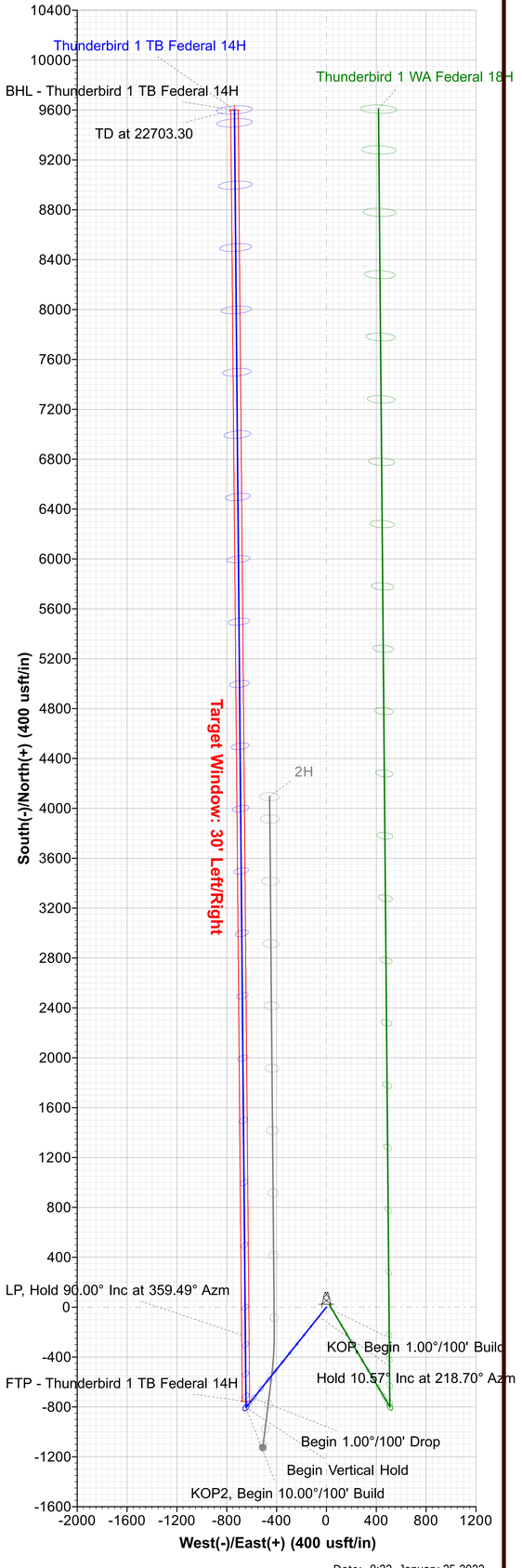
Geomagnetic Model: MVHD
Sample Date: 28-Feb-22
Magnetic Declination: 6.29°
Dip Angle from Horizontal: 59.63°
Magnetic Field Strength: 47412.94260204nT

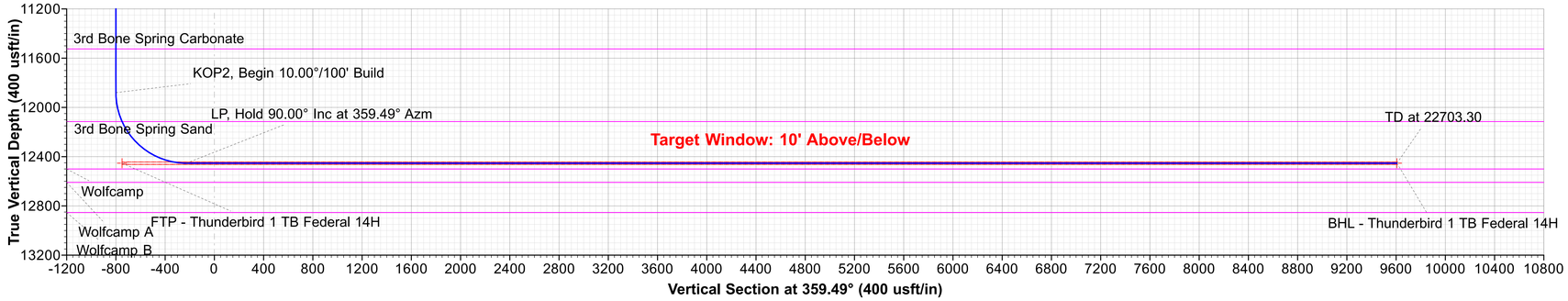
To convert a Magnetic Direction to a Grid Direction, Add 5.80°
To convert a Magnetic Direction to a True Direction, Add 6.29° East
To convert a True Direction to a Grid Direction, Subtract 0.49°











Date: 8:22, January 25 2022

PHOENIX
TECHNOLOGY SERVICES

Marathon Oil Permian LLC

Lea County, NM (NAD27 NME)
Thunderbird 1
Thunderbird 1 TB Federal 14H

OH

Plan: Plan 1 01-25-22

Standard Planning Report

25 January, 2022

Marathon Oil Corporation

Database:	USA Compass	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	**North Reference:**	Grid
Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Project Lea County, NM (NAD27 NME)

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

Site Thunderbird 1

Site Position:		**Northing:**	389,429.57 usft	**Latitude:**	32° 4' 2.481899 N
From:	Map	**Easting:**	783,349.48 usft	**Longitude:**	103° 25' 7.085457 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.49 °

Well Thunderbird 1 TB Federal 14H

Well Position	**+N/-S**	0.00 usft	**Northing:**	389,429.57 usft	**Latitude:**	32° 4' 2.481899 N
	+E/-W	0.00 usft	**Easting:**	783,349.48 usft	**Longitude:**	103° 25' 7.085457 W
Position Uncertainty		1.00 usft	**Wellhead Elevation:**		**Ground Level:**	3,281.00 usft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	2/28/2022	6.29	59.63	47,412.94260204

Design Plan 1 01-25-22

Audit Notes:

Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	359.49

Plan Survey Tool Program **Date** 1/25/2022

	Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	22,703.30	Plan 1 01-25-22 (OH)	MWD+HRGM	
				OWSG MWD + HRGM	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	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	
2,356.58	10.57	218.70	2,350.60	-75.81	-60.75	1.00	1.00	0.00	218.70	
6,926.86	10.57	218.70	6,843.40	-729.79	-584.77	0.00	0.00	0.00	0.00	
7,983.45	0.00	0.01	7,894.00	-805.60	-645.52	1.00	-1.00	0.00	180.00	
11,969.49	0.00	0.00	11,880.04	-805.60	-645.52	0.00	0.00	0.00	0.00	
12,869.49	90.00	359.49	12,453.00	-232.66	-650.61	10.00	10.00	0.00	359.49	
22,703.30	90.00	359.49	12,453.00	9,600.76	-737.91	0.00	0.00	0.00	0.00	BHL - Thunderbird

Database:	USA Compass	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	**North Reference:**	Grid
Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 1.00°/100' Build									
1,400.00	1.00	218.70	1,399.99	-0.68	-0.55	-0.68	1.00	1.00	0.00
1,500.00	2.00	218.70	1,499.96	-2.72	-2.18	-2.70	1.00	1.00	0.00
1,600.00	3.00	218.70	1,599.86	-6.13	-4.91	-6.08	1.00	1.00	0.00
1,700.00	4.00	218.70	1,699.68	-10.89	-8.73	-10.81	1.00	1.00	0.00
1,800.00	5.00	218.70	1,799.37	-17.01	-13.63	-16.89	1.00	1.00	0.00
1,900.00	6.00	218.70	1,898.90	-24.49	-19.63	-24.32	1.00	1.00	0.00
2,000.00	7.00	218.70	1,998.26	-33.33	-26.71	-33.09	1.00	1.00	0.00
2,100.00	8.00	218.70	2,097.40	-43.51	-34.87	-43.20	1.00	1.00	0.00
2,200.00	9.00	218.70	2,196.30	-55.05	-44.11	-54.65	1.00	1.00	0.00
2,300.00	10.00	218.70	2,294.93	-67.93	-54.43	-67.44	1.00	1.00	0.00
2,356.58	10.57	218.70	2,350.60	-75.81	-60.75	-75.27	1.00	1.00	0.00
Hold 10.57° Inc at 218.70° Azm									
2,400.00	10.57	218.70	2,393.29	-82.02	-65.72	-81.43	0.00	0.00	0.00
2,500.00	10.57	218.70	2,491.59	-96.33	-77.19	-95.64	0.00	0.00	0.00
2,600.00	10.57	218.70	2,589.89	-110.64	-88.66	-109.85	0.00	0.00	0.00
2,700.00	10.57	218.70	2,688.20	-124.95	-100.12	-124.06	0.00	0.00	0.00
2,800.00	10.57	218.70	2,786.50	-139.26	-111.59	-138.26	0.00	0.00	0.00
2,900.00	10.57	218.70	2,884.81	-153.57	-123.05	-152.47	0.00	0.00	0.00
3,000.00	10.57	218.70	2,983.11	-167.88	-134.52	-166.68	0.00	0.00	0.00
3,100.00	10.57	218.70	3,081.42	-182.19	-145.99	-180.88	0.00	0.00	0.00
3,200.00	10.57	218.70	3,179.72	-196.50	-157.45	-195.09	0.00	0.00	0.00
3,300.00	10.57	218.70	3,278.03	-210.81	-168.92	-209.30	0.00	0.00	0.00
3,400.00	10.57	218.70	3,376.33	-225.12	-180.38	-223.50	0.00	0.00	0.00
3,500.00	10.57	218.70	3,474.64	-239.43	-191.85	-237.71	0.00	0.00	0.00
3,600.00	10.57	218.70	3,572.94	-253.74	-203.32	-251.92	0.00	0.00	0.00
3,700.00	10.57	218.70	3,671.24	-268.05	-214.78	-266.12	0.00	0.00	0.00
3,800.00	10.57	218.70	3,769.55	-282.35	-226.25	-280.33	0.00	0.00	0.00
3,900.00	10.57	218.70	3,867.85	-296.66	-237.71	-294.54	0.00	0.00	0.00
4,000.00	10.57	218.70	3,966.16	-310.97	-249.18	-308.74	0.00	0.00	0.00
4,100.00	10.57	218.70	4,064.46	-325.28	-260.65	-322.95	0.00	0.00	0.00
4,200.00	10.57	218.70	4,162.77	-339.59	-272.11	-337.16	0.00	0.00	0.00
4,300.00	10.57	218.70	4,261.07	-353.90	-283.58	-351.36	0.00	0.00	0.00
4,400.00	10.57	218.70	4,359.38	-368.21	-295.04	-365.57	0.00	0.00	0.00
4,500.00	10.57	218.70	4,457.68	-382.52	-306.51	-379.78	0.00	0.00	0.00
4,600.00	10.57	218.70	4,555.98	-396.83	-317.98	-393.98	0.00	0.00	0.00
4,700.00	10.57	218.70	4,654.29	-411.14	-329.44	-408.19	0.00	0.00	0.00
4,800.00	10.57	218.70	4,752.59	-425.45	-340.91	-422.40	0.00	0.00	0.00
4,900.00	10.57	218.70	4,850.90	-439.76	-352.37	-436.60	0.00	0.00	0.00
5,000.00	10.57	218.70	4,949.20	-454.07	-363.84	-450.81	0.00	0.00	0.00
5,100.00	10.57	218.70	5,047.51	-468.38	-375.31	-465.02	0.00	0.00	0.00
5,200.00	10.57	218.70	5,145.81	-482.69	-386.77	-479.22	0.00	0.00	0.00
5,300.00	10.57	218.70	5,244.12	-497.00	-398.24	-493.43	0.00	0.00	0.00
5,400.00	10.57	218.70	5,342.42	-511.30	-409.70	-507.64	0.00	0.00	0.00
5,500.00	10.57	218.70	5,440.72	-525.61	-421.17	-521.84	0.00	0.00	0.00
5,600.00	10.57	218.70	5,539.03	-539.92	-432.64	-536.05	0.00	0.00	0.00
5,700.00	10.57	218.70	5,637.33	-554.23	-444.10	-550.26	0.00	0.00	0.00
5,800.00	10.57	218.70	5,735.64	-568.54	-455.57	-564.46	0.00	0.00	0.00
5,900.00	10.57	218.70	5,833.94	-582.85	-467.03	-578.67	0.00	0.00	0.00
6,000.00	10.57	218.70	5,932.25	-597.16	-478.50	-592.88	0.00	0.00	0.00
6,100.00	10.57	218.70	6,030.55	-611.47	-489.97	-607.09	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	**North Reference:**	Grid
Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

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)
6,200.00	10.57	218.70	6,128.86	-625.78	-501.43	-621.29	0.00	0.00	0.00
6,300.00	10.57	218.70	6,227.16	-640.09	-512.90	-635.50	0.00	0.00	0.00
6,400.00	10.57	218.70	6,325.47	-654.40	-524.36	-649.71	0.00	0.00	0.00
6,500.00	10.57	218.70	6,423.77	-668.71	-535.83	-663.91	0.00	0.00	0.00
6,600.00	10.57	218.70	6,522.07	-683.02	-547.30	-678.12	0.00	0.00	0.00
6,700.00	10.57	218.70	6,620.38	-697.33	-558.76	-692.33	0.00	0.00	0.00
6,800.00	10.57	218.70	6,718.68	-711.64	-570.23	-706.53	0.00	0.00	0.00
6,900.00	10.57	218.70	6,816.99	-725.95	-581.69	-720.74	0.00	0.00	0.00
6,926.86	10.57	218.70	6,843.39	-729.79	-584.77	-724.56	0.00	0.00	0.00
Begin 1.00°/100' Drop									
7,000.00	9.83	218.70	6,915.38	-739.90	-592.87	-734.59	1.00	-1.00	0.00
7,100.00	8.83	218.70	7,014.05	-752.55	-603.01	-747.16	1.00	-1.00	0.00
7,200.00	7.83	218.70	7,112.99	-763.87	-612.08	-758.39	1.00	-1.00	0.00
7,300.00	6.83	218.70	7,212.17	-773.83	-620.06	-768.28	1.00	-1.00	0.00
7,400.00	5.83	218.70	7,311.56	-782.44	-626.96	-776.83	1.00	-1.00	0.00
7,500.00	4.83	218.70	7,411.13	-789.69	-632.77	-784.03	1.00	-1.00	0.00
7,600.00	3.83	218.70	7,510.84	-795.59	-637.50	-789.88	1.00	-1.00	0.00
7,700.00	2.83	218.70	7,610.67	-800.13	-641.14	-794.39	1.00	-1.00	0.00
7,800.00	1.83	218.70	7,710.59	-803.31	-643.68	-797.55	1.00	-1.00	0.00
7,900.00	0.83	218.70	7,810.56	-805.13	-645.14	-799.35	1.00	-1.00	0.00
7,983.45	0.00	0.01	7,894.00	-805.60	-645.52	-799.82	1.00	-1.00	0.00
Begin Vertical Hold									
11,969.49	0.00	0.00	11,880.04	-805.60	-645.52	-799.82	0.00	0.00	0.00
KOP2, Begin 10.00°/100' Build									
12,000.00	3.05	359.49	11,910.54	-804.79	-645.53	-799.01	10.00	10.00	0.00
12,100.00	13.05	359.49	12,009.43	-790.80	-645.65	-785.02	10.00	10.00	0.00
12,200.00	23.05	359.49	12,104.39	-759.85	-645.93	-754.07	10.00	10.00	0.00
12,300.00	33.05	359.49	12,192.53	-712.89	-646.34	-707.11	10.00	10.00	0.00
12,400.00	43.05	359.49	12,271.17	-651.33	-646.89	-645.55	10.00	10.00	0.00
12,500.00	53.05	359.49	12,337.93	-577.06	-647.55	-571.27	10.00	10.00	0.00
12,600.00	63.05	359.49	12,390.78	-492.32	-648.30	-486.53	10.00	10.00	0.00
12,700.00	73.05	359.49	12,428.11	-399.69	-649.12	-393.89	10.00	10.00	0.00
12,800.00	83.05	359.49	12,448.79	-301.98	-649.99	-296.18	10.00	10.00	0.00
12,869.49	90.00	359.49	12,453.00	-232.66	-650.61	-226.86	10.00	10.00	0.00
LP, Hold 90.00° Inc at 359.49° Azm									
12,900.00	90.00	359.49	12,453.00	-202.15	-650.88	-196.35	0.00	0.00	0.00
13,000.00	90.00	359.49	12,453.00	-102.16	-651.77	-96.35	0.00	0.00	0.00
13,100.00	90.00	359.49	12,453.00	-2.16	-652.65	3.65	0.00	0.00	0.00
13,200.00	90.00	359.49	12,453.00	97.83	-653.54	103.65	0.00	0.00	0.00
13,300.00	90.00	359.49	12,453.00	197.83	-654.43	203.65	0.00	0.00	0.00
13,400.00	90.00	359.49	12,453.00	297.83	-655.32	303.65	0.00	0.00	0.00
13,500.00	90.00	359.49	12,453.00	397.82	-656.20	403.65	0.00	0.00	0.00
13,600.00	90.00	359.49	12,453.00	497.82	-657.09	503.65	0.00	0.00	0.00
13,700.00	90.00	359.49	12,453.00	597.81	-657.98	603.65	0.00	0.00	0.00
13,800.00	90.00	359.49	12,453.00	697.81	-658.87	703.65	0.00	0.00	0.00
13,900.00	90.00	359.49	12,453.00	797.81	-659.76	803.65	0.00	0.00	0.00
14,000.00	90.00	359.49	12,453.00	897.80	-660.64	903.65	0.00	0.00	0.00
14,100.00	90.00	359.49	12,453.00	997.80	-661.53	1,003.65	0.00	0.00	0.00
14,200.00	90.00	359.49	12,453.00	1,097.79	-662.42	1,103.65	0.00	0.00	0.00
14,300.00	90.00	359.49	12,453.00	1,197.79	-663.31	1,203.65	0.00	0.00	0.00
14,400.00	90.00	359.49	12,453.00	1,297.79	-664.19	1,303.65	0.00	0.00	0.00
14,500.00	90.00	359.49	12,453.00	1,397.78	-665.08	1,403.65	0.00	0.00	0.00
14,600.00	90.00	359.49	12,453.00	1,497.78	-665.97	1,503.65	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	**North Reference:**	Grid
Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
14,700.00	90.00	359.49	12,453.00	1,597.77	-666.86	1,603.65	0.00	0.00	0.00
14,800.00	90.00	359.49	12,453.00	1,697.77	-667.75	1,703.65	0.00	0.00	0.00
14,900.00	90.00	359.49	12,453.00	1,797.77	-668.63	1,803.65	0.00	0.00	0.00
15,000.00	90.00	359.49	12,453.00	1,897.76	-669.52	1,903.65	0.00	0.00	0.00
15,100.00	90.00	359.49	12,453.00	1,997.76	-670.41	2,003.65	0.00	0.00	0.00
15,200.00	90.00	359.49	12,453.00	2,097.75	-671.30	2,103.65	0.00	0.00	0.00
15,300.00	90.00	359.49	12,453.00	2,197.75	-672.19	2,203.65	0.00	0.00	0.00
15,400.00	90.00	359.49	12,453.00	2,297.75	-673.07	2,303.65	0.00	0.00	0.00
15,500.00	90.00	359.49	12,453.00	2,397.74	-673.96	2,403.65	0.00	0.00	0.00
15,600.00	90.00	359.49	12,453.00	2,497.74	-674.85	2,503.65	0.00	0.00	0.00
15,700.00	90.00	359.49	12,453.00	2,597.74	-675.74	2,603.65	0.00	0.00	0.00
15,800.00	90.00	359.49	12,453.00	2,697.73	-676.62	2,703.65	0.00	0.00	0.00
15,900.00	90.00	359.49	12,453.00	2,797.73	-677.51	2,803.65	0.00	0.00	0.00
16,000.00	90.00	359.49	12,453.00	2,897.72	-678.40	2,903.65	0.00	0.00	0.00
16,100.00	90.00	359.49	12,453.00	2,997.72	-679.29	3,003.65	0.00	0.00	0.00
16,200.00	90.00	359.49	12,453.00	3,097.72	-680.18	3,103.65	0.00	0.00	0.00
16,300.00	90.00	359.49	12,453.00	3,197.71	-681.06	3,203.65	0.00	0.00	0.00
16,400.00	90.00	359.49	12,453.00	3,297.71	-681.95	3,303.65	0.00	0.00	0.00
16,500.00	90.00	359.49	12,453.00	3,397.70	-682.84	3,403.65	0.00	0.00	0.00
16,600.00	90.00	359.49	12,453.00	3,497.70	-683.73	3,503.65	0.00	0.00	0.00
16,700.00	90.00	359.49	12,453.00	3,597.70	-684.61	3,603.65	0.00	0.00	0.00
16,800.00	90.00	359.49	12,453.00	3,697.69	-685.50	3,703.65	0.00	0.00	0.00
16,900.00	90.00	359.49	12,453.00	3,797.69	-686.39	3,803.65	0.00	0.00	0.00
17,000.00	90.00	359.49	12,453.00	3,897.68	-687.28	3,903.65	0.00	0.00	0.00
17,100.00	90.00	359.49	12,453.00	3,997.68	-688.17	4,003.65	0.00	0.00	0.00
17,200.00	90.00	359.49	12,453.00	4,097.68	-689.05	4,103.65	0.00	0.00	0.00
17,300.00	90.00	359.49	12,453.00	4,197.67	-689.94	4,203.65	0.00	0.00	0.00
17,400.00	90.00	359.49	12,453.00	4,297.67	-690.83	4,303.65	0.00	0.00	0.00
17,500.00	90.00	359.49	12,453.00	4,397.66	-691.72	4,403.65	0.00	0.00	0.00
17,600.00	90.00	359.49	12,453.00	4,497.66	-692.60	4,503.65	0.00	0.00	0.00
17,700.00	90.00	359.49	12,453.00	4,597.66	-693.49	4,603.65	0.00	0.00	0.00
17,800.00	90.00	359.49	12,453.00	4,697.65	-694.38	4,703.65	0.00	0.00	0.00
17,900.00	90.00	359.49	12,453.00	4,797.65	-695.27	4,803.65	0.00	0.00	0.00
18,000.00	90.00	359.49	12,453.00	4,897.64	-696.16	4,903.65	0.00	0.00	0.00
18,100.00	90.00	359.49	12,453.00	4,997.64	-697.04	5,003.65	0.00	0.00	0.00
18,200.00	90.00	359.49	12,453.00	5,097.64	-697.93	5,103.65	0.00	0.00	0.00
18,300.00	90.00	359.49	12,453.00	5,197.63	-698.82	5,203.65	0.00	0.00	0.00
18,400.00	90.00	359.49	12,453.00	5,297.63	-699.71	5,303.65	0.00	0.00	0.00
18,500.00	90.00	359.49	12,453.00	5,397.62	-700.59	5,403.65	0.00	0.00	0.00
18,600.00	90.00	359.49	12,453.00	5,497.62	-701.48	5,503.65	0.00	0.00	0.00
18,700.00	90.00	359.49	12,453.00	5,597.62	-702.37	5,603.65	0.00	0.00	0.00
18,800.00	90.00	359.49	12,453.00	5,697.61	-703.26	5,703.65	0.00	0.00	0.00
18,900.00	90.00	359.49	12,453.00	5,797.61	-704.15	5,803.65	0.00	0.00	0.00
19,000.00	90.00	359.49	12,453.00	5,897.61	-705.03	5,903.65	0.00	0.00	0.00
19,100.00	90.00	359.49	12,453.00	5,997.60	-705.92	6,003.65	0.00	0.00	0.00
19,200.00	90.00	359.49	12,453.00	6,097.60	-706.81	6,103.65	0.00	0.00	0.00
19,300.00	90.00	359.49	12,453.00	6,197.59	-707.70	6,203.65	0.00	0.00	0.00
19,400.00	90.00	359.49	12,453.00	6,297.59	-708.59	6,303.65	0.00	0.00	0.00
19,500.00	90.00	359.49	12,453.00	6,397.59	-709.47	6,403.65	0.00	0.00	0.00
19,600.00	90.00	359.49	12,453.00	6,497.58	-710.36	6,503.65	0.00	0.00	0.00
19,700.00	90.00	359.49	12,453.00	6,597.58	-711.25	6,603.65	0.00	0.00	0.00
19,800.00	90.00	359.49	12,453.00	6,697.57	-712.14	6,703.65	0.00	0.00	0.00
19,900.00	90.00	359.49	12,453.00	6,797.57	-713.02	6,803.65	0.00	0.00	0.00
20,000.00	90.00	359.49	12,453.00	6,897.57	-713.91	6,903.65	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	**North Reference:**	Grid
Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

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)
20,100.00	90.00	359.49	12,453.00	6,997.56	-714.80	7,003.65	0.00	0.00	0.00
20,200.00	90.00	359.49	12,453.00	7,097.56	-715.69	7,103.65	0.00	0.00	0.00
20,300.00	90.00	359.49	12,453.00	7,197.55	-716.58	7,203.65	0.00	0.00	0.00
20,400.00	90.00	359.49	12,453.00	7,297.55	-717.46	7,303.65	0.00	0.00	0.00
20,500.00	90.00	359.49	12,453.00	7,397.55	-718.35	7,403.65	0.00	0.00	0.00
20,600.00	90.00	359.49	12,453.00	7,497.54	-719.24	7,503.65	0.00	0.00	0.00
20,700.00	90.00	359.49	12,453.00	7,597.54	-720.13	7,603.65	0.00	0.00	0.00
20,800.00	90.00	359.49	12,453.00	7,697.53	-721.01	7,703.65	0.00	0.00	0.00
20,900.00	90.00	359.49	12,453.00	7,797.53	-721.90	7,803.65	0.00	0.00	0.00
21,000.00	90.00	359.49	12,453.00	7,897.53	-722.79	7,903.65	0.00	0.00	0.00
21,100.00	90.00	359.49	12,453.00	7,997.52	-723.68	8,003.65	0.00	0.00	0.00
21,200.00	90.00	359.49	12,453.00	8,097.52	-724.57	8,103.65	0.00	0.00	0.00
21,300.00	90.00	359.49	12,453.00	8,197.51	-725.45	8,203.65	0.00	0.00	0.00
21,400.00	90.00	359.49	12,453.00	8,297.51	-726.34	8,303.65	0.00	0.00	0.00
21,500.00	90.00	359.49	12,453.00	8,397.51	-727.23	8,403.65	0.00	0.00	0.00
21,600.00	90.00	359.49	12,453.00	8,497.50	-728.12	8,503.65	0.00	0.00	0.00
21,700.00	90.00	359.49	12,453.00	8,597.50	-729.00	8,603.65	0.00	0.00	0.00
21,800.00	90.00	359.49	12,453.00	8,697.49	-729.89	8,703.65	0.00	0.00	0.00
21,900.00	90.00	359.49	12,453.00	8,797.49	-730.78	8,803.65	0.00	0.00	0.00
22,000.00	90.00	359.49	12,453.00	8,897.49	-731.67	8,903.65	0.00	0.00	0.00
22,100.00	90.00	359.49	12,453.00	8,997.48	-732.56	9,003.65	0.00	0.00	0.00
22,200.00	90.00	359.49	12,453.00	9,097.48	-733.44	9,103.65	0.00	0.00	0.00
22,300.00	90.00	359.49	12,453.00	9,197.48	-734.33	9,203.65	0.00	0.00	0.00
22,400.00	90.00	359.49	12,453.00	9,297.47	-735.22	9,303.65	0.00	0.00	0.00
22,500.00	90.00	359.49	12,453.00	9,397.47	-736.11	9,403.65	0.00	0.00	0.00
22,600.00	90.00	359.49	12,453.00	9,497.46	-736.99	9,503.65	0.00	0.00	0.00
22,700.00	90.00	359.49	12,453.00	9,597.46	-737.88	9,603.65	0.00	0.00	0.00
22,703.30	90.00	359.49	12,453.00	9,600.76	-737.91	9,606.95	0.00	0.00	0.00
TD at 22703.30									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
FTP - Thunderbird 1 T	0.00	0.00	12,453.00	-755.60	-645.97	388,673.97	782,703.51	32° 3' 55.059084 N	3° 25' 14.665908 W
- plan misses target center by 202.78usft at 12444.05usft MD (12302.18 TVD, -620.06 N, -647.17 E)									
- Point									
BHL - Thunderbird 1 T	0.00	359.49	12,453.00	9,600.76	-737.91	399,030.33	782,611.57	32° 5' 37.546605 N	3° 25' 14.716271 W
- plan hits target center									
- Rectangle (sides W60.00 H10,356.71 D20.00)									

Database:	USA Compass	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	**North Reference:**	Grid
Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,090.00	1,090.00	Rustler		0.00	
1,529.06	1,529.00	Salado		0.00	
3,593.96	3,567.00	Castile		0.00	
5,177.81	5,124.00	Base of Salt (BX)		0.00	
5,448.40	5,390.00	Lamar		0.00	
5,475.87	5,417.00	Bell Canyon		0.00	
6,460.56	6,385.00	Cherry Canyon		0.00	
7,983.45	7,894.00	Brushy Canyon		0.00	
9,420.45	9,331.00	Bone Spring Lime		0.00	
9,439.45	9,350.00	Upper Avalon Shale		0.00	
10,526.45	10,437.00	1st Bone Spring Sand		0.00	
10,688.45	10,599.00	2nd Bone Spring Carbonate		0.00	
11,077.45	10,988.00	2nd Bone Spring Sand		0.00	
11,614.45	11,525.00	3rd Bone Spring Carbonate		0.00	
12,211.59	12,115.00	3rd Bone Spring Sand		0.00	

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
1,300.00	1,300.00	0.00	0.00	KOP, Begin 1.00°/100' Build
2,356.58	2,350.60	-75.81	-60.75	Hold 10.57° Inc at 218.70° Azm
6,926.86	6,843.39	-729.79	-584.77	Begin 1.00°/100' Drop
7,983.45	7,894.00	-805.60	-645.52	Begin Vertical Hold
11,969.49	11,880.04	-805.60	-645.52	KOP2, Begin 10.00°/100' Build
12,869.49	12,453.00	-232.66	-650.61	LP, Hold 90.00° Inc at 359.49° Azm
22,703.30	12,453.00	9,600.76	-737.91	TD at 22703.30

PHOENIX
TECHNOLOGY SERVICES

Marathon Oil Permian LLC

Lea County, NM (NAD27 NME)
Thunderbird 1
Thunderbird 1 TB Federal 14H

OH
Plan 1 01-25-22

Anticollision Report

25 January, 2022

Marathon Oil Corporation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Reference Plan 1 01-25-22

Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum centre distance of 50,000.00usft	**Error Surface:**	Pedal Curve
Warning Levels Evaluated at:	2.00 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 1/25/2022

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	22,703.30	Plan 1 01-25-22 (OH)	MWD+HRGM	OWSG MWD + HRGM

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Mammoth 1 Federal BC						
2H - OH - Plan 1 01-26-17	9,131.89	9,142.84	173.39	118.03	3.132	CC, ES, SF
Thunderbird 1						
Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22	1,300.00	1,300.00	30.04	21.16	3.382	CC, ES
Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22	1,400.00	1,400.03	30.82	21.61	3.346	SF

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Rule Assigned:** — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	11.50	1.00	0.00	-155.60	-1,124.88	-510.29	1,235.27				
100.00	100.00	88.50	100.00	1.11	0.11	-155.60	-1,124.88	-510.29	1,235.21	1,233.99	1.22	1,013.444	
200.00	200.00	188.50	200.00	1.64	0.45	-155.60	-1,124.88	-510.29	1,235.21	1,233.13	2.09	592.166	
300.00	300.00	288.50	300.00	2.04	0.80	-155.60	-1,124.88	-510.29	1,235.21	1,232.37	2.85	433.879	
400.00	400.00	388.50	400.00	2.38	1.16	-155.60	-1,124.88	-510.29	1,235.21	1,231.67	3.54	348.584	
500.00	500.00	488.50	500.00	2.68	1.52	-155.60	-1,124.88	-510.29	1,235.21	1,231.01	4.20	294.082	
600.00	600.00	588.50	600.00	2.95	1.88	-155.60	-1,124.88	-510.29	1,235.21	1,230.38	4.83	255.781	
700.00	700.00	688.50	700.00	3.20	2.24	-155.60	-1,124.88	-510.29	1,235.21	1,229.78	5.44	227.169	
800.00	800.00	788.50	800.00	3.43	2.60	-155.60	-1,124.88	-510.29	1,235.21	1,229.18	6.03	204.863	
900.00	900.00	888.50	900.00	3.65	2.95	-155.60	-1,124.88	-510.29	1,235.21	1,228.61	6.61	186.915	
1,000.00	1,000.00	988.50	1,000.00	3.86	3.31	-155.60	-1,124.88	-510.29	1,235.21	1,228.04	7.18	172.119	
1,100.00	1,100.00	1,088.50	1,100.00	4.06	3.67	-155.60	-1,124.88	-510.29	1,235.21	1,227.48	7.74	159.682	
1,200.00	1,200.00	1,188.50	1,200.00	4.26	4.03	-155.60	-1,124.88	-510.29	1,235.21	1,226.93	8.29	149.063	
1,300.00	1,300.00	1,288.50	1,300.00	4.44	4.39	-155.60	-1,124.88	-510.29	1,235.21	1,226.38	8.83	139.876	
1,400.00	1,399.99	1,388.49	1,399.99	4.61	4.75	-14.32	-1,124.88	-510.29	1,234.37	1,225.01	9.35	131.959	
1,500.00	1,499.96	1,488.46	1,499.96	4.77	5.11	-14.35	-1,124.88	-510.29	1,231.83	1,221.96	9.87	124.799	
1,600.00	1,599.86	1,588.36	1,599.86	4.94	5.46	-14.41	-1,124.88	-510.29	1,227.61	1,217.20	10.40	118.004	
1,700.00	1,699.68	1,688.18	1,699.68	5.14	5.82	-14.50	-1,124.88	-510.29	1,221.69	1,210.74	10.95	111.522	
1,800.00	1,799.37	1,787.87	1,799.37	5.36	6.18	-14.61	-1,124.88	-510.29	1,214.10	1,202.57	11.53	105.329	
1,900.00	1,898.90	1,887.40	1,898.90	5.60	6.54	-14.75	-1,124.88	-510.29	1,204.82	1,192.70	12.12	99.412	
2,000.00	1,998.26	1,986.76	1,998.26	5.87	6.89	-14.92	-1,124.88	-510.29	1,193.88	1,181.14	12.73	93.764	
2,100.00	2,097.40	2,085.90	2,097.40	6.15	7.25	-15.11	-1,124.88	-510.29	1,181.26	1,167.90	13.37	88.379	

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Rule Assigned:** — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
2,200.00	2,196.30	2,184.80	2,196.30	6.46	7.60	-15.34	-1,124.88	-510.29	1,166.99	1,152.97	14.02	83.251	
2,300.00	2,294.93	2,283.43	2,294.93	6.79	7.96	-15.60	-1,124.88	-510.29	1,151.07	1,136.38	14.69	78.372	
2,400.00	2,393.29	2,381.79	2,393.29	7.07	8.31	-15.87	-1,124.88	-510.29	1,133.66	1,118.35	15.32	74.022	
2,500.00	2,491.59	2,480.09	2,491.59	7.43	8.66	-16.13	-1,124.88	-510.29	1,116.01	1,100.00	16.01	69.694	
2,600.00	2,589.89	2,578.39	2,589.89	7.80	9.01	-16.39	-1,124.88	-510.29	1,098.39	1,081.67	16.72	65.690	
2,700.00	2,688.20	2,676.70	2,688.20	8.18	9.36	-16.67	-1,124.88	-510.29	1,080.79	1,063.35	17.44	61.984	
2,800.00	2,786.50	2,775.00	2,786.50	8.57	9.72	-16.95	-1,124.88	-510.29	1,063.21	1,045.05	18.16	58.548	
2,900.00	2,884.81	2,873.31	2,884.81	8.96	10.07	-17.24	-1,124.88	-510.29	1,045.66	1,026.77	18.89	55.360	
3,000.00	2,983.11	2,971.61	2,983.11	9.36	10.42	-17.55	-1,124.88	-510.29	1,028.13	1,008.51	19.62	52.397	
3,100.00	3,081.42	3,069.92	3,081.42	9.77	10.77	-17.86	-1,124.88	-510.29	1,010.64	990.28	20.36	49.638	
3,200.00	3,179.72	3,168.22	3,179.72	10.18	11.13	-18.18	-1,124.88	-510.29	993.17	972.07	21.10	47.067	
3,300.00	3,278.03	3,266.53	3,278.03	10.59	11.48	-18.52	-1,124.88	-510.29	975.74	953.89	21.85	44.666	
3,400.00	3,376.33	3,364.83	3,376.33	11.01	11.83	-18.87	-1,124.88	-510.29	958.34	935.75	22.59	42.420	
3,500.00	3,474.64	3,463.14	3,474.64	11.43	12.18	-19.23	-1,124.88	-510.29	940.97	917.64	23.34	40.317	
3,600.00	3,572.94	3,561.44	3,572.94	11.86	12.54	-19.60	-1,124.88	-510.29	923.65	899.56	24.09	38.344	
3,700.00	3,671.24	3,659.74	3,671.24	12.29	12.89	-19.99	-1,124.88	-510.29	906.36	881.52	24.84	36.490	
3,800.00	3,769.55	3,758.05	3,769.55	12.72	13.24	-20.39	-1,124.88	-510.29	889.12	863.53	25.59	34.747	
3,900.00	3,867.85	3,856.35	3,867.85	13.15	13.59	-20.81	-1,124.88	-510.29	871.92	845.58	26.34	33.104	
4,000.00	3,966.16	3,954.66	3,966.16	13.58	13.95	-21.25	-1,124.88	-510.29	854.77	827.68	27.09	31.555	
4,100.00	4,064.46	4,052.96	4,064.46	14.02	14.30	-21.70	-1,124.88	-510.29	837.66	809.83	27.84	30.092	
4,200.00	4,162.77	4,151.27	4,162.77	14.46	14.65	-22.17	-1,124.88	-510.29	820.61	792.03	28.58	28.709	
4,300.00	4,261.07	4,249.57	4,261.07	14.90	15.00	-22.66	-1,124.88	-510.29	803.62	774.29	29.33	27.400	
4,400.00	4,359.38	4,347.88	4,359.38	15.34	15.36	-23.18	-1,124.88	-510.29	786.69	756.62	30.07	26.160	
4,500.00	4,457.68	4,446.18	4,457.68	15.78	15.71	-23.71	-1,124.88	-510.29	769.82	739.01	30.81	24.983	
4,600.00	4,555.98	4,544.48	4,555.98	16.22	16.06	-24.27	-1,124.88	-510.29	753.02	721.47	31.55	23.866	
4,700.00	4,654.29	4,642.79	4,654.29	16.67	16.41	-24.86	-1,124.88	-510.29	736.30	704.01	32.29	22.805	
4,800.00	4,752.59	4,741.09	4,752.59	17.11	16.77	-25.47	-1,124.88	-510.29	719.65	686.63	33.02	21.796	
4,900.00	4,850.90	4,839.40	4,850.90	17.56	17.12	-26.11	-1,124.88	-510.29	703.09	669.34	33.74	20.836	
5,000.00	4,949.20	4,937.70	4,949.20	18.00	17.47	-26.78	-1,124.88	-510.29	686.61	652.15	34.46	19.922	
5,100.00	5,047.51	5,036.01	5,047.51	18.45	17.82	-27.49	-1,124.88	-510.29	670.24	635.06	35.18	19.052	
5,200.00	5,145.81	5,134.31	5,145.81	18.90	18.17	-28.22	-1,124.88	-510.29	653.96	618.08	35.89	18.222	
5,300.00	5,244.12	5,232.62	5,244.12	19.35	18.53	-29.00	-1,124.88	-510.29	637.80	601.21	36.59	17.431	
5,400.00	5,342.42	5,330.92	5,342.42	19.80	18.88	-29.82	-1,124.88	-510.29	621.77	584.48	37.29	16.676	
5,500.00	5,440.72	5,429.22	5,440.72	20.25	19.23	-30.67	-1,124.88	-510.29	605.86	567.89	37.97	15.956	
5,600.00	5,539.03	5,527.53	5,539.03	20.70	19.58	-31.58	-1,124.88	-510.29	590.09	551.44	38.65	15.269	
5,700.00	5,637.33	5,625.83	5,637.33	21.15	19.94	-32.53	-1,124.88	-510.29	574.47	535.16	39.31	14.614	
5,800.00	5,735.64	5,724.14	5,735.64	21.60	20.29	-33.54	-1,124.88	-510.29	559.02	519.06	39.96	13.988	
5,900.00	5,833.94	5,822.44	5,833.94	22.05	20.64	-34.60	-1,124.88	-510.29	543.75	503.15	40.60	13.392	
6,000.00	5,932.25	5,920.75	5,932.25	22.51	20.99	-35.72	-1,124.88	-510.29	528.68	487.45	41.23	12.824	
6,100.00	6,030.55	6,019.05	6,030.55	22.96	21.35	-36.91	-1,124.88	-510.29	513.81	471.98	41.83	12.282	
6,200.00	6,128.86	6,117.36	6,128.86	23.41	21.70	-38.16	-1,124.88	-510.29	499.18	456.75	42.42	11.766	
6,300.00	6,227.16	6,215.66	6,227.16	23.87	22.05	-39.49	-1,124.88	-510.29	484.80	441.80	42.99	11.276	
6,400.00	6,325.47	6,313.97	6,325.47	24.32	22.40	-40.90	-1,124.88	-510.29	470.69	427.15	43.54	10.810	
6,500.00	6,423.77	6,412.27	6,423.77	24.78	22.76	-42.40	-1,124.88	-510.29	456.89	412.82	44.07	10.368	
6,600.00	6,522.07	6,510.57	6,522.07	25.23	23.11	-43.98	-1,124.88	-510.29	443.41	398.84	44.56	9.950	
6,700.00	6,620.38	6,608.88	6,620.38	25.69	23.46	-45.66	-1,124.88	-510.29	430.29	385.26	45.03	9.555	
6,800.00	6,718.68	6,707.18	6,718.68	26.14	23.81	-47.45	-1,124.88	-510.29	417.57	372.09	45.48	9.182	
6,900.00	6,816.99	6,805.49	6,816.99	26.60	24.17	-49.34	-1,124.88	-510.29	405.27	359.39	45.88	8.832	
7,000.00	6,915.38	6,903.88	6,915.38	27.04	24.52	-51.23	-1,124.88	-510.29	393.74	347.49	46.25	8.513	
7,100.00	7,014.05	7,002.55	7,014.05	27.48	24.87	-53.02	-1,124.88	-510.29	383.70	337.08	46.62	8.230	
7,200.00	7,112.99	7,101.49	7,112.99	27.92	25.23	-54.70	-1,124.88	-510.29	375.09	328.11	46.98	7.983	
7,300.00	7,212.17	7,200.67	7,212.17	28.34	25.58	-56.26	-1,124.88	-510.29	367.81	320.47	47.35	7.769	

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Rule Assigned:** — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,400.00	7,311.56	7,300.06	7,311.56	28.75	25.94	-57.65	-1,124.88	-510.29	361.77	314.06	47.71	7.582	
7,500.00	7,411.13	7,399.63	7,411.13	29.14	26.30	-58.87	-1,124.88	-510.29	356.86	308.77	48.09	7.420	
7,600.00	7,510.84	7,499.34	7,510.84	29.51	26.65	-59.88	-1,124.88	-510.29	353.01	304.52	48.48	7.281	
7,700.00	7,610.67	7,599.17	7,610.67	29.87	27.01	-60.68	-1,124.88	-510.29	350.12	301.23	48.89	7.162	
7,800.00	7,710.59	7,699.09	7,710.59	30.19	27.37	-61.25	-1,124.88	-510.29	348.14	298.83	49.31	7.060	
7,900.00	7,810.56	7,799.06	7,810.56	30.47	27.73	-61.57	-1,124.88	-510.29	347.03	297.27	49.76	6.975	
8,000.00	7,910.55	7,899.05	7,910.55	30.58	28.09	157.05	-1,124.88	-510.29	346.74	296.58	50.15	6.913	
8,100.00	8,010.55	7,999.05	8,010.55	30.60	28.44	157.05	-1,124.88	-510.29	346.74	296.20	50.54	6.861	
8,200.00	8,110.55	8,099.05	8,110.55	30.62	28.80	157.05	-1,124.88	-510.29	346.74	295.82	50.92	6.810	
8,300.00	8,210.55	8,199.05	8,210.55	30.63	29.16	157.05	-1,124.88	-510.29	346.74	295.44	51.30	6.759	
8,400.00	8,310.55	8,299.05	8,310.55	30.65	29.52	157.05	-1,124.88	-510.29	346.74	295.06	51.68	6.709	
8,500.00	8,410.55	8,399.05	8,410.55	30.67	29.88	157.05	-1,124.88	-510.29	346.74	294.67	52.06	6.660	
8,600.00	8,510.55	8,499.05	8,510.55	30.68	30.24	157.05	-1,124.88	-510.29	346.74	294.29	52.45	6.611	
8,700.00	8,610.55	8,674.97	8,684.84	30.70	30.86	155.40	-1,106.03	-507.96	338.67	287.35	51.32	6.599	
8,800.00	8,710.55	8,849.48	8,844.23	30.72	31.43	147.76	-1,037.19	-499.45	304.70	256.97	47.72	6.385	
8,900.00	8,810.55	8,976.33	8,943.18	30.73	31.82	134.53	-958.83	-489.76	255.60	209.51	46.10	5.545	
9,000.00	8,910.55	9,064.62	9,000.65	30.75	32.09	117.90	-892.42	-481.54	206.26	157.32	48.94	4.214	
9,100.00	9,010.55	9,126.88	9,034.66	30.77	32.27	101.64	-840.70	-475.15	175.61	121.20	54.42	3.227	
9,131.89	9,042.45	9,142.84	9,042.45	30.78	32.32	97.05	-826.88	-473.44	173.39	118.03	55.36	3.132	CC, ES, SF
9,200.00	9,110.55	9,172.16	9,055.74	30.79	32.41	88.48	-800.95	-470.23	183.72	129.37	54.35	3.381	
9,300.00	9,210.55	9,206.18	9,069.45	30.81	32.51	78.78	-770.06	-466.41	230.77	182.50	48.27	4.781	
9,400.00	9,310.55	9,232.50	9,078.79	30.83	32.59	71.78	-745.64	-463.39	300.80	258.25	42.56	7.068	
9,500.00	9,410.55	9,250.00	9,084.36	30.84	32.65	67.46	-729.17	-461.35	382.31	343.74	38.57	9.913	
9,600.00	9,510.55	9,270.33	9,090.20	30.86	32.71	62.83	-709.85	-458.96	469.75	433.37	36.39	12.910	
9,700.00	9,610.55	9,284.32	9,093.82	30.88	32.75	59.89	-696.43	-457.31	560.68	525.79	34.89	16.068	
9,800.00	9,710.55	9,300.00	9,097.47	30.90	32.80	56.82	-681.30	-455.43	653.80	619.73	34.07	19.188	
9,900.00	9,810.55	9,300.00	9,097.47	30.92	32.80	56.82	-681.30	-455.43	748.38	715.17	33.21	22.534	
10,000.00	9,910.55	9,300.00	9,097.47	30.94	32.80	56.82	-681.30	-455.43	844.21	811.50	32.70	25.814	
10,100.00	10,010.55	9,322.09	9,101.91	30.96	32.87	52.90	-659.83	-452.78	940.23	907.41	32.82	28.649	
10,200.00	10,110.55	9,328.63	9,103.07	30.98	32.89	51.82	-653.44	-451.99	1,037.13	1,004.38	32.74	31.674	
10,300.00	10,210.55	9,350.00	9,106.33	31.00	32.96	48.57	-632.48	-449.40	1,134.79	1,101.81	32.98	34.405	
10,400.00	10,310.55	9,350.00	9,106.33	31.02	32.96	48.57	-632.48	-449.40	1,232.31	1,199.35	32.96	37.384	
10,500.00	10,410.55	9,350.00	9,106.33	31.04	32.96	48.57	-632.48	-449.40	1,330.20	1,297.19	33.02	40.287	
10,600.00	10,510.55	9,350.00	9,106.33	31.07	32.96	48.57	-632.48	-449.40	1,428.39	1,395.26	33.13	43.117	
10,700.00	10,610.55	9,350.00	9,106.33	31.09	32.96	48.57	-632.48	-449.40	1,526.81	1,493.52	33.28	45.874	
10,800.00	10,710.55	9,350.00	9,106.33	31.11	32.96	48.57	-632.48	-449.40	1,625.42	1,591.95	33.47	48.563	
10,900.00	10,810.55	9,350.00	9,106.33	31.13	32.96	48.57	-632.48	-449.40	1,724.19	1,690.50	33.69	51.185	
11,000.00	10,910.55	9,350.00	9,106.33	31.15	32.96	48.57	-632.48	-449.40	1,823.09	1,789.17	33.92	53.743	
11,100.00	11,010.55	9,350.00	9,106.33	31.17	32.96	48.57	-632.48	-449.40	1,922.11	1,887.94	34.18	56.239	
11,200.00	11,110.55	9,350.00	9,106.33	31.20	32.96	48.57	-632.48	-449.40	2,021.23	1,986.78	34.45	58.675	
11,300.00	11,210.55	9,350.00	9,106.33	31.22	32.96	48.57	-632.48	-449.40	2,120.43	2,085.70	34.73	61.053	
11,400.00	11,310.55	9,370.86	9,108.75	31.24	33.02	45.73	-611.92	-446.85	2,219.22	2,184.07	35.15	63.139	
11,500.00	11,410.55	9,372.80	9,108.93	31.26	33.03	45.48	-610.00	-446.62	2,318.47	2,283.01	35.46	65.387	
11,600.00	11,510.55	9,374.62	9,109.10	31.29	33.03	45.25	-608.21	-446.39	2,417.77	2,381.99	35.77	67.584	
11,700.00	11,610.55	9,376.31	9,109.25	31.31	33.04	45.04	-606.53	-446.19	2,517.11	2,481.02	36.10	69.730	
11,800.00	11,710.55	9,377.91	9,109.39	31.33	33.04	44.84	-604.96	-445.99	2,616.51	2,580.08	36.43	71.826	
11,900.00	11,810.55	9,400.00	9,110.86	31.36	33.11	42.27	-583.08	-443.29	2,716.39	2,679.52	36.87	73.679	
12,000.00	11,910.54	9,400.00	9,110.86	31.34	33.11	28.99	-583.08	-443.29	2,815.72	2,778.52	37.20	75.698	
12,100.00	12,009.43	9,400.00	9,110.86	31.10	33.11	13.43	-583.08	-443.29	2,913.04	2,875.54	37.50	77.677	
12,200.00	12,104.39	9,400.00	9,110.86	30.79	33.11	8.71	-583.08	-443.29	3,005.58	2,967.80	37.78	79.550	
12,300.00	12,192.53	9,400.00	9,110.86	30.48	33.11	6.52	-583.08	-443.29	3,091.08	3,053.02	38.05	81.227	
12,400.00	12,271.17	9,400.00	9,110.86	30.18	33.11	5.29	-583.08	-443.29	3,167.60	3,129.26	38.34	82.618	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Rule Assigned:** — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,500.00	12,337.93	9,427.04	9,111.50	29.92	33.20	4.59	-556.25	-439.97	3,233.17	3,194.45	38.73	83.487	
12,600.00	12,390.78	9,467.99	9,111.50	29.74	33.33	4.18	-515.58	-435.23	3,286.28	3,247.11	39.17	83.898	
12,700.00	12,428.11	9,567.79	9,111.50	29.65	33.70	4.02	-416.20	-426.13	3,324.15	3,284.37	39.77	83.576	
12,800.00	12,448.79	9,673.69	9,111.50	29.66	34.14	3.97	-310.47	-420.27	3,345.20	3,304.78	40.42	82.754	
12,900.00	12,453.00	9,782.25	9,111.50	29.79	34.66	3.98	-201.93	-418.31	3,349.59	3,308.51	41.08	81.541	
13,000.00	12,453.00	9,884.05	9,111.50	29.96	35.20	3.98	-100.14	-419.11	3,349.59	3,307.86	41.73	80.267	
13,100.00	12,453.00	9,984.05	9,111.50	30.17	35.78	3.98	-0.14	-419.98	3,349.59	3,307.16	42.43	78.941	
13,200.00	12,453.00	10,084.05	9,111.50	30.41	36.41	3.98	99.86	-420.85	3,349.60	3,306.41	43.18	77.570	
13,300.00	12,453.00	10,184.05	9,111.50	30.69	37.08	3.98	199.85	-421.71	3,349.60	3,305.62	43.98	76.166	
13,400.00	12,453.00	10,284.05	9,111.50	31.00	37.79	3.98	299.85	-422.58	3,349.60	3,304.78	44.82	74.742	
13,500.00	12,453.00	10,384.05	9,111.50	31.36	38.55	3.98	399.84	-423.45	3,349.60	3,303.91	45.69	73.308	
13,600.00	12,453.00	10,484.05	9,111.50	31.75	39.34	3.99	499.84	-424.32	3,349.60	3,302.99	46.61	71.871	
13,700.00	12,453.00	10,584.05	9,111.50	32.18	40.17	3.99	599.84	-425.19	3,349.60	3,302.05	47.55	70.440	
13,800.00	12,453.00	10,684.05	9,111.50	32.66	41.03	3.99	699.83	-426.05	3,349.60	3,301.07	48.53	69.019	
13,900.00	12,453.00	10,784.05	9,111.50	33.18	41.93	3.99	799.83	-426.92	3,349.60	3,300.07	49.54	67.615	
14,000.00	12,453.00	10,884.05	9,111.50	33.75	42.85	3.99	899.83	-427.79	3,349.61	3,299.03	50.57	66.231	
14,100.00	12,453.00	10,984.05	9,111.50	34.37	43.80	3.99	999.82	-428.66	3,349.61	3,297.97	51.63	64.871	
14,200.00	12,453.00	11,084.05	9,111.50	35.04	44.78	3.99	1,099.82	-429.53	3,349.61	3,296.89	52.72	63.537	
14,300.00	12,453.00	11,184.05	9,111.50	35.75	45.78	3.99	1,199.81	-430.39	3,349.61	3,295.78	53.83	62.230	
14,400.00	12,453.00	11,284.05	9,111.50	36.50	46.80	3.99	1,299.81	-431.26	3,349.61	3,294.66	54.95	60.953	
14,500.00	12,453.00	11,384.05	9,111.50	37.30	47.85	3.99	1,399.81	-432.13	3,349.61	3,293.51	56.10	59.706	
14,600.00	12,453.00	11,484.05	9,111.50	38.14	48.91	3.99	1,499.80	-433.00	3,349.61	3,292.35	57.27	58.491	
14,700.00	12,453.00	11,584.05	9,111.50	39.02	49.99	3.99	1,599.80	-433.87	3,349.61	3,291.16	58.45	57.306	
14,800.00	12,453.00	11,684.05	9,111.50	39.94	51.09	3.99	1,699.80	-434.74	3,349.62	3,289.97	59.65	56.154	
14,900.00	12,453.00	11,784.05	9,111.50	40.90	52.21	3.99	1,799.79	-435.60	3,349.62	3,288.75	60.87	55.032	
15,000.00	12,453.00	11,884.05	9,111.50	41.88	53.34	3.99	1,899.79	-436.47	3,349.62	3,287.52	62.10	53.942	
15,100.00	12,453.00	11,984.05	9,111.50	42.90	54.49	3.99	1,999.78	-437.34	3,349.62	3,286.28	63.34	52.883	
15,200.00	12,453.00	12,084.05	9,111.50	43.95	55.65	3.99	2,099.78	-438.21	3,349.62	3,285.02	64.60	51.853	
15,300.00	12,453.00	12,184.05	9,111.50	45.02	56.82	3.99	2,199.78	-439.08	3,349.62	3,283.76	65.87	50.854	
15,400.00	12,453.00	12,284.05	9,111.50	46.12	58.01	3.99	2,299.77	-439.94	3,349.62	3,282.48	67.15	49.884	
15,500.00	12,453.00	12,384.05	9,111.50	47.23	59.20	3.99	2,399.77	-440.81	3,349.63	3,281.18	68.44	48.941	
15,600.00	12,453.00	12,484.05	9,111.50	48.37	60.41	3.99	2,499.77	-441.68	3,349.63	3,279.88	69.74	48.027	
15,700.00	12,453.00	12,584.05	9,111.50	49.53	61.62	3.99	2,599.76	-442.55	3,349.63	3,278.57	71.06	47.139	
15,800.00	12,453.00	12,684.05	9,111.50	50.70	62.85	3.99	2,699.76	-443.42	3,349.63	3,277.25	72.38	46.278	
15,900.00	12,453.00	12,784.05	9,111.50	51.89	64.08	3.99	2,799.75	-444.28	3,349.63	3,275.92	73.71	45.442	
16,000.00	12,453.00	12,884.05	9,111.50	53.10	65.32	3.99	2,899.75	-445.15	3,349.63	3,274.58	75.05	44.630	
16,100.00	12,453.00	12,984.05	9,111.50	54.31	66.57	3.99	2,999.75	-446.02	3,349.63	3,273.23	76.40	43.842	
16,200.00	12,453.00	13,084.05	9,111.50	55.54	67.83	3.99	3,099.74	-446.89	3,349.63	3,271.88	77.76	43.077	
16,300.00	12,453.00	13,184.05	9,111.50	56.78	69.09	3.99	3,199.74	-447.76	3,349.64	3,270.51	79.12	42.334	
16,400.00	12,453.00	13,284.05	9,111.50	58.04	70.37	3.99	3,299.73	-448.62	3,349.64	3,269.14	80.49	41.613	
16,500.00	12,453.00	13,384.05	9,111.50	59.30	71.64	3.99	3,399.73	-449.49	3,349.64	3,267.77	81.87	40.913	
16,600.00	12,453.00	13,484.05	9,111.50	60.57	72.92	4.00	3,499.73	-450.36	3,349.64	3,266.38	83.26	40.232	
16,700.00	12,453.00	13,584.05	9,111.50	61.85	74.21	4.00	3,599.72	-451.23	3,349.64	3,264.99	84.65	39.571	
16,800.00	12,453.00	13,684.05	9,111.50	63.13	75.51	4.00	3,699.72	-452.10	3,349.64	3,263.60	86.05	38.929	
16,900.00	12,453.00	13,784.05	9,111.50	64.43	76.81	4.00	3,799.72	-452.97	3,349.64	3,262.20	87.45	38.304	
17,000.00	12,453.00	13,884.05	9,111.50	65.73	78.11	4.00	3,899.71	-453.83	3,349.65	3,260.79	88.86	37.697	
17,100.00	12,453.00	13,984.05	9,111.50	67.04	79.42	4.00	3,999.71	-454.70	3,349.65	3,259.38	90.27	37.107	
17,108.71	12,453.00	13,992.76	9,111.50	67.15	79.53	4.00	4,008.42	-454.78	3,349.65	3,259.25	90.39	37.056	
17,200.00	12,453.00	14,078.47	9,111.50	68.35	80.66	4.00	4,094.13	-455.52	3,349.65	3,257.98	91.68	36.537	
17,300.00	12,453.00	14,078.47	9,111.50	69.67	80.66	4.00	4,094.13	-455.52	3,351.31	3,258.44	92.88	36.083	
17,400.00	12,453.00	14,078.47	9,111.50	70.99	80.66	4.00	4,094.13	-455.52	3,355.95	3,261.92	94.03	35.689	
17,500.00	12,453.00	14,078.47	9,111.50	72.32	80.66	4.00	4,094.13	-455.52	3,363.56	3,268.42	95.14	35.353	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Rule Assigned:** — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
17,600.00	12,453.00	14,078.47	9,111.50	73.65	80.66	4.00	4,094.13	-455.52	3,374.12	3,277.92	96.20	35.074	
17,700.00	12,453.00	14,078.47	9,111.50	74.99	80.66	4.00	4,094.13	-455.52	3,387.59	3,290.39	97.21	34.850	
17,800.00	12,453.00	14,078.47	9,111.50	76.33	80.66	4.00	4,094.13	-455.52	3,403.96	3,305.80	98.16	34.679	
17,900.00	12,453.00	14,078.47	9,111.50	77.68	80.66	4.00	4,094.13	-455.52	3,423.16	3,324.11	99.05	34.560	
18,000.00	12,453.00	14,078.47	9,111.50	79.03	80.66	4.00	4,094.13	-455.52	3,445.17	3,345.28	99.89	34.490	
18,100.00	12,453.00	14,078.47	9,111.50	80.38	80.66	4.00	4,094.13	-455.52	3,469.91	3,369.24	100.67	34.469	
18,200.00	12,453.00	14,078.47	9,111.50	81.73	80.66	4.00	4,094.13	-455.52	3,497.34	3,395.95	101.39	34.493	
18,300.00	12,453.00	14,078.47	9,111.50	83.09	80.66	4.00	4,094.13	-455.52	3,527.40	3,425.34	102.06	34.561	
18,400.00	12,453.00	14,078.47	9,111.50	84.45	80.66	4.00	4,094.13	-455.52	3,560.01	3,457.33	102.68	34.673	
18,500.00	12,453.00	14,078.47	9,111.50	85.82	80.66	4.00	4,094.13	-455.52	3,595.11	3,491.87	103.24	34.824	
18,600.00	12,453.00	14,078.47	9,111.50	87.18	80.66	4.00	4,094.13	-455.52	3,632.62	3,528.87	103.74	35.015	
18,700.00	12,453.00	14,078.47	9,111.50	88.55	80.66	4.00	4,094.13	-455.52	3,672.47	3,568.27	104.20	35.243	
18,800.00	12,453.00	14,078.47	9,111.50	89.92	80.66	4.00	4,094.13	-455.52	3,714.59	3,609.97	104.62	35.507	
18,900.00	12,453.00	14,078.47	9,111.50	91.29	80.66	4.00	4,094.13	-455.52	3,758.89	3,653.91	104.98	35.805	
19,000.00	12,453.00	14,078.47	9,111.50	92.67	80.66	4.00	4,094.13	-455.52	3,805.31	3,700.01	105.31	36.135	
19,100.00	12,453.00	14,078.47	9,111.50	94.05	80.66	4.00	4,094.13	-455.52	3,853.77	3,748.18	105.59	36.497	
19,200.00	12,453.00	14,078.47	9,111.50	95.43	80.66	4.00	4,094.13	-455.52	3,904.18	3,798.35	105.84	36.888	
19,300.00	12,453.00	14,078.47	9,111.50	96.81	80.66	4.00	4,094.13	-455.52	3,956.48	3,850.43	106.05	37.308	
19,400.00	12,453.00	14,078.47	9,111.50	98.19	80.66	4.00	4,094.13	-455.52	4,010.60	3,904.37	106.23	37.754	
19,500.00	12,453.00	14,078.47	9,111.50	99.57	80.66	4.00	4,094.13	-455.52	4,066.45	3,960.07	106.38	38.226	
19,600.00	12,453.00	14,078.47	9,111.50	100.96	80.66	4.00	4,094.13	-455.52	4,123.97	4,017.47	106.50	38.723	
19,700.00	12,453.00	14,078.47	9,111.50	102.35	80.66	4.00	4,094.13	-455.52	4,183.09	4,076.50	106.60	39.243	
19,800.00	12,453.00	14,078.47	9,111.50	103.74	80.66	4.00	4,094.13	-455.52	4,243.75	4,137.08	106.67	39.785	
19,900.00	12,453.00	14,078.47	9,111.50	105.13	80.66	4.00	4,094.13	-455.52	4,305.87	4,199.15	106.72	40.348	
20,000.00	12,453.00	14,078.47	9,111.50	106.52	80.66	4.00	4,094.13	-455.52	4,369.40	4,262.65	106.75	40.931	
20,100.00	12,453.00	14,078.47	9,111.50	107.91	80.66	4.00	4,094.13	-455.52	4,434.27	4,327.51	106.77	41.533	
20,200.00	12,453.00	14,078.47	9,111.50	109.30	80.66	4.00	4,094.13	-455.52	4,500.43	4,393.67	106.76	42.153	
20,300.00	12,453.00	14,078.47	9,111.50	110.70	80.66	4.00	4,094.13	-455.52	4,567.82	4,461.08	106.75	42.791	
20,400.00	12,453.00	14,078.47	9,111.50	112.10	80.66	4.00	4,094.13	-455.52	4,636.39	4,529.67	106.72	43.444	
20,500.00	12,453.00	14,078.47	9,111.50	113.49	80.66	4.00	4,094.13	-455.52	4,706.09	4,599.41	106.68	44.114	
20,600.00	12,453.00	14,078.47	9,111.50	114.89	80.66	4.00	4,094.13	-455.52	4,776.86	4,670.23	106.63	44.798	
20,700.00	12,453.00	14,078.47	9,111.50	116.29	80.66	4.00	4,094.13	-455.52	4,848.66	4,742.09	106.57	45.496	
20,800.00	12,453.00	14,078.47	9,111.50	117.69	80.66	4.00	4,094.13	-455.52	4,921.45	4,814.94	106.51	46.207	
20,900.00	12,453.00	14,078.47	9,111.50	119.09	80.66	4.00	4,094.13	-455.52	4,995.17	4,888.74	106.44	46.931	
21,000.00	12,453.00	14,078.47	9,111.50	120.49	80.66	4.00	4,094.13	-455.52	5,069.80	4,963.44	106.36	47.667	
21,100.00	12,453.00	14,078.47	9,111.50	121.90	80.66	4.00	4,094.13	-455.52	5,145.29	5,039.01	106.28	48.414	
21,200.00	12,453.00	14,078.47	9,111.50	123.30	80.66	4.00	4,094.13	-455.52	5,221.60	5,115.41	106.19	49.172	
21,300.00	12,453.00	14,078.47	9,111.50	124.70	80.66	4.00	4,094.13	-455.52	5,298.70	5,192.60	106.10	49.940	
21,400.00	12,453.00	14,078.47	9,111.50	126.11	80.66	4.00	4,094.13	-455.52	5,376.56	5,270.55	106.01	50.718	
21,500.00	12,453.00	14,078.47	9,111.50	127.51	80.66	4.00	4,094.13	-455.52	5,455.14	5,349.22	105.91	51.505	
21,600.00	12,453.00	14,078.47	9,111.50	128.92	80.66	4.00	4,094.13	-455.52	5,534.40	5,428.58	105.82	52.301	
21,700.00	12,453.00	14,078.47	9,111.50	130.33	80.66	4.00	4,094.13	-455.52	5,614.33	5,508.61	105.72	53.105	
21,800.00	12,453.00	14,078.47	9,111.50	131.74	80.66	4.00	4,094.13	-455.52	5,694.90	5,589.27	105.63	53.916	
21,900.00	12,453.00	14,078.47	9,111.50	133.14	80.66	4.00	4,094.13	-455.52	5,776.07	5,670.54	105.53	54.735	
22,000.00	12,453.00	14,078.47	9,111.50	134.55	80.66	4.00	4,094.13	-455.52	5,857.83	5,752.40	105.43	55.561	
22,100.00	12,453.00	14,078.47	9,111.50	135.96	80.66	4.00	4,094.13	-455.52	5,940.14	5,834.80	105.33	56.394	
22,200.00	12,453.00	14,078.47	9,111.50	137.37	80.66	4.00	4,094.13	-455.52	6,022.99	5,917.75	105.24	57.232	
22,300.00	12,453.00	14,078.47	9,111.50	138.78	80.66	4.00	4,094.13	-455.52	6,106.35	6,001.21	105.14	58.077	
22,400.00	12,453.00	14,078.47	9,111.50	140.20	80.66	4.00	4,094.13	-455.52	6,190.20	6,085.15	105.05	58.927	
22,500.00	12,453.00	14,078.47	9,111.50	141.61	80.66	4.00	4,094.13	-455.52	6,274.53	6,169.57	104.96	59.782	
22,600.00	12,453.00	14,078.47	9,111.50	143.02	80.66	4.00	4,094.13	-455.52	6,359.31	6,254.45	104.87	60.643	
22,700.00	12,453.00	14,078.47	9,111.50	144.43	80.66	4.00	4,094.13	-455.52	6,444.53	6,339.75	104.78	61.507	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Rule Assigned:** — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
22,703.30	12,453.00	14,078.47	9,111.50	144.48	80.66	4.00	4,094.13	-455.52	6,447.35	6,342.58	104.77	61.536	

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HRGM — **Offset Well Error:** 1.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Rule Assigned: Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	1.00	1.00	54.92	17.27	24.59	30.04				
100.00	100.00	100.00	100.00	1.11	1.11	54.92	17.27	24.59	30.04	27.83	2.21	13.589	
200.00	200.00	200.00	200.00	1.64	1.64	54.92	17.27	24.59	30.04	26.76	3.28	9.156	
300.00	300.00	300.00	300.00	2.04	2.04	54.92	17.27	24.59	30.04	25.96	4.09	7.352	
400.00	400.00	400.00	400.00	2.38	2.38	54.92	17.27	24.59	30.04	25.28	4.76	6.308	
500.00	500.00	500.00	500.00	2.68	2.68	54.92	17.27	24.59	30.04	24.68	5.36	5.606	
600.00	600.00	600.00	600.00	2.95	2.95	54.92	17.27	24.59	30.04	24.14	5.90	5.092	
700.00	700.00	700.00	700.00	3.20	3.20	54.92	17.27	24.59	30.04	23.64	6.40	4.695	
800.00	800.00	800.00	800.00	3.43	3.43	54.92	17.27	24.59	30.04	23.18	6.87	4.375	
900.00	900.00	900.00	900.00	3.65	3.65	54.92	17.27	24.59	30.04	22.74	7.31	4.111	
1,000.00	1,000.00	1,000.00	1,000.00	3.86	3.86	54.92	17.27	24.59	30.04	22.32	7.73	3.888	
1,100.00	1,100.00	1,100.00	1,100.00	4.06	4.06	54.92	17.27	24.59	30.04	21.91	8.13	3.696	
1,200.00	1,200.00	1,200.00	1,200.00	4.26	4.26	54.92	17.27	24.59	30.04	21.53	8.51	3.529	
1,300.00	1,300.00	1,300.00	1,300.00	4.44	4.44	54.92	17.27	24.59	30.04	21.16	8.88	3.382	CC, ES
1,400.00	1,399.99	1,400.03	1,400.03	4.61	4.61	-162.62	16.52	25.03	30.82	21.61	9.21	3.346	SF
1,500.00	1,499.96	1,500.00	1,499.96	4.77	4.76	-159.45	14.26	26.37	33.22	23.71	9.51	3.493	
1,600.00	1,599.86	1,599.85	1,599.72	4.94	4.94	-155.10	10.52	28.59	37.41	27.59	9.82	3.810	
1,700.00	1,699.68	1,699.53	1,699.21	5.14	5.13	-150.45	5.29	31.69	43.54	33.41	10.14	4.295	
1,800.00	1,799.37	1,798.97	1,798.34	5.36	5.35	-146.12	-1.40	35.67	51.73	41.26	10.47	4.941	
1,900.00	1,898.90	1,898.12	1,897.03	5.60	5.59	-142.39	-9.55	40.51	61.99	51.18	10.81	5.733	
2,000.00	1,998.26	1,996.92	1,995.20	5.87	5.85	-139.32	-19.13	46.20	74.33	63.16	11.18	6.651	
2,100.00	2,097.40	2,095.32	2,092.77	6.15	6.13	-136.83	-30.12	52.72	88.73	77.17	11.56	7.675	
2,200.00	2,196.30	2,193.26	2,189.64	6.46	6.43	-134.82	-42.49	60.06	105.14	93.17	11.96	8.787	
2,300.00	2,294.93	2,291.00	2,286.09	6.79	6.69	-133.23	-56.16	68.18	123.49	111.15	12.33	10.012	
2,400.00	2,393.29	2,389.05	2,382.77	7.07	7.02	-132.40	-70.17	76.50	143.10	130.37	12.73	11.242	
2,500.00	2,491.59	2,487.06	2,479.41	7.43	7.36	-131.92	-84.18	84.81	162.91	149.70	13.21	12.331	
2,600.00	2,589.89	2,585.07	2,576.06	7.80	7.72	-131.54	-98.18	93.13	182.73	169.02	13.71	13.328	
2,700.00	2,688.20	2,683.07	2,672.71	8.18	8.08	-131.23	-112.19	101.44	202.56	188.34	14.22	14.240	
2,800.00	2,786.50	2,781.08	2,769.35	8.57	8.45	-130.98	-126.19	109.76	222.39	207.64	14.75	15.076	
2,900.00	2,884.81	2,879.09	2,866.00	8.96	8.83	-130.77	-140.20	118.07	242.23	226.94	15.29	15.843	
3,000.00	2,983.11	2,977.10	2,962.64	9.36	9.21	-130.59	-154.21	126.39	262.07	246.23	15.84	16.547	
3,100.00	3,081.42	3,075.11	3,059.29	9.77	9.60	-130.43	-168.21	134.71	281.91	265.51	16.40	17.193	
3,200.00	3,179.72	3,173.12	3,155.94	10.18	10.00	-130.30	-182.22	143.02	301.75	284.79	16.96	17.789	
3,300.00	3,278.03	3,271.13	3,252.58	10.59	10.39	-130.18	-196.23	151.34	321.60	304.06	17.54	18.338	
3,400.00	3,376.33	3,369.14	3,349.23	11.01	10.79	-130.08	-210.23	159.65	341.44	323.32	18.12	18.845	
3,500.00	3,474.64	3,467.15	3,445.88	11.43	11.20	-129.99	-224.24	167.97	361.29	342.58	18.71	19.315	
3,600.00	3,572.94	3,565.16	3,542.52	11.86	11.60	-129.91	-238.25	176.28	381.13	361.83	19.30	19.750	
3,700.00	3,671.24	3,663.17	3,639.17	12.29	12.01	-129.83	-252.25	184.60	400.98	381.08	19.90	20.153	
3,800.00	3,769.55	3,761.18	3,735.81	12.72	12.42	-129.77	-266.26	192.92	420.83	400.33	20.50	20.529	
3,900.00	3,867.85	3,859.19	3,832.46	13.15	12.84	-129.70	-280.27	201.23	440.68	419.57	21.11	20.879	
4,000.00	3,966.16	3,957.20	3,929.11	13.58	13.25	-129.65	-294.27	209.55	460.52	438.81	21.72	21.205	
4,100.00	4,064.46	4,055.21	4,025.75	14.02	13.67	-129.60	-308.28	217.86	480.37	458.04	22.33	21.510	
4,200.00	4,162.77	4,153.22	4,122.40	14.46	14.09	-129.55	-322.29	226.18	500.22	477.27	22.95	21.796	
4,300.00	4,261.07	4,251.23	4,219.05	14.90	14.51	-129.51	-336.29	234.49	520.07	496.50	23.57	22.064	
4,400.00	4,359.38	4,349.23	4,315.69	15.34	14.93	-129.47	-350.30	242.81	539.92	515.73	24.20	22.315	
4,500.00	4,457.68	4,447.24	4,412.34	15.78	15.35	-129.43	-364.31	251.13	559.77	534.95	24.82	22.551	
4,600.00	4,555.98	4,545.25	4,508.99	16.22	15.78	-129.39	-378.31	259.44	579.62	554.17	25.45	22.774	
4,700.00	4,654.29	4,643.26	4,605.63	16.67	16.20	-129.36	-392.32	267.76	599.47	573.39	26.08	22.983	
4,800.00	4,752.59	4,741.27	4,702.28	17.11	16.63	-129.33	-406.33	276.07	619.33	592.61	26.72	23.181	
4,900.00	4,850.90	4,839.28	4,798.92	17.56	17.05	-129.30	-420.33	284.39	639.18	611.82	27.35	23.368	
5,000.00	4,949.20	4,937.29	4,895.57	18.00	17.48	-129.27	-434.34	292.71	659.03	631.04	27.99	23.545	
5,100.00	5,047.51	5,035.30	4,992.22	18.45	17.91	-129.25	-448.35	301.02	678.88	650.25	28.63	23.713	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HRGM — **Offset Well Error:** 1.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Rule Assigned: Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,145.81	5,133.31	5,088.86	18.90	18.34	-129.22	-462.35	309.34	698.73	669.46	29.27	23.872	
5,300.00	5,244.12	5,231.32	5,185.51	19.35	18.77	-129.20	-476.36	317.65	718.58	688.67	29.91	24.023	
5,400.00	5,342.42	5,329.33	5,282.16	19.80	19.20	-129.18	-490.37	325.97	738.43	707.88	30.56	24.167	
5,500.00	5,440.72	5,427.34	5,378.80	20.25	19.63	-129.16	-504.37	334.28	758.29	727.08	31.20	24.304	
5,600.00	5,539.03	5,525.35	5,475.45	20.70	20.06	-129.14	-518.38	342.60	778.14	746.29	31.85	24.434	
5,700.00	5,637.33	5,623.36	5,572.09	21.15	20.49	-129.12	-532.39	350.92	797.99	765.49	32.49	24.558	
5,800.00	5,735.64	5,721.37	5,668.74	21.60	20.93	-129.11	-546.39	359.23	817.84	784.70	33.14	24.676	
5,900.00	5,833.94	5,819.38	5,765.39	22.05	21.36	-129.09	-560.40	367.55	837.69	803.90	33.79	24.789	
6,000.00	5,932.25	5,917.38	5,862.03	22.51	21.79	-129.07	-574.41	375.86	857.55	823.10	34.44	24.897	
6,100.00	6,030.55	6,015.39	5,958.68	22.96	22.23	-129.06	-588.41	384.18	877.40	842.30	35.09	25.001	
6,200.00	6,128.86	6,113.40	6,055.33	23.41	22.66	-129.04	-602.42	392.49	897.25	861.50	35.75	25.100	
6,300.00	6,227.16	6,211.41	6,151.97	23.87	23.10	-129.03	-616.42	400.81	917.10	880.70	36.40	25.195	
6,400.00	6,325.47	6,309.42	6,248.62	24.32	23.53	-129.02	-630.43	409.13	936.95	899.90	37.06	25.285	
6,500.00	6,423.77	6,407.43	6,345.26	24.78	23.97	-129.00	-644.44	417.44	956.81	919.10	37.71	25.373	
6,600.00	6,522.07	6,505.44	6,441.91	25.23	24.40	-128.99	-658.44	425.76	976.66	938.29	38.37	25.457	
6,700.00	6,620.38	6,603.45	6,538.56	25.69	24.84	-128.98	-672.45	434.07	996.51	957.49	39.02	25.537	
6,800.00	6,718.68	6,701.46	6,635.20	26.14	25.27	-128.97	-686.46	442.39	1,016.36	976.68	39.68	25.614	
6,900.00	6,816.99	6,799.47	6,731.85	26.60	25.71	-128.96	-700.46	450.70	1,036.22	995.88	40.34	25.689	
7,000.00	6,915.38	6,897.53	6,828.55	27.04	26.15	-129.04	-714.48	459.03	1,055.78	1,014.80	40.98	25.765	
7,100.00	7,014.05	6,995.79	6,925.43	27.48	26.58	-129.09	-728.52	467.36	1,074.31	1,032.69	41.62	25.813	
7,200.00	7,112.99	7,102.79	7,031.07	27.92	27.05	-129.07	-743.21	476.08	1,091.43	1,049.15	42.28	25.812	
7,300.00	7,212.17	7,212.08	7,139.26	28.34	27.52	-129.05	-756.47	483.96	1,106.56	1,063.63	42.93	25.774	
7,400.00	7,311.56	7,321.89	7,248.24	28.75	27.98	-129.04	-768.01	490.81	1,119.65	1,076.11	43.55	25.711	
7,500.00	7,411.13	7,432.14	7,357.90	29.14	28.42	-129.03	-777.79	496.61	1,130.70	1,086.58	44.12	25.626	
7,600.00	7,510.84	7,542.76	7,468.14	29.51	28.84	-129.02	-785.78	501.35	1,139.70	1,095.04	44.66	25.521	
7,700.00	7,610.67	7,653.68	7,578.82	29.87	29.24	-129.02	-791.94	505.02	1,146.62	1,101.48	45.15	25.399	
7,800.00	7,710.59	7,764.82	7,689.85	30.19	29.61	-129.01	-796.28	507.59	1,151.48	1,105.90	45.58	25.261	
7,900.00	7,810.56	7,876.10	7,801.09	30.47	29.93	-129.01	-798.76	509.06	1,154.26	1,108.30	45.96	25.116	
8,000.00	7,910.55	7,985.57	7,910.55	30.58	30.08	89.69	-799.40	509.45	1,154.98	1,108.87	46.11	25.047	
8,100.00	8,010.55	8,085.57	8,010.55	30.60	30.09	89.69	-799.40	509.45	1,154.98	1,108.84	46.14	25.031	
8,200.00	8,110.55	8,185.57	8,110.55	30.62	30.11	89.69	-799.40	509.45	1,154.98	1,108.81	46.18	25.012	
8,300.00	8,210.55	8,285.57	8,210.55	30.63	30.12	89.69	-799.40	509.45	1,154.98	1,108.77	46.21	24.993	
8,400.00	8,310.55	8,385.57	8,310.55	30.65	30.14	89.69	-799.40	509.45	1,154.98	1,108.73	46.25	24.974	
8,500.00	8,410.55	8,485.57	8,410.55	30.67	30.16	89.69	-799.40	509.45	1,154.98	1,108.70	46.28	24.955	
8,600.00	8,510.55	8,585.57	8,510.55	30.68	30.17	89.69	-799.40	509.45	1,154.98	1,108.66	46.32	24.935	
8,700.00	8,610.55	8,685.57	8,610.55	30.70	30.19	89.69	-799.40	509.45	1,154.98	1,108.62	46.36	24.915	
8,800.00	8,710.55	8,785.57	8,710.55	30.72	30.21	89.69	-799.40	509.45	1,154.98	1,108.59	46.40	24.894	
8,900.00	8,810.55	8,885.57	8,810.55	30.73	30.22	89.69	-799.40	509.45	1,154.98	1,108.55	46.43	24.874	
9,000.00	8,910.55	8,985.57	8,910.55	30.75	30.24	89.69	-799.40	509.45	1,154.98	1,108.51	46.47	24.853	
9,100.00	9,010.55	9,085.57	9,010.55	30.77	30.26	89.69	-799.40	509.45	1,154.98	1,108.47	46.51	24.832	
9,200.00	9,110.55	9,185.57	9,110.55	30.79	30.27	89.69	-799.40	509.45	1,154.98	1,108.43	46.55	24.811	
9,300.00	9,210.55	9,285.57	9,210.55	30.81	30.29	89.69	-799.40	509.45	1,154.98	1,108.39	46.59	24.789	
9,400.00	9,310.55	9,385.57	9,310.55	30.83	30.31	89.69	-799.40	509.45	1,154.98	1,108.35	46.63	24.767	
9,500.00	9,410.55	9,485.57	9,410.55	30.84	30.33	89.69	-799.40	509.45	1,154.98	1,108.31	46.67	24.745	
9,600.00	9,510.55	9,585.57	9,510.55	30.86	30.35	89.69	-799.40	509.45	1,154.98	1,108.27	46.72	24.723	
9,700.00	9,610.55	9,685.57	9,610.55	30.88	30.36	89.69	-799.40	509.45	1,154.98	1,108.22	46.76	24.701	
9,800.00	9,710.55	9,785.57	9,710.55	30.90	30.38	89.69	-799.40	509.45	1,154.98	1,108.18	46.80	24.678	
9,900.00	9,810.55	9,885.57	9,810.55	30.92	30.40	89.69	-799.40	509.45	1,154.98	1,108.14	46.85	24.655	
10,000.00	9,910.55	9,985.57	9,910.55	30.94	30.42	89.69	-799.40	509.45	1,154.98	1,108.09	46.89	24.632	
10,100.00	10,010.55	10,085.57	10,010.55	30.96	30.44	89.69	-799.40	509.45	1,154.98	1,108.05	46.93	24.608	
10,200.00	10,110.55	10,185.57	10,110.55	30.98	30.46	89.69	-799.40	509.45	1,154.98	1,108.00	46.98	24.584	
10,300.00	10,210.55	10,285.57	10,210.55	31.00	30.48	89.69	-799.40	509.45	1,154.98	1,107.96	47.03	24.560	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22

Offset Site Error: 0.00 usft

Survey Program: 0-MWD+HRGM

Offset Well Error: 1.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Rule Assigned: Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,400.00	10,310.55	10,385.57	10,310.55	31.02	30.50	89.69	-799.40	509.45	1,154.98	1,107.91	47.07	24.536	
10,500.00	10,410.55	10,485.57	10,410.55	31.04	30.52	89.69	-799.40	509.45	1,154.98	1,107.86	47.12	24.512	
10,600.00	10,510.55	10,585.57	10,510.55	31.07	30.54	89.69	-799.40	509.45	1,154.98	1,107.82	47.17	24.487	
10,700.00	10,610.55	10,685.57	10,610.55	31.09	30.56	89.69	-799.40	509.45	1,154.98	1,107.77	47.21	24.463	
10,800.00	10,710.55	10,785.57	10,710.55	31.11	30.58	89.69	-799.40	509.45	1,154.98	1,107.72	47.26	24.438	
10,900.00	10,810.55	10,885.57	10,810.55	31.13	30.60	89.69	-799.40	509.45	1,154.98	1,107.67	47.31	24.412	
11,000.00	10,910.55	10,985.57	10,910.55	31.15	30.62	89.69	-799.40	509.45	1,154.98	1,107.62	47.36	24.387	
11,100.00	11,010.55	11,085.57	11,010.55	31.17	30.64	89.69	-799.40	509.45	1,154.98	1,107.57	47.41	24.361	
11,200.00	11,110.55	11,185.57	11,110.55	31.20	30.66	89.69	-799.40	509.45	1,154.98	1,107.52	47.46	24.335	
11,300.00	11,210.55	11,285.57	11,210.55	31.22	30.69	89.69	-799.40	509.45	1,154.98	1,107.47	47.51	24.309	
11,400.00	11,310.55	11,385.57	11,310.55	31.24	30.71	89.69	-799.40	509.45	1,154.98	1,107.42	47.56	24.283	
11,500.00	11,410.55	11,485.57	11,410.55	31.26	30.73	89.69	-799.40	509.45	1,154.98	1,107.37	47.62	24.256	
11,600.00	11,510.55	11,585.57	11,510.55	31.29	30.75	89.69	-799.40	509.45	1,154.98	1,107.31	47.67	24.230	
11,700.00	11,610.55	11,685.57	11,610.55	31.31	30.78	89.69	-799.40	509.45	1,154.98	1,107.26	47.72	24.203	
11,800.00	11,710.55	11,785.57	11,710.55	31.33	30.80	89.69	-799.40	509.45	1,154.98	1,107.21	47.77	24.176	
11,900.00	11,810.55	11,885.57	11,810.55	31.36	30.82	89.69	-799.40	509.45	1,154.98	1,107.15	47.83	24.149	
11,900.17	11,810.72	11,885.74	11,810.72	31.36	30.82	89.69	-799.40	509.45	1,154.98	1,107.15	47.83	24.148	
12,000.00	11,910.54	11,985.56	11,910.54	31.34	30.84	90.24	-799.40	509.45	1,154.99	1,107.12	47.86	24.130	
12,100.00	12,009.43	12,084.45	12,009.43	31.10	30.87	90.91	-799.40	509.45	1,155.13	1,107.28	47.85	24.142	
12,200.00	12,104.39	12,179.41	12,104.39	30.79	30.89	92.27	-799.40	509.45	1,156.05	1,108.27	47.78	24.197	
12,300.00	12,192.53	12,281.94	12,206.57	30.48	30.71	94.11	-792.52	509.38	1,158.55	1,110.93	47.62	24.328	
12,400.00	12,271.17	12,395.71	12,316.49	30.18	30.35	95.97	-763.94	509.13	1,162.38	1,115.03	47.35	24.548	
12,500.00	12,337.93	12,521.63	12,428.90	29.92	29.92	97.76	-707.75	508.64	1,167.10	1,120.11	47.00	24.834	
12,600.00	12,390.78	12,661.51	12,536.02	29.74	29.46	99.40	-618.34	507.86	1,172.04	1,125.39	46.64	25.128	
12,700.00	12,428.11	12,815.64	12,625.14	29.65	29.08	100.72	-493.17	506.76	1,176.27	1,129.86	46.41	25.345	
12,800.00	12,448.79	12,981.26	12,680.13	29.66	28.90	101.51	-337.56	505.39	1,178.85	1,132.45	46.40	25.405	
12,900.00	12,453.00	13,127.52	12,691.00	29.79	28.98	101.64	-192.01	504.11	1,179.30	1,132.70	46.60	25.307	
13,000.00	12,453.00	13,227.52	12,691.00	29.96	29.10	101.64	-92.02	503.23	1,179.31	1,132.40	46.91	25.141	
13,100.00	12,453.00	13,327.52	12,691.00	30.17	29.25	101.64	7.98	502.36	1,179.32	1,131.93	47.38	24.889	
13,200.00	12,453.00	13,427.52	12,691.00	30.41	29.43	101.64	107.98	501.48	1,179.33	1,131.30	48.02	24.557	
13,300.00	12,453.00	13,527.52	12,691.00	30.69	29.63	101.64	207.97	500.60	1,179.34	1,130.52	48.82	24.156	
13,400.00	12,453.00	13,627.52	12,691.00	31.00	29.86	101.64	307.97	499.72	1,179.35	1,129.58	49.77	23.696	
13,500.00	12,453.00	13,727.52	12,691.00	31.36	30.13	101.64	407.96	498.84	1,179.36	1,128.50	50.86	23.189	
13,600.00	12,453.00	13,827.52	12,691.00	31.75	30.44	101.64	507.96	497.97	1,179.37	1,127.29	52.08	22.645	
13,700.00	12,453.00	13,927.52	12,691.00	32.18	30.80	101.64	607.96	497.09	1,179.38	1,125.95	53.42	22.075	
13,800.00	12,453.00	14,027.52	12,691.00	32.66	31.20	101.64	707.95	496.21	1,179.39	1,124.50	54.88	21.489	
13,900.00	12,453.00	14,127.52	12,691.00	33.18	31.65	101.64	807.95	495.33	1,179.39	1,122.95	56.45	20.893	
14,000.00	12,453.00	14,227.52	12,691.00	33.75	32.15	101.64	907.95	494.45	1,179.40	1,121.29	58.11	20.296	
14,100.00	12,453.00	14,327.52	12,691.00	34.37	32.71	101.64	1,007.94	493.57	1,179.41	1,119.55	59.86	19.703	
14,200.00	12,453.00	14,427.52	12,691.00	35.04	33.34	101.64	1,107.94	492.70	1,179.42	1,117.73	61.69	19.118	
14,300.00	12,453.00	14,527.52	12,691.00	35.75	34.01	101.64	1,207.93	491.82	1,179.43	1,115.84	63.60	18.546	
14,400.00	12,453.00	14,627.52	12,691.00	36.50	34.75	101.64	1,307.93	490.94	1,179.44	1,113.88	65.57	17.988	
14,500.00	12,453.00	14,727.52	12,691.00	37.30	35.54	101.64	1,407.93	490.06	1,179.45	1,111.85	67.60	17.447	
14,600.00	12,453.00	14,827.52	12,691.00	38.14	36.39	101.64	1,507.92	489.18	1,179.46	1,109.77	69.69	16.925	
14,700.00	12,453.00	14,927.52	12,691.00	39.02	37.28	101.64	1,607.92	488.31	1,179.47	1,107.64	71.83	16.421	
14,800.00	12,453.00	15,027.52	12,691.00	39.94	38.23	101.64	1,707.91	487.43	1,179.48	1,105.47	74.02	15.936	
14,900.00	12,453.00	15,127.52	12,691.00	40.90	39.21	101.64	1,807.91	486.55	1,179.49	1,103.25	76.24	15.470	
15,000.00	12,453.00	15,227.52	12,691.00	41.88	40.23	101.64	1,907.91	485.67	1,179.50	1,100.99	78.51	15.023	
15,100.00	12,453.00	15,327.52	12,691.00	42.90	41.28	101.64	2,007.90	484.79	1,179.51	1,098.69	80.81	14.595	
15,200.00	12,453.00	15,427.52	12,691.00	43.95	42.37	101.64	2,107.90	483.92	1,179.52	1,096.37	83.15	14.185	
15,300.00	12,453.00	15,527.52	12,691.00	45.02	43.48	101.64	2,207.90	483.04	1,179.53	1,094.01	85.52	13.793	
15,400.00	12,453.00	15,627.52	12,691.00	46.12	44.62	101.64	2,307.89	482.16	1,179.54	1,091.63	87.91	13.418	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HRGM — **Offset Well Error:** 1.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Rule Assigned: Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,500.00	12,453.00	15,727.52	12,691.00	47.23	45.78	101.64	2,407.89	481.28	1,179.55	1,089.22	90.33	13.059	
15,600.00	12,453.00	15,827.52	12,691.00	48.37	46.96	101.64	2,507.88	480.40	1,179.56	1,086.79	92.77	12.715	
15,700.00	12,453.00	15,927.52	12,691.00	49.53	48.16	101.64	2,607.88	479.53	1,179.57	1,084.33	95.23	12.386	
15,800.00	12,453.00	16,027.52	12,691.00	50.70	49.37	101.64	2,707.88	478.65	1,179.58	1,081.86	97.72	12.072	
15,900.00	12,453.00	16,127.52	12,691.00	51.89	50.60	101.64	2,807.87	477.77	1,179.59	1,079.37	100.22	11.770	
16,000.00	12,453.00	16,227.52	12,691.00	53.10	51.84	101.64	2,907.87	476.89	1,179.59	1,076.86	102.74	11.482	
16,100.00	12,453.00	16,327.52	12,691.00	54.31	53.10	101.64	3,007.86	476.01	1,179.60	1,074.33	105.27	11.206	
16,200.00	12,453.00	16,427.52	12,691.00	55.54	54.37	101.64	3,107.86	475.14	1,179.61	1,071.80	107.82	10.941	
16,300.00	12,453.00	16,527.52	12,691.00	56.78	55.64	101.64	3,207.86	474.26	1,179.62	1,069.24	110.38	10.687	
16,400.00	12,453.00	16,627.52	12,691.00	58.04	56.93	101.64	3,307.85	473.38	1,179.63	1,066.68	112.96	10.443	
16,500.00	12,453.00	16,727.52	12,691.00	59.30	58.22	101.64	3,407.85	472.50	1,179.64	1,064.10	115.54	10.209	
16,600.00	12,453.00	16,827.52	12,691.00	60.57	59.53	101.64	3,507.85	471.62	1,179.65	1,061.51	118.14	9.985	
16,700.00	12,453.00	16,927.52	12,691.00	61.85	60.83	101.64	3,607.84	470.74	1,179.66	1,058.91	120.75	9.769	
16,800.00	12,453.00	17,027.52	12,691.00	63.13	62.15	101.64	3,707.84	469.87	1,179.67	1,056.30	123.37	9.562	
16,900.00	12,453.00	17,127.52	12,691.00	64.43	63.47	101.64	3,807.83	468.99	1,179.68	1,053.68	126.00	9.363	
17,000.00	12,453.00	17,227.52	12,691.00	65.73	64.80	101.64	3,907.83	468.11	1,179.69	1,051.06	128.63	9.171	
17,100.00	12,453.00	17,327.52	12,691.00	67.04	66.13	101.64	4,007.83	467.23	1,179.70	1,048.42	131.28	8.986	
17,200.00	12,453.00	17,427.52	12,691.00	68.35	67.47	101.64	4,107.82	466.35	1,179.71	1,045.78	133.93	8.808	
17,300.00	12,453.00	17,527.52	12,691.00	69.67	68.81	101.64	4,207.82	465.48	1,179.72	1,043.13	136.59	8.637	
17,400.00	12,453.00	17,627.52	12,691.00	70.99	70.16	101.64	4,307.81	464.60	1,179.73	1,040.47	139.26	8.472	
17,500.00	12,453.00	17,727.52	12,691.00	72.32	71.51	101.64	4,407.81	463.72	1,179.74	1,037.81	141.93	8.312	
17,600.00	12,453.00	17,827.52	12,691.00	73.65	72.87	101.64	4,507.81	462.84	1,179.75	1,035.14	144.61	8.158	
17,700.00	12,453.00	17,927.52	12,691.00	74.99	74.22	101.64	4,607.80	461.96	1,179.76	1,032.47	147.29	8.010	
17,800.00	12,453.00	18,027.52	12,691.00	76.33	75.59	101.64	4,707.80	461.09	1,179.77	1,029.79	149.98	7.866	
17,900.00	12,453.00	18,127.52	12,691.00	77.68	76.95	101.64	4,807.79	460.21	1,179.78	1,027.10	152.67	7.727	
18,000.00	12,453.00	18,227.52	12,691.00	79.03	78.32	101.64	4,907.79	459.33	1,179.79	1,024.41	155.37	7.593	
18,100.00	12,453.00	18,327.52	12,691.00	80.38	79.69	101.64	5,007.79	458.45	1,179.79	1,021.72	158.08	7.463	
18,200.00	12,453.00	18,427.52	12,691.00	81.73	81.06	101.64	5,107.78	457.57	1,179.80	1,019.02	160.78	7.338	
18,300.00	12,453.00	18,527.52	12,691.00	83.09	82.43	101.64	5,207.78	456.70	1,179.81	1,016.32	163.50	7.216	
18,400.00	12,453.00	18,627.52	12,691.00	84.45	83.81	101.64	5,307.78	455.82	1,179.82	1,013.61	166.21	7.098	
18,500.00	12,453.00	18,727.52	12,691.00	85.82	85.19	101.64	5,407.77	454.94	1,179.83	1,010.90	168.93	6.984	
18,600.00	12,453.00	18,827.52	12,691.00	87.18	86.57	101.64	5,507.77	454.06	1,179.84	1,008.19	171.66	6.873	
18,700.00	12,453.00	18,927.52	12,691.00	88.55	87.96	101.64	5,607.76	453.18	1,179.85	1,005.47	174.38	6.766	
18,800.00	12,453.00	19,027.52	12,691.00	89.92	89.34	101.64	5,707.76	452.31	1,179.86	1,002.75	177.11	6.662	
18,900.00	12,453.00	19,127.52	12,691.00	91.29	90.73	101.64	5,807.76	451.43	1,179.87	1,000.02	179.85	6.560	
19,000.00	12,453.00	19,227.52	12,691.00	92.67	92.12	101.64	5,907.75	450.55	1,179.88	997.30	182.58	6.462	
19,100.00	12,453.00	19,327.52	12,691.00	94.05	93.51	101.64	6,007.75	449.67	1,179.89	994.57	185.32	6.367	
19,200.00	12,453.00	19,427.52	12,691.00	95.43	94.90	101.64	6,107.74	448.79	1,179.90	991.84	188.06	6.274	
19,300.00	12,453.00	19,527.52	12,691.00	96.81	96.29	101.64	6,207.74	447.91	1,179.91	989.10	190.81	6.184	
19,400.00	12,453.00	19,627.52	12,691.00	98.19	97.68	101.64	6,307.74	447.04	1,179.92	986.36	193.55	6.096	
19,500.00	12,453.00	19,727.52	12,691.00	99.57	99.08	101.64	6,407.73	446.16	1,179.93	983.62	196.30	6.011	
19,600.00	12,453.00	19,827.52	12,691.00	100.96	100.48	101.64	6,507.73	445.28	1,179.94	980.88	199.06	5.928	
19,700.00	12,453.00	19,927.52	12,691.00	102.35	101.87	101.64	6,607.73	444.40	1,179.95	978.14	201.81	5.847	
19,800.00	12,453.00	20,027.52	12,691.00	103.74	103.27	101.64	6,707.72	443.52	1,179.96	975.39	204.56	5.768	
19,900.00	12,453.00	20,127.52	12,691.00	105.13	104.67	101.64	6,807.72	442.65	1,179.97	972.64	207.32	5.691	
20,000.00	12,453.00	20,227.52	12,691.00	106.52	106.07	101.64	6,907.71	441.77	1,179.98	969.89	210.08	5.617	
20,100.00	12,453.00	20,327.52	12,691.00	107.91	107.48	101.64	7,007.71	440.89	1,179.99	967.14	212.84	5.544	
20,200.00	12,453.00	20,427.52	12,691.00	109.30	108.88	101.64	7,107.71	440.01	1,180.00	964.39	215.61	5.473	
20,300.00	12,453.00	20,527.52	12,691.00	110.70	110.28	101.64	7,207.70	439.13	1,180.00	961.63	218.37	5.404	
20,400.00	12,453.00	20,627.52	12,691.00	112.10	111.69	101.64	7,307.70	438.26	1,180.01	958.88	221.14	5.336	
20,500.00	12,453.00	20,727.52	12,691.00	113.49	113.09	101.64	7,407.69	437.38	1,180.02	956.12	223.91	5.270	
20,600.00	12,453.00	20,827.52	12,691.00	114.89	114.50	101.64	7,507.69	436.50	1,180.03	953.36	226.68	5.206	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22

Offset Site Error: 0.00 usft

Survey Program: 0-MWD+HRGM

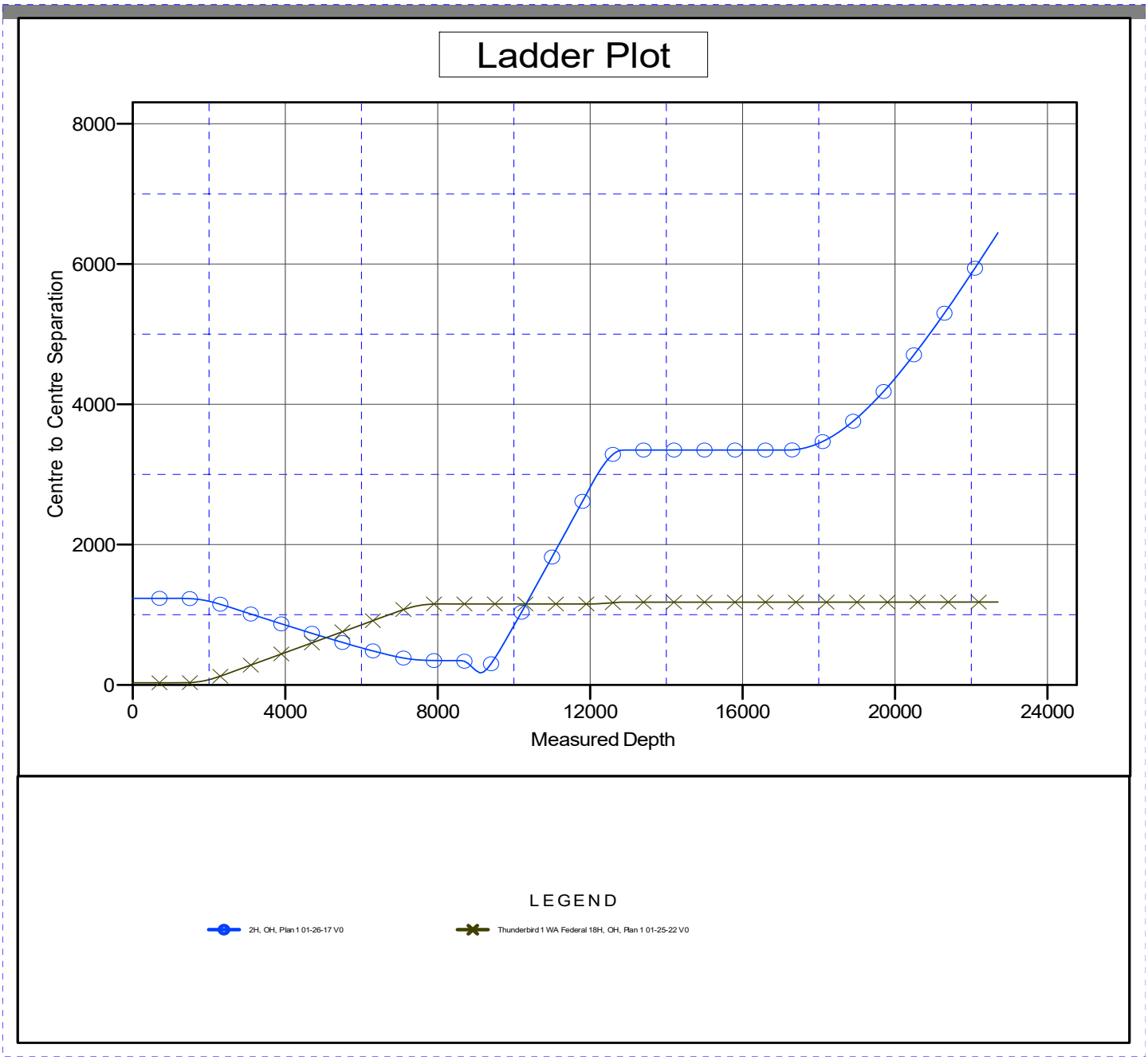
Offset Well Error: 1.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Rule Assigned: Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
20,700.00	12,453.00	20,927.52	12,691.00	116.29	115.91	101.64	7,607.69	435.62	1,180.04	950.59	229.45	5.143	
20,800.00	12,453.00	21,027.52	12,691.00	117.69	117.32	101.64	7,707.68	434.74	1,180.05	947.83	232.22	5.082	
20,900.00	12,453.00	21,127.52	12,691.00	119.09	118.72	101.64	7,807.68	433.87	1,180.06	945.07	235.00	5.022	
21,000.00	12,453.00	21,227.52	12,691.00	120.49	120.13	101.64	7,907.68	432.99	1,180.07	942.30	237.77	4.963	
21,100.00	12,453.00	21,327.52	12,691.00	121.90	121.54	101.64	8,007.67	432.11	1,180.08	939.53	240.55	4.906	
21,200.00	12,453.00	21,427.52	12,691.00	123.30	122.95	101.64	8,107.67	431.23	1,180.09	936.76	243.33	4.850	
21,300.00	12,453.00	21,527.52	12,691.00	124.70	124.37	101.64	8,207.66	430.35	1,180.10	934.00	246.10	4.795	
21,400.00	12,453.00	21,627.52	12,691.00	126.11	125.78	101.63	8,307.66	429.47	1,180.11	931.22	248.88	4.742	
21,500.00	12,453.00	21,727.52	12,691.00	127.51	127.19	101.63	8,407.66	428.60	1,180.12	928.45	251.67	4.689	
21,600.00	12,453.00	21,827.52	12,691.00	128.92	128.60	101.63	8,507.65	427.72	1,180.13	925.68	254.45	4.638	
21,700.00	12,453.00	21,927.52	12,691.00	130.33	130.02	101.63	8,607.65	426.84	1,180.14	922.91	257.23	4.588	
21,800.00	12,453.00	22,027.52	12,691.00	131.74	131.43	101.63	8,707.64	425.96	1,180.15	920.13	260.02	4.539	
21,900.00	12,453.00	22,127.52	12,691.00	133.14	132.85	101.63	8,807.64	425.08	1,180.16	917.35	262.80	4.491	
22,000.00	12,453.00	22,227.52	12,691.00	134.55	134.26	101.63	8,907.64	424.21	1,180.17	914.58	265.59	4.444	
22,100.00	12,453.00	22,327.52	12,691.00	135.96	135.68	101.63	9,007.63	423.33	1,180.18	911.80	268.38	4.397	
22,200.00	12,453.00	22,427.52	12,691.00	137.37	137.09	101.63	9,107.63	422.45	1,180.19	909.02	271.16	4.352	
22,300.00	12,453.00	22,527.52	12,691.00	138.78	138.51	101.63	9,207.63	421.57	1,180.20	906.24	273.95	4.308	
22,400.00	12,453.00	22,627.52	12,691.00	140.20	139.93	101.63	9,307.62	420.69	1,180.20	903.46	276.74	4.265	
22,500.00	12,453.00	22,727.52	12,691.00	141.61	141.34	101.63	9,407.62	419.82	1,180.21	900.68	279.53	4.222	
22,600.00	12,453.00	22,827.52	12,691.00	143.02	142.76	101.63	9,507.61	418.94	1,180.22	897.90	282.33	4.180	
22,700.00	12,453.00	22,927.24	12,691.00	144.43	144.17	101.63	9,607.33	418.06	1,180.23	895.12	285.11	4.140	
22,703.30	12,453.00	22,927.24	12,691.00	144.48	144.17	101.63	9,607.33	418.06	1,180.24	895.10	285.14	4.139	

Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Reference Depths are relative to RKB @ 3311.00usft (Est GL)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.000000 W

Coordinates are relative to: Thunderbird 1 TB Federal 14H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30(
Grid Convergence at Surface is: 0.49°



Company:	Marathon Oil Permian LLC	**Local Co-ordinate Reference:**	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	**MD Reference:**	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	1.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 01-25-22	**Offset TVD Reference:**	Reference Datum

Reference Depths are relative to RKB @ 3311.00usft (Est GL)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.000000 W

Coordinates are relative to: Thunderbird 1 TB Federal 14H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30(
Grid Convergence at Surface is: 0.49°

Separation Factor Plot