Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Carlsbad Field Office
OCD Hobbs
HOBBS OCD

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

**SUNDRY NOTICES AND REPORTS ON WELLS**

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

***SUBMIT IN TRIPLICATE - Other instructions on page 2***

NOV 28 2018

RECEIVED

| | |
|---|---|
| 1. Type of Well<br>☐ Oil Well ☒ Gas Well ☐ Other | 5. Lease Serial No.<br>NMNM26394 |
| | 6. If Indian, Allottee or Tribe Name |
| | 7. If Unit or CA/Agreement, Name and/or No. |
| | 8. Well Name and No.<br>VACA DRAW 20-17 FED 4H |
| 2. Name of Operator<br>CIMAREX ENERGY CO<br>Contact: ARICKA EASTERLING<br>E-Mail: aeasterling@cimarex.com | 9. API Well No.<br>30-025-44304 |
| 3a. Address<br>202 S CHEYENNE AVE, SUITE 1000<br>TULSA, OK 74103<br>3b. Phone No. (include area code)<br>Ph: 918-560-7060 | 10. Field and Pool or Exploratory Area<br>WC-025 S253317M; WOLFCAMP |
| 4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*<br>Sec 20 T25S R33E SESW 390FSL 1950FWL | 11. County or Parish, State<br>LEA COUNTY, 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 |
| ☐ Subsequent Report | ☐ Alter Casing | ☐ Hydraulic Fracturing | ☐ Reclamation | ☐ Well Integrity |
| ☐ Final Abandonment Notice | ☐ Casing Repair | ☐ New Construction | ☐ Recomplete | ☒ Other Change to Original APD |
| | ☐ Change Plans | ☐ Plug and Abandon | ☐ Temporarily Abandon | |
| | ☐ 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 performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or 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 determined that the site is ready for final inspection.

Cimarex respectfully requests approval to change the BHL, casing & Rig layout.

Approved:
BHL: 330 FSL & 2024 FWL
Proposed
BHL: 100 FNL & 2407 FEL

Approved: Drill 9 7/8" hole from 1034' to 12,610' and run 7 5/8" 29.7# L80 BTC casing from surface to 12,610' Surface good 11-5-2018 SR

Proposed: Drill 9 7/8" hole from 1,034' to 11,985' and then 8.75" hole from 11,985' to 12,610'.
Casing will be 7 5/8" 29.7# L80 BTC casing from surface to 11,985' and then 7 5/8" 29.7# L80 Ultra

Engineering is Good. Approved by JS. 11/4/18. See attached COA.

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

**Electronic Submission #441226 verified by the BLM Well Information System**
**For CIMAREX ENERGY CO, sent to the Hobbs**
**Committed to AFMSS for processing by PRISCILLA PEREZ on 10/29/2018 ()**

Name *(Printed/Typed)* ARICKA EASTERLING — Title REGULATORY ANALYST

Signature (Electronic Submission) — Date 10/25/2018

**THIS SPACE FOR FEDERAL OR STATE OFFICE USE**

Approved By Cody R. Layton — Title AFM - L&M — Date 11/05/2018

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

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)

** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED **

KE

District I
1625 N. French Dr., Hobbs, NM 88240
Phone (575) 393-6161 Fax (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone (575) 748-1283 Fax (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone (505) 334-6178 Fax (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone (505) 476-3460 Fax (505) 476-3462

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

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

☐ AMENDED REPORT

## WELL LOCATION AND ACREAGE DEDICATION PLAT

| [1] API Number | [2] Pool Code | [3] Pool Name |
|---|---|---|
| 30-025-44304 | 98250 | WC-025-S253317M ; Wolfcamp |

| [4] Property Code | [5] Property Name | [6] Well Number |
|---|---|---|
| 319775 | VACA DRAW 20-17 FEDERAL | 4H |

| [7] OGRID No. | [8] Operator Name | [9] Elevation |
|---|---|---|
| 215099 | CIMAREX ENERGY CO. | 3417.7' |

### [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 |
|---|---|---|---|---|---|---|---|---|---|
| N | 20 | 25S | 33E | | 390 | SOUTH | 1950 | WEST | 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 |
|---|---|---|---|---|---|---|---|---|---|
| C | 17 | 25S | 33E | | 100 | NORTH | 2407 | EAST | LEA |

| [12] Dedicated Acres | [13] Joint or Infill | [14] Consolidation Code | [15] Order No. |
|---|---|---|---|
| 640 | | | |

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.

[16] NOTE
- Distances referenced on plat to section lines are perpendicular.
- Basis of Bearing is a Transverse Mercator Projection with a Central Meridian of W103°53'00"

| NAD 83 (SURFACE HOLE LOCATION) |
|---|
| LATITUDE = 32°06'35.66" (32.109906) |
| LONGITUDE = 103°35'47.58" (103.596550) |
| NAD 27 (SURFACE HOLE LOCATION) |
| LATITUDE = 32°06'35.21" (32.109781) |
| LONGITUDE = 103°35'45.88" (103.596078) |
| STATE PLANE NAD 83 (N.M. EAST) |
| N: 404499.61' E: 769461.17' |
| STATE PLANE NAD 27 (N.M. EAST) |
| N: 404441.83' E: 728275.01' |

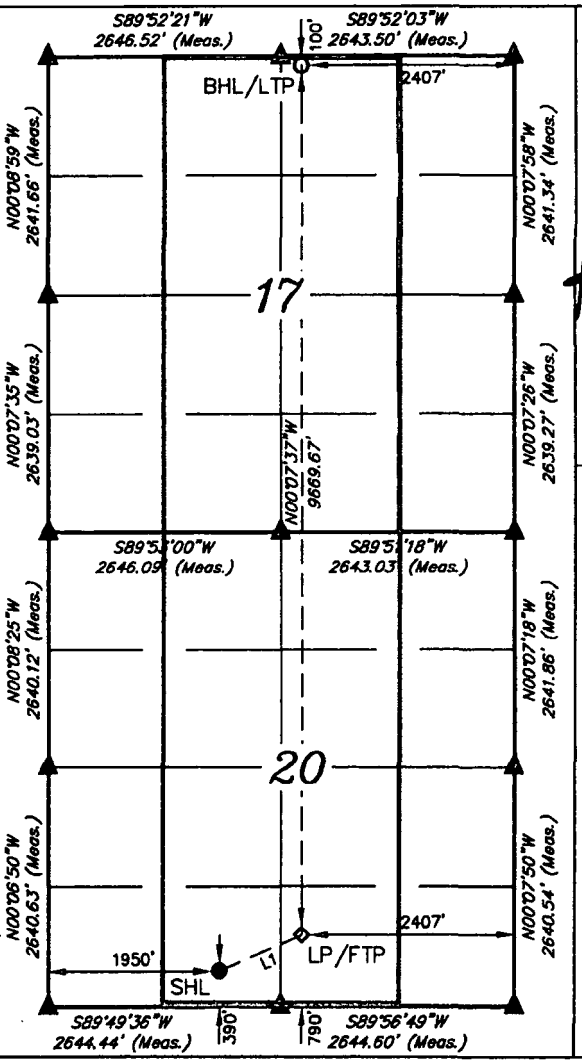
| NAD 83 (BOTTOM HOLE LOCATION) |
|---|
| LATITUDE = 32°08'15.29" (32.137579°) |
| LONGITUDE = 103°35'36.69" (103.593526°) |
| NAD 27 (BOTTOM HOLE LOCATION) |
| LATITUDE = 32°08'14.84" (32.137455°) |
| LONGITUDE = 103°35'34.99" (103.593053°) |
| STATE PLANE NAD 83 (N.M. EAST) |
| N: 414573.54' E: 770328.55' |
| STATE PLANE NAD 27 (N.M. EAST) |
| N: 414515.50' E: 729142.85' |

| LINE TABLE | | |
|---|---|---|
| LINE | DIRECTION | LENGTH |
| L1 | N66°37'50"E | 1014.23' |

2000' 1000' 0' 2000'
SCALE

REV: 3 10-19-18 C.M.T.
(BHL MOVE)

● = SURFACE HOLE LOCATION
◇ = LANDING POINT/FIRST TAKE POINT
○ = BOTTOM HOLE LOCATION/LAST TAKE POINT
▲ = SECTION CORNER LOCATED




### [17] OPERATOR CERTIFICATION

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

Signature 10/24/18 Date

Aricka Easterling
Printed Name

aeasterling@cimarex.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 20, 2017
Date of Survey

Signature and Seal of Professional Surveyor

PAUL BUCHELE
NEW MEXICO
23782
10-19-18
PROFESSIONAL SURVEYOR

Certificate Number

## Additional data for EC transaction #441226 that would not fit on the form

**32. Additional remarks, continued**

FJ from 11,985' to 12610'. Cement volumes will not change. Excess will increase due to hole size reduction

The Rig layout, including v-door and flare line may change depending on rig availability. The pad dimensions and orientation will remain the same. There will be no addition disturbance if a rig layout change is necessary to accommodate the drilling rig.

Please see attached plat, directional plan, drilling plan & AC Report,

## 1. Geological Formations

TVD of target 12,430
MD at TD 22,335

Pilot Hole TD N/A
Deepest expected fresh water

| Formation | Depth (TVD) from KB | Water/Mineral Bearing/Target Zone | Hazards |
|---|---|---|---|
| Rustler | 984 | N/A | |
| Salado | 1128 | N/A | |
| Castille | 4687 | N/A | |
| Bell Canyon | 4956 | N/A | |
| Cherry Canyon | 5974 | Hydrocarbons | |
| Brushy Canyon | 7484 | Hydrocarbons | |
| Bone Spring | 9040 | Hydrocarbons | |
| 2nd Bone Spring Sand | 10573 | Hydrocarbons | |
| 3rd Bone Spring Sand | 11726 | Hydrocarbons | |
| Wolfcamp | 12196 | Hydrocarbons | |
| Wolfcamp A1 Shale | 12361 | Hydrocarbons | |

## 2. Casing Program

| Hole Size | Casing Depth From | Casing Depth To | Setting Depth TVD | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 3/4 | 0 | 1034 | 1034 | 10-3/4" | 40.50 | J-55 | BT&C | 3.34 | 6.62 | 15.02 |
| 9 7/8 | 0 | 11985 | 11985 | 7-5/8" | 29.70 | L-80 | BT&C | 2.47 | 1.19 | 1.81 |
| 8 3/4 | 11985 | 12610 | 12381 | 7-5/8" | 29.70 | L-80 | Ultra FJ | 2.86 | 1.19 | 28.6 |
| 6 3/4 | 0 | 11985 | 11985 | 5-1/2" | 20.00 | L-80 | LT&C | 1.13 | 1.18 | 1.86 |
| 6 3/4 | 11855 | 22335 | 12430 | 5" | 18.00 | P-110 | BT&C | 1.66 | 1.69 | 72.41 |

| | | | |
|---|---|---|---|
| BLM Minimum Safety Factor | 1.125 | 1 | 1.6 Dry<br>1.8 Wet |

TVD was used on all calculations.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Request Variance for 5-1/2" x 7-5/8" annular clearance. The portion that does not meet clearance will not be cemented

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

| | |
|---|---|
| If yes, are there two strings cemented to surface? | N |
| (For 2 string wells) If yes, is there a contingency casing if lost circulation occurs? | N |
| Is well located in critical Cave/Karst? | N |
| If yes, are there three strings cemented to surface? | N |
| Is AC Report included? | Y |

### 3. Cementing Program

| Casing | # Sks | Wt. lb/gal | Yld ft3/sack | H2O gal/sk | 500# Comp. Strength (hours) | Slurry Description |
|---|---|---|---|---|---|---|
| **Surface** | 402 | 13.50 | 1.72 | 9.15 | 15.5 | Lead: Class C + Bentonite |
| | 107 | 14.80 | 1.34 | 6.32 | 9.5 | Tail: Class C + LCM |
| | | | | | | |
| **Intermediate Stage 1** | 627 | 10.50 | 3.45 | 22.18 | N/A | Lead: NeoCem |
| | 207 | 14.20 | 1.30 | 5.86 | 14:30 | Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS |
| | | | | | | |
| **Intermediate Stage 2** | 792 | 12.90 | 1.88 | 9.65 | 12 | Lead: 35:65 (Poz:C) + Salt + Bentonite |
| | | | | | | |
| **Production** | 732 | 14.20 | 1.30 | 5.86 | 14:30 | Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS |
| | | | | | | |

DV tool with possible annular casing packer as needed is proposed at a depth of +/- 4,900'.

| Casing String | TOC | % Excess |
|---|---|---|
| Surface | 0 | 45 |
| Intermediate Stage 1 | 4900 | 47 |
| Intermediate Stage 2 | 0 | 39 |
| Production | 12181 | 9 |

## 4. Pressure Control Equipment

| | |
|---|---|
| | A variance is requested for the use of a diverter on the surface casing. See attached for schematic. |

| BOP installed and tested before drilling which hole? | Size | Min Required WP | Type | | Tested To |
|---|---|---|---|---|---|
| 9 7/8 | 13 5/8 | 5M | Annular | X | 50% of working pressure |
| | | | Blind Ram | | 5M |
| | | | Pipe Ram | X | |
| | | | Double Ram | X | |
| | | | Other | | |
| 6 3/4 | 13 5/8 | 10M | Annular | X | 50% of working pressure |
| | | | Blind Ram | | 10M |
| | | | Pipe Ram | X | |
| | | | Double Ram | X | |
| | | | Other | | |

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

| | |
|---|---|
| X | Formation integrity test will be performed per Onshore Order #2.<br>On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i. |

| | |
|---|---|
| X | A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart. |

| | |
|---|---|
| N | Are anchors required by manufacturer? |

## 5. Mud Program

| Depth | Type | Weight (ppg) | Viscosity | Water Loss |
|---|---|---|---|---|
| 0' to 1034' | FW Spud Mud | 8.30 - 8.80 | 30-32 | N/C |
| 1034' to 12610' | Brine Diesel Emulsion | 8.50 - 9.00 | 30-35 | N/C |
| 12610' to 22335' | OBM | 12.00 - 12.50 | 50-70 | N/C |

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

The Brine Emulsion is completely saturated brine fluid that ties diesel into itself to lower the weight of the fluid. The drilling fluid is completely salt saturated.

| | |
|---|---|
| What will be used to monitor the loss or gain of fluid? | PVT/Pason/Visual Monitoring |

## 6. Logging and Testing Procedures

| Logging, Coring and Testing | |
|---|---|
| | Will run GR/CNL fromTD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM. |
| X | No logs are planned based on well control or offset log information. |
| | Drill stem test? |
| | Coring? |

| Additional Logs Planned | Interval |
|---|---|

## 7. Drilling Conditions

| Condition | |
|---|---|
| BH Pressure at deepest TVD | 8079 psi |
| Abnormal Temperature | No |

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

| | |
|---|---|
| X | H2S is present |
| X | H2S plan is attached |

## 8. Other Facets of Operation

## 9. Wellhead

A multi-bowl wellhead system will be utilized.

After running the 10-3/4" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 10000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 10000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2.

The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office.

The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative.

All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type.

A solid steel body pack-off will be utilized after running and cementing the intermediate casing. After installation the pack-off and lower flange will be pressure tested to 10000 psi.

The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater.

The casing string utilizing steel body pack-off will be tested to 70% of casing burst.

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

# PERFORMANCE DATA

**TMK UP ULTRA™ FJ** **7.625 in** **29.70 lbs/ft** **L80 HC**

**Technical Data Sheet**

## Tubular Parameters

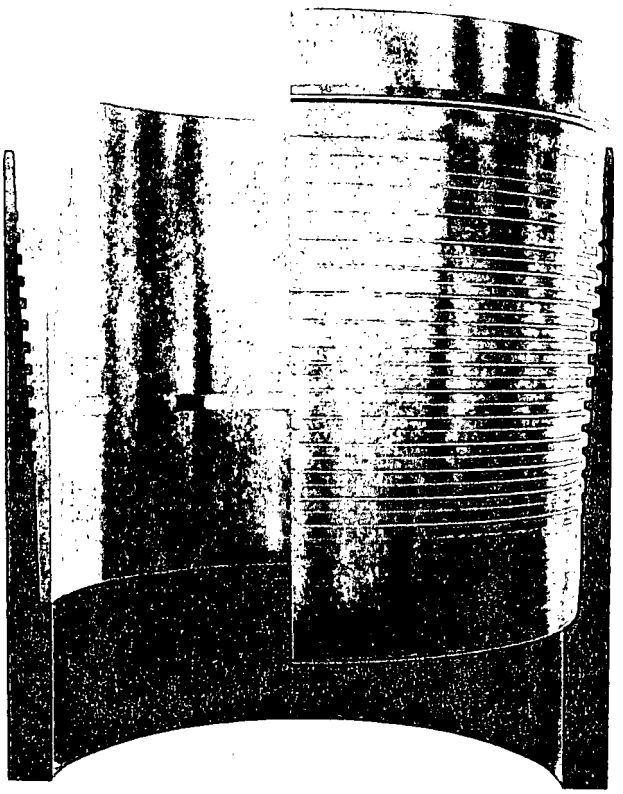
| | | | | | |
|---|---|---|---|---|---|
| Size | 7.625 | in | Minimum Yield | 80,000 | psi |
| Nominal Weight | 29.70 | lbs/ft | Minimum Tensile | 95,000 | psi |
| Grade | L80 HC | | Yield Load | 683,000 | lbs |
| PE Weight | 29.04 | lbs/ft | Tensile Load | 811,000 | lbs |
| Wall Thickness | 0.375 | in | Min. Internal Yield Pressure | 6,890 | psi |
| Nominal ID | 6.875 | in | Collapse Pressure | 5,510 | psi |
| Drift Diameter | 6.750 | in | | | |
| Nom Pipe Body Area | 8.541 | in² | | | |

## Connection Parameters

| | | |
|---|---|---|
| Connection OD | 7.625 | in |
| Connection ID | 6.881 | in |
| Make-Up Loss | 4.022 | in |
| Critical Section Area | 5.316 | in² |
| Tension Efficiency | 62.2 | % |
| Compression Efficiency | 62.2 | % |
| Yield Load In Tension | 425,000 | lbs |
| Min Internal Yield Pressure | 6,890 | psi |
| Collapse Pressure | 5,510 | psi |
| Uniaxial Bending | 30 | °/100 ft |

## Make-Up Torques

| | | |
|---|---|---|
| Min Make-Up Torque | 13,200 | ft-lbs |
| Opt Make-Up Torque | 14,700 | ft-lbs |
| Max Make-Up Torque | 16,200 | ft-lbs |
| Operating Torque | 13,200 | ft-lbs |
| Yield Torque | 23,500 | ft-lbs |



Printed on: August-27-2018



IPSCO

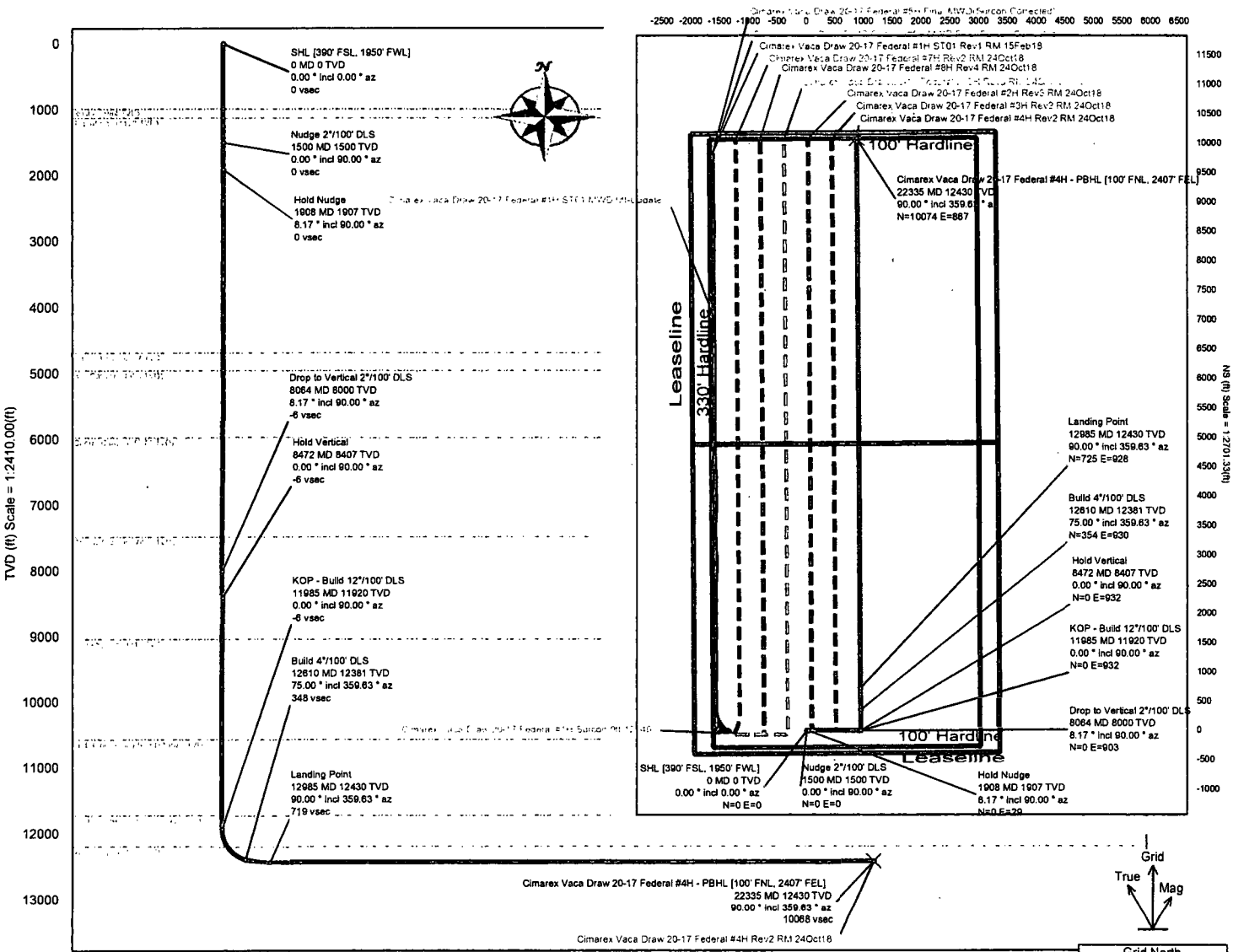
Schlumberger

# Cimarex Rev 2

CIMAREX

| Borehole: | Well: | Field: | Structure: |
|---|---|---|---|
| Original Borehole | Cimarex Vaca Draw 20-17 Federal #4H | NM Lea County (NAD 83) | Cimarex Vaca Draw 20-17 Federal #4H |

| Gravity & Magnetic Parameters | | | | | Surface Location | NAD83 New Mexico State Plane, Eastern Zone, US Feet | | | | Miscellaneous | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model: | HDGM 2018 | Dip: | 59.754° | Date: | 24-Oct-2018 | Lat: | N 32 6 35.88 | Northing: | 404499.81ftUS | Grid Conv: | 0.3916° | Slot: | Cimarex Vaca Draw 20-17 Federal #4H | TVD Ref: | RKB(3443.7ft above MSL) |
| MagDec: | 6.719° | FS: | 47835.578nT | Gravity FS: | 998.43mgn (9.80665 Based) | Lon: | W 103 35 47.58 | Easting: | 769481.17ftUS | Scale Fact: | 0.99996869 | Plan: | Cimarex Vaca Draw 20-17 Federal #4H Rev2 RM 24Oct18 | | |




Vertical Section (ft) Azim = 359.63° Scale = 1:2410.00(ft) Origin = 0N/-S, 0E/-W

## Critical Points

| Critical Point | MD | INCL | AZIM | TVD | VSEC | N(+)/S(-) | E(+)/W(-) | DLS |
|---|---|---|---|---|---|---|---|---|
| SHL [390' FSL, 1950' FWL] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Rustler | 984.00 | 0.00 | 90.00 | 984.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Top of Salt | 1128.00 | 0.00 | 90.00 | 1128.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nudge 2°/100' DLS | 1500.00 | 0.00 | 90.00 | 1500.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hold Nudge | 1908.32 | 8.17 | 90.00 | 1906.93 | -0.19 | 0.00 | 29.05 | 2.00 |
| Base of Salt | 4716.86 | 8.17 | 90.00 | 4687.00 | -2.76 | 0.00 | 427.99 | 0.00 |
| Bell Canyon | 4986.62 | 8.17 | 90.00 | 4956.00 | -3.01 | 0.00 | 466.80 | 0.00 |
| Cherry Canyon | 6017.04 | 8.17 | 90.00 | 5974.00 | -3.96 | 0.00 | 612.68 | 0.00 |
| Brushy Canyon | 7542.51 | 8.17 | 90.00 | 7484.00 | -5.36 | 0.00 | 829.37 | 0.00 |
| Drop to Vertical 2°/100' DLS | 8063.80 | 8.17 | 90.00 | 8000.00 | -5.83 | 0.00 | 903.42 | 0.00 |
| Hold Vertical | 8472.11 | 0.00 | 90.00 | 8406.93 | -6.02 | 0.00 | 932.46 | 2.00 |
| Bone Spring | 9105.18 | 0.00 | 90.00 | 9040.00 | -6.02 | 0.00 | 932.46 | 0.00 |
| 2nd Bone Spring Sand | 10638.18 | 0.00 | 90.00 | 10573.00 | -6.02 | 0.00 | 932.46 | 0.00 |
| 3rd Bone Spring Sand | 11791.18 | 0.00 | 90.00 | 11726.00 | -6.02 | 0.00 | 932.46 | 0.00 |
| KOP - Build 12°/100' DLS | 11985.18 | 0.00 | 90.00 | 11920.00 | -6.02 | 0.00 | 932.46 | 0.00 |
| Wolfcamp | 12279.46 | 35.31 | 359.63 | 12196.00 | 81.83 | 87.85 | 931.90 | 12.00 |
| Build 4°/100' DLS | 12610.18 | 75.00 | 359.63 | 12381.19 | 347.87 | 353.88 | 930.18 | 12.00 |
| Landing Point | 12985.18 | 90.00 | 359.63 | 12430.00 | 718.60 | 724.60 | 927.79 | 4.00 |
| Cimarex Vaca Draw 20-17 Federal #4H - PBHL [100' FNL, 2407' FEL] | 22335.03 | 90.00 | 359.63 | 12430.00 | 10068.45 | 10074.27 | 887.41 | 0.00 |

Schlumberger

# Cimarex Vaca Draw 20-17 Federal #4H Rev2 RM 24Oct18 Proposal
## Geodetic Report
(Def Plan)

CIMAREX

| | | | |
|---|---|---|---|
| **Report Date:** | October 25, 2018 - 09:50 AM | **Survey / DLS Computation:** | Minimum Curvature / Lubinski |
| **Client:** | Cimarex | **Vertical Section Azimuth:** | 359.630 ° (Grid North) |
| **Field:** | NM Lea County (NAD 83) | **Vertical Section Origin:** | 0.000 ft, 0.000 ft |
| **Structure / Slot:** | Cimarex Vaca Draw 20-17 Federal #4H / Cimarex Vaca Draw 20-17 Federal #4H | **TVD Reference Datum:** | RKB |
| **Well:** | Cimarex Vaca Draw 20-17 Federal #4H | **TVD Reference Elevation:** | 3443.700 ft above MSL |
| **Borehole:** | Original Borehole | **Seabed / Ground Elevation:** | 3417.700 ft above MSL |
| **UWI / API#:** | Unknown / Unknown | **Magnetic Declination:** | 6.719 ° |
| **Survey Name:** | Cimarex Vaca Draw 20-17 Federal #4H Rev2 RM 24Oct18 | **Total Gravity Field Strength:** | 998.4301mgn (9.80665 Based) |
| **Survey Date:** | April 13, 2017 | **Gravity Model:** | GARM |
| **Tort / AHD / DDI / ERD Ratio:** | 106.333 ° / 11006.940 ft / 6.323 / 0.886 | **Total Magnetic Field Strength:** | 47835.578 nT |
| **Coordinate Reference System:** | NAD83 New Mexico State Plane, Eastern Zone, US Feet | **Magnetic Dip Angle:** | 59.754 ° |
| **Location Lat / Long:** | N 32° 6' 35.65929", W 103° 35' 47.58310" | **Declination Date:** | October 24, 2018 |
| **Location Grid N/E Y/X:** | N 404499.610 ftUS, E 769461.170 ftUS | **Magnetic Declination Model:** | HDGM 2018 |
| **CRS Grid Convergence Angle:** | 0.3916 ° | **North Reference:** | Grid North |
| **Grid Scale Factor:** | 0.99996869 | **Grid Convergence Used:** | 0.3916 ° |
| **Version / Patch:** | 2.10.740.0 | **Total Corr Mag North->Grid North:** | 6.3269 ° |
| | | **Local Coord Referenced To:** | Structure Reference Point |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHL [390' FSL, 1950' FWL] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N/A | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 100.00 | 0.00 | 90.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 200.00 | 0.00 | 90.00 | 200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 300.00 | 0.00 | 90.00 | 300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 400.00 | 0.00 | 90.00 | 400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 500.00 | 0.00 | 90.00 | 500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 600.00 | 0.00 | 90.00 | 600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 700.00 | 0.00 | 90.00 | 700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 800.00 | 0.00 | 90.00 | 800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 900.00 | 0.00 | 90.00 | 900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| *Rustler* | *984.00* | *0.00* | *90.00* | *984.00* | *0.00* | *0.00* | *0.00* | *0.00* | *404499.61* | *769461.17* | *N 32 6 35.66* | *W 103 35 47.58* |
| | 1000.00 | 0.00 | 90.00 | 1000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 1100.00 | 0.00 | 90.00 | 1100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| *Top of Salt* | *1128.00* | *0.00* | *90.00* | *1128.00* | *0.00* | *0.00* | *0.00* | *0.00* | *404499.61* | *769461.17* | *N 32 6 35.66* | *W 103 35 47.58* |
| | 1200.00 | 0.00 | 90.00 | 1200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 1300.00 | 0.00 | 90.00 | 1300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 1400.00 | 0.00 | 90.00 | 1400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| Nudge 2°/100' DLS | 1500.00 | 0.00 | 90.00 | 1500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 404499.61 | 769461.17 | N 32 6 35.66 | W 103 35 47.58 |
| | 1600.00 | 2.00 | 90.00 | 1599.98 | -0.01 | 0.00 | 1.75 | 2.00 | 404499.61 | 769462.92 | N 32 6 35.66 | W 103 35 47.56 |
| | 1700.00 | 4.00 | 90.00 | 1699.84 | -0.05 | 0.00 | 6.98 | 2.00 | 404499.61 | 769468.15 | N 32 6 35.66 | W 103 35 47.50 |
| | 1800.00 | 6.00 | 90.00 | 1799.45 | -0.10 | 0.00 | 15.69 | 2.00 | 404499.61 | 769476.86 | N 32 6 35.66 | W 103 35 47.40 |
| | 1900.00 | 8.00 | 90.00 | 1898.70 | -0.18 | 0.00 | 27.88 | 2.00 | 404499.61 | 769489.05 | N 32 6 35.66 | W 103 35 47.26 |
| Hold Nudge | 1908.32 | 8.17 | 90.00 | 1906.93 | -0.19 | 0.00 | 29.05 | 2.00 | 404499.61 | 769490.22 | N 32 6 35.66 | W 103 35 47.25 |
| | 2000.00 | 8.17 | 90.00 | 1997.69 | -0.27 | 0.00 | 42.07 | 0.00 | 404499.61 | 769503.24 | N 32 6 35.66 | W 103 35 47.09 |
| | 2100.00 | 8.17 | 90.00 | 2096.68 | -0.36 | 0.00 | 56.28 | 0.00 | 404499.61 | 769517.45 | N 32 6 35.66 | W 103 35 46.93 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2200.00 | 8.17 | 90.00 | 2195.66 | -0.46 | 0.00 | 70.48 | 0.00 | 404499.61 | 769531.65 | N 32 6 35.65 | W 103 35 46.76 |
| | 2300.00 | 8.17 | 90.00 | 2294.65 | -0.55 | 0.00 | 84.69 | 0.00 | 404499.61 | 769545.85 | N 32 6 35.65 | W 103 35 46.60 |
| | 2400.00 | 8.17 | 90.00 | 2393.63 | -0.64 | 0.00 | 98.89 | 0.00 | 404499.61 | 769560.06 | N 32 6 35.65 | W 103 35 46.43 |
| | 2500.00 | 8.17 | 90.00 | 2492.62 | -0.73 | 0.00 | 113.10 | 0.00 | 404499.61 | 769574.26 | N 32 6 35.65 | W 103 35 46.27 |
| | 2600.00 | 8.17 | 90.00 | 2591.61 | -0.82 | 0.00 | 127.30 | 0.00 | 404499.61 | 769588.47 | N 32 6 35.65 | W 103 35 46.10 |
| | 2700.00 | 8.17 | 90.00 | 2690.59 | -0.91 | 0.00 | 141.51 | 0.00 | 404499.61 | 769602.67 | N 32 6 35.65 | W 103 35 45.94 |
| | 2800.00 | 8.17 | 90.00 | 2789.58 | -1.01 | 0.00 | 155.71 | 0.00 | 404499.61 | 769616.87 | N 32 6 35.65 | W 103 35 45.77 |
| | 2900.00 | 8.17 | 90.00 | 2888.56 | -1.10 | 0.00 | 169.91 | 0.00 | 404499.61 | 769631.08 | N 32 6 35.65 | W 103 35 45.61 |
| | 3000.00 | 8.17 | 90.00 | 2987.55 | -1.19 | 0.00 | 184.12 | 0.00 | 404499.61 | 769645.28 | N 32 6 35.65 | W 103 35 45.44 |
| | 3100.00 | 8.17 | 90.00 | 3086.54 | -1.28 | 0.00 | 198.32 | 0.00 | 404499.61 | 769659.49 | N 32 6 35.65 | W 103 35 45.28 |
| | 3200.00 | 8.17 | 90.00 | 3185.52 | -1.37 | 0.00 | 212.53 | 0.00 | 404499.61 | 769673.69 | N 32 6 35.64 | W 103 35 45.11 |
| | 3300.00 | 8.17 | 90.00 | 3284.51 | -1.46 | 0.00 | 226.73 | 0.00 | 404499.61 | 769687.90 | N 32 6 35.64 | W 103 35 44.95 |
| | 3400.00 | 8.17 | 90.00 | 3383.49 | -1.56 | 0.00 | 240.94 | 0.00 | 404499.61 | 769702.10 | N 32 6 35.64 | W 103 35 44.78 |
| | 3500.00 | 8.17 | 90.00 | 3482.48 | -1.65 | 0.00 | 255.14 | 0.00 | 404499.61 | 769716.30 | N 32 6 35.64 | W 103 35 44.62 |
| | 3600.00 | 8.17 | 90.00 | 3581.47 | -1.74 | 0.00 | 269.35 | 0.00 | 404499.61 | 769730.51 | N 32 6 35.64 | W 103 35 44.45 |
| | 3700.00 | 8.17 | 90.00 | 3680.45 | -1.83 | 0.00 | 283.55 | 0.00 | 404499.61 | 769744.71 | N 32 6 35.64 | W 103 35 44.29 |
| | 3800.00 | 8.17 | 90.00 | 3779.44 | -1.92 | 0.00 | 297.76 | 0.00 | 404499.61 | 769758.92 | N 32 6 35.64 | W 103 35 44.12 |
| | 3900.00 | 8.17 | 90.00 | 3878.42 | -2.01 | 0.00 | 311.96 | 0.00 | 404499.61 | 769773.12 | N 32 6 35.64 | W 103 35 43.96 |
| | 4000.00 | 8.17 | 90.00 | 3977.41 | -2.11 | 0.00 | 326.17 | 0.00 | 404499.61 | 769787.33 | N 32 6 35.64 | W 103 35 43.79 |
| | 4100.00 | 8.17 | 90.00 | 4076.40 | -2.20 | 0.00 | 340.37 | 0.00 | 404499.61 | 769801.53 | N 32 6 35.64 | W 103 35 43.63 |
| | 4200.00 | 8.17 | 90.00 | 4175.38 | -2.29 | 0.00 | 354.58 | 0.00 | 404499.61 | 769815.73 | N 32 6 35.64 | W 103 35 43.46 |
| | 4300.00 | 8.17 | 90.00 | 4274.37 | -2.38 | 0.00 | 368.78 | 0.00 | 404499.61 | 769829.94 | N 32 6 35.63 | W 103 35 43.30 |
| | 4400.00 | 8.17 | 90.00 | 4373.35 | -2.47 | 0.00 | 382.98 | 0.00 | 404499.61 | 769844.14 | N 32 6 35.63 | W 103 35 43.13 |
| | 4500.00 | 8.17 | 90.00 | 4472.34 | -2.56 | 0.00 | 397.19 | 0.00 | 404499.61 | 769858.35 | N 32 6 35.63 | W 103 35 42.97 |
| | 4600.00 | 8.17 | 90.00 | 4571.33 | -2.66 | 0.00 | 411.39 | 0.00 | 404499.61 | 769872.55 | N 32 6 35.63 | W 103 35 42.80 |
| | 4700.00 | 8.17 | 90.00 | 4670.31 | -2.75 | 0.00 | 425.60 | 0.00 | 404499.61 | 769886.75 | N 32 6 35.63 | W 103 35 42.64 |
| *Base of Salt* | *4716.86* | *8.17* | *90.00* | *4687.00* | *-2.76* | *0.00* | *427.99* | *0.00* | *404499.61* | *769889.15* | *N 32 6 35.63* | *W 103 35 42.61* |
| | 4800.00 | 8.17 | 90.00 | 4769.30 | -2.84 | 0.00 | 439.80 | 0.00 | 404499.61 | 769900.96 | N 32 6 35.63 | W 103 35 42.47 |
| | 4900.00 | 8.17 | 90.00 | 4868.28 | -2.93 | 0.00 | 454.01 | 0.00 | 404499.61 | 769915.16 | N 32 6 35.63 | W 103 35 42.30 |
| *Bell Canyon* | *4988.62* | *8.17* | *90.00* | *4956.00* | *-3.01* | *0.00* | *466.60* | *0.00* | *404499.61* | *769927.75* | *N 32 6 35.63* | *W 103 35 42.16* |
| | 5000.00 | 8.17 | 90.00 | 4967.27 | -3.02 | 0.00 | 468.21 | 0.00 | 404499.61 | 769929.37 | N 32 6 35.63 | W 103 35 42.14 |
| | 5100.00 | 8.17 | 90.00 | 5066.26 | -3.12 | 0.00 | 482.42 | 0.00 | 404499.61 | 769943.57 | N 32 6 35.63 | W 103 35 41.97 |
| | 5200.00 | 8.17 | 90.00 | 5165.24 | -3.21 | 0.00 | 496.62 | 0.00 | 404499.61 | 769957.78 | N 32 6 35.63 | W 103 35 41.81 |
| | 5300.00 | 8.17 | 90.00 | 5264.23 | -3.30 | 0.00 | 510.83 | 0.00 | 404499.61 | 769971.98 | N 32 6 35.62 | W 103 35 41.64 |
| | 5400.00 | 8.17 | 90.00 | 5363.21 | -3.39 | 0.00 | 525.03 | 0.00 | 404499.61 | 769986.18 | N 32 6 35.62 | W 103 35 41.48 |
| | 5500.00 | 8.17 | 90.00 | 5462.20 | -3.48 | 0.00 | 539.24 | 0.00 | 404499.61 | 770000.39 | N 32 6 35.62 | W 103 35 41.31 |
| | 5600.00 | 8.17 | 90.00 | 5561.19 | -3.57 | 0.00 | 553.44 | 0.00 | 404499.61 | 770014.59 | N 32 6 35.62 | W 103 35 41.15 |
| | 5700.00 | 8.17 | 90.00 | 5660.17 | -3.67 | 0.00 | 567.65 | 0.00 | 404499.61 | 770028.80 | N 32 6 35.62 | W 103 35 40.98 |
| | 5800.00 | 8.17 | 90.00 | 5759.16 | -3.76 | 0.00 | 581.85 | 0.00 | 404499.61 | 770043.00 | N 32 6 35.62 | W 103 35 40.82 |
| | 5900.00 | 8.17 | 90.00 | 5858.14 | -3.85 | 0.00 | 596.05 | 0.00 | 404499.61 | 770057.21 | N 32 6 35.62 | W 103 35 40.65 |
| | 6000.00 | 8.17 | 90.00 | 5957.13 | -3.94 | 0.00 | 610.26 | 0.00 | 404499.61 | 770071.41 | N 32 6 35.62 | W 103 35 40.49 |
| *Cherry Canyon* | *6017.04* | *8.17* | *90.00* | *5974.00* | *-3.96* | *0.00* | *612.68* | *0.00* | *404499.61* | *770073.83* | *N 32 6 35.62* | *W 103 35 40.46* |
| | 6100.00 | 8.17 | 90.00 | 6056.12 | -4.03 | 0.00 | 624.46 | 0.00 | 404499.61 | 770085.61 | N 32 6 35.62 | W 103 35 40.32 |
| | 6200.00 | 8.17 | 90.00 | 6155.10 | -4.12 | 0.00 | 638.67 | 0.00 | 404499.61 | 770099.82 | N 32 6 35.62 | W 103 35 40.16 |
| | 6300.00 | 8.17 | 90.00 | 6254.09 | -4.22 | 0.00 | 652.87 | 0.00 | 404499.61 | 770114.02 | N 32 6 35.62 | W 103 35 39.99 |
| | 6400.00 | 8.17 | 90.00 | 6353.07 | -4.31 | 0.00 | 667.08 | 0.00 | 404499.61 | 770128.23 | N 32 6 35.61 | W 103 35 39.83 |
| | 6500.00 | 8.17 | 90.00 | 6452.06 | -4.40 | 0.00 | 681.28 | 0.00 | 404499.61 | 770142.43 | N 32 6 35.61 | W 103 35 39.66 |
| | 6600.00 | 8.17 | 90.00 | 6551.05 | -4.49 | 0.00 | 695.49 | 0.00 | 404499.61 | 770156.63 | N 32 6 35.61 | W 103 35 39.50 |
| | 6700.00 | 8.17 | 90.00 | 6650.03 | -4.58 | 0.00 | 709.69 | 0.00 | 404499.61 | 770170.84 | N 32 6 35.61 | W 103 35 39.33 |
| | 6800.00 | 8.17 | 90.00 | 6749.02 | -4.67 | 0.00 | 723.90 | 0.00 | 404499.61 | 770185.04 | N 32 6 35.61 | W 103 35 39.17 |
| | 6900.00 | 8.17 | 90.00 | 6848.00 | -4.77 | 0.00 | 738.10 | 0.00 | 404499.61 | 770199.25 | N 32 6 35.61 | W 103 35 39.00 |
| | 7000.00 | 8.17 | 90.00 | 6946.99 | -4.86 | 0.00 | 752.31 | 0.00 | 404499.61 | 770213.45 | N 32 6 35.61 | W 103 35 38.84 |
| | 7100.00 | 8.17 | 90.00 | 7045.98 | -4.95 | 0.00 | 766.51 | 0.00 | 404499.61 | 770227.66 | N 32 6 35.61 | W 103 35 38.67 |
| | 7200.00 | 8.17 | 90.00 | 7144.96 | -5.04 | 0.00 | 780.72 | 0.00 | 404499.61 | 770241.86 | N 32 6 35.61 | W 103 35 38.51 |
| | 7300.00 | 8.17 | 90.00 | 7243.95 | -5.13 | 0.00 | 794.92 | 0.00 | 404499.61 | 770256.06 | N 32 6 35.61 | W 103 35 38.34 |
| | 7400.00 | 8.17 | 90.00 | 7342.93 | -5.23 | 0.00 | 809.13 | 0.00 | 404499.61 | 770270.27 | N 32 6 35.60 | W 103 35 38.18 |
| | 7500.00 | 8.17 | 90.00 | 7441.92 | -5.32 | 0.00 | 823.33 | 0.00 | 404499.61 | 770284.47 | N 32 6 35.60 | W 103 35 38.01 |
| *Brushy Canyon* | *7542.51* | *8.17* | *90.00* | *7484.00* | *-5.36* | *0.00* | *829.37* | *0.00* | *404499.61* | *770290.51* | *N 32 6 35.60* | *W 103 35 37.94* |
| | 7600.00 | 8.17 | 90.00 | 7540.90 | -5.41 | 0.00 | 837.53 | 0.00 | 404499.61 | 770298.68 | N 32 6 35.60 | W 103 35 37.85 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7700.00 | 8.17 | 90.00 | 7639.89 | -5.50 | 0.00 | 851.74 | 0.00 | 404499.61 | 770312.88 | N 32 6 35.60 | W 103 35 37.68 |
| | 7800.00 | 8.17 | 90.00 | 7738.88 | -5.59 | 0.00 | 865.94 | 0.00 | 404499.61 | 770327.08 | N 32 6 35.60 | W 103 35 37.52 |
| | 7900.00 | 8.17 | 90.00 | 7837.86 | -5.68 | 0.00 | 880.15 | 0.00 | 404499.61 | 770341.29 | N 32 6 35.60 | W 103 35 37.35 |
| | 8000.00 | 8.17 | 90.00 | 7936.85 | -5.78 | 0.00 | 894.35 | 0.00 | 404499.61 | 770355.49 | N 32 6 35.60 | W 103 35 37.19 |
| Drop to Vertical 2°/100' DLS | 8063.80 | 8.17 | 90.00 | 8000.00 | -5.83 | 0.00 | 903.42 | 0.00 | 404499.61 | 770364.56 | N 32 6 35.60 | W 103 35 37.08 |
| | 8100.00 | 7.44 | 90.00 | 8035.87 | -5.87 | 0.00 | 908.33 | 2.00 | 404499.61 | 770369.47 | N 32 6 35.60 | W 103 35 37.02 |
| | 8200.00 | 5.44 | 90.00 | 8135.23 | -5.94 | 0.00 | 919.55 | 2.00 | 404499.61 | 770380.69 | N 32 6 35.60 | W 103 35 36.89 |
| | 8300.00 | 3.44 | 90.00 | 8234.92 | -5.99 | 0.00 | 927.30 | 2.00 | 404499.61 | 770388.44 | N 32 6 35.60 | W 103 35 36.80 |
| | 8400.00 | 1.44 | 90.00 | 8334.83 | -6.02 | 0.00 | 931.56 | 2.00 | 404499.61 | 770392.70 | N 32 6 35.60 | W 103 35 36.75 |
| Hold Vertical | 8472.11 | 0.00 | 90.00 | 8406.93 | -6.02 | 0.00 | 932.46 | 2.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 8500.00 | 0.00 | 90.00 | 8434.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 8600.00 | 0.00 | 90.00 | 8534.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 8700.00 | 0.00 | 90.00 | 8634.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 8800.00 | 0.00 | 90.00 | 8734.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 8900.00 | 0.00 | 90.00 | 8834.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9000.00 | 0.00 | 90.00 | 8934.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9100.00 | 0.00 | 90.00 | 9034.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| *Bone Spring* | *9105.18* | *0.00* | *90.00* | *9040.00* | *-6.02* | *0.00* | *932.46* | *0.00* | *404499.61* | *770393.60* | *N 32 6 35.60* | *W 103 35 36.74* |
| | 9200.00 | 0.00 | 90.00 | 9134.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9300.00 | 0.00 | 90.00 | 9234.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9400.00 | 0.00 | 90.00 | 9334.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9500.00 | 0.00 | 90.00 | 9434.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9600.00 | 0.00 | 90.00 | 9534.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9700.00 | 0.00 | 90.00 | 9634.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9800.00 | 0.00 | 90.00 | 9734.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 9900.00 | 0.00 | 90.00 | 9834.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10000.00 | 0.00 | 90.00 | 9934.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10100.00 | 0.00 | 90.00 | 10034.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10200.00 | 0.00 | 90.00 | 10134.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10300.00 | 0.00 | 90.00 | 10234.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10400.00 | 0.00 | 90.00 | 10334.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10500.00 | 0.00 | 90.00 | 10434.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10600.00 | 0.00 | 90.00 | 10534.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| *2nd Bone Spring Sand* | *10638.18* | *0.00* | *90.00* | *10573.00* | *-6.02* | *0.00* | *932.46* | *0.00* | *404499.61* | *770393.60* | *N 32 6 35.60* | *W 103 35 36.74* |
| | 10700.00 | 0.00 | 90.00 | 10634.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10800.00 | 0.00 | 90.00 | 10734.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 10900.00 | 0.00 | 90.00 | 10834.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11000.00 | 0.00 | 90.00 | 10934.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11100.00 | 0.00 | 90.00 | 11034.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11200.00 | 0.00 | 90.00 | 11134.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11300.00 | 0.00 | 90.00 | 11234.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11400.00 | 0.00 | 90.00 | 11334.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11500.00 | 0.00 | 90.00 | 11434.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11600.00 | 0.00 | 90.00 | 11534.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11700.00 | 0.00 | 90.00 | 11634.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| *3rd Bone Spring Sand* | *11791.18* | *0.00* | *90.00* | *11726.00* | *-6.02* | *0.00* | *932.46* | *0.00* | *404499.61* | *770393.60* | *N 32 6 35.60* | *W 103 35 36.74* |
| | 11800.00 | 0.00 | 90.00 | 11734.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 11900.00 | 0.00 | 90.00 | 11834.82 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| KOP - Build 12°/100' DLS | 11985.18 | 0.00 | 90.00 | 11920.00 | -6.02 | 0.00 | 932.46 | 0.00 | 404499.61 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 12000.00 | 1.78 | 359.63 | 11934.82 | -5.79 | 0.23 | 932.46 | 12.00 | 404499.84 | 770393.60 | N 32 6 35.60 | W 103 35 36.74 |
| | 12100.00 | 13.78 | 359.63 | 12033.72 | 7.72 | 13.74 | 932.38 | 12.00 | 404513.35 | 770393.51 | N 32 6 35.73 | W 103 35 36.74 |
| | 12200.00 | 25.78 | 359.63 | 12127.65 | 41.50 | 47.52 | 932.16 | 12.00 | 404547.13 | 770393.30 | N 32 6 36.07 | W 103 35 36.74 |
| *Wolfcamp* | *12279.46* | *35.31* | *359.63* | *12196.00* | *81.83* | *87.85* | *931.90* | *12.00* | *404587.46* | *770393.04* | *N 32 6 36.47* | *W 103 35 36.74* |
| | 12300.00 | 37.78 | 359.63 | 12212.50 | 94.06 | 100.08 | 931.82 | 12.00 | 404599.69 | 770392.96 | N 32 6 36.59 | W 103 35 36.74 |
| | 12400.00 | 49.78 | 359.63 | 12284.57 | 163.13 | 169.14 | 931.37 | 12.00 | 404668.75 | 770392.51 | N 32 6 37.27 | W 103 35 36.74 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12500.00 | 61.78 | 359.63 | 12340.71 | 245.66 | 251.68 | 930.84 | 12.00 | 404751.28 | 770391.98 | N 32 6 38.09 | W 103 35 36.74 |
| | 12600.00 | 73.78 | 359.63 | 12378.45 | 338.07 | 344.08 | 930.24 | 12.00 | 404843.68 | 770391.38 | N 32 6 39.00 | W 103 35 36.74 |
| Build 4°/100' DLS | 12610.18 | 75.00 | 359.63 | 12381.19 | 347.87 | 353.88 | 930.18 | 12.00 | 404853.48 | 770391.32 | N 32 6 39.10 | W 103 35 36.74 |
| | 12700.00 | 78.59 | 359.63 | 12401.71 | 435.30 | 441.31 | 929.61 | 4.00 | 404940.91 | 770390.75 | N 32 6 39.96 | W 103 35 36.74 |
| | 12800.00 | 82.59 | 359.63 | 12418.05 | 533.94 | 539.95 | 928.98 | 4.00 | 405039.54 | 770390.12 | N 32 6 40.94 | W 103 35 36.74 |
| | 12900.00 | 86.59 | 359.63 | 12427.47 | 633.47 | 639.48 | 928.33 | 4.00 | 405139.07 | 770389.47 | N 32 6 41.92 | W 103 35 36.74 |
| Landing Point | 12985.18 | 90.00 | 359.63 | 12430.00 | 718.60 | 724.60 | 927.79 | 4.00 | 405224.19 | 770388.92 | N 32 6 42.77 | W 103 35 36.74 |
| | 13000.00 | 90.00 | 359.63 | 12430.00 | 733.42 | 739.43 | 927.69 | 0.00 | 405239.01 | 770388.83 | N 32 6 42.91 | W 103 35 36.74 |
| | 13100.00 | 90.00 | 359.63 | 12430.00 | 833.42 | 839.43 | 927.04 | 0.00 | 405339.01 | 770388.18 | N 32 6 43.90 | W 103 35 36.74 |
| | 13200.00 | 90.00 | 359.63 | 12430.00 | 933.42 | 939.42 | 926.40 | 0.00 | 405439.00 | 770387.54 | N 32 6 44.89 | W 103 35 36.74 |
| | 13300.00 | 90.00 | 359.63 | 12430.00 | 1033.42 | 1039.42 | 925.75 | 0.00 | 405539.00 | 770386.89 | N 32 6 45.88 | W 103 35 36.74 |
| | 13400.00 | 90.00 | 359.63 | 12430.00 | 1133.42 | 1139.42 | 925.11 | 0.00 | 405638.99 | 770386.25 | N 32 6 46.87 | W 103 35 36.74 |
| | 13500.00 | 90.00 | 359.63 | 12430.00 | 1233.42 | 1239.42 | 924.46 | 0.00 | 405738.99 | 770385.60 | N 32 6 47.86 | W 103 35 36.74 |
| | 13600.00 | 90.00 | 359.63 | 12430.00 | 1333.42 | 1339.42 | 923.82 | 0.00 | 405838.98 | 770384.95 | N 32 6 48.85 | W 103 35 36.74 |
| | 13700.00 | 90.00 | 359.63 | 12430.00 | 1433.42 | 1439.41 | 923.17 | 0.00 | 405938.98 | 770384.31 | N 32 6 49.84 | W 103 35 36.74 |
| | 13800.00 | 90.00 | 359.63 | 12430.00 | 1533.42 | 1539.41 | 922.52 | 0.00 | 406038.97 | 770383.66 | N 32 6 50.83 | W 103 35 36.74 |
| | 13900.00 | 90.00 | 359.63 | 12430.00 | 1633.42 | 1639.41 | 921.88 | 0.00 | 406138.96 | 770383.02 | N 32 6 51.82 | W 103 35 36.73 |
| | 14000.00 | 90.00 | 359.63 | 12430.00 | 1733.42 | 1739.41 | 921.23 | 0.00 | 406238.96 | 770382.37 | N 32 6 52.81 | W 103 35 36.73 |
| | 14100.00 | 90.00 | 359.63 | 12430.00 | 1833.42 | 1839.40 | 920.59 | 0.00 | 406338.95 | 770381.73 | N 32 6 53.80 | W 103 35 36.73 |
| | 14200.00 | 90.00 | 359.63 | 12430.00 | 1933.42 | 1939.40 | 919.94 | 0.00 | 406438.95 | 770381.08 | N 32 6 54.79 | W 103 35 36.73 |
| | 14300.00 | 90.00 | 359.63 | 12430.00 | 2033.42 | 2039.40 | 919.29 | 0.00 | 406538.94 | 770380.43 | N 32 6 55.78 | W 103 35 36.73 |
| | 14400.00 | 90.00 | 359.63 | 12430.00 | 2133.42 | 2139.40 | 918.65 | 0.00 | 406638.94 | 770379.79 | N 32 6 56.77 | W 103 35 36.73 |
| | 14500.00 | 90.00 | 359.63 | 12430.00 | 2233.42 | 2239.40 | 918.00 | 0.00 | 406738.93 | 770379.14 | N 32 6 57.76 | W 103 35 36.73 |
| | 14600.00 | 90.00 | 359.63 | 12430.00 | 2333.42 | 2339.39 | 917.36 | 0.00 | 406838.93 | 770378.50 | N 32 6 58.75 | W 103 35 36.73 |
| | 14700.00 | 90.00 | 359.63 | 12430.00 | 2433.42 | 2439.39 | 916.71 | 0.00 | 406938.92 | 770377.85 | N 32 6 59.74 | W 103 35 36.73 |
| | 14800.00 | 90.00 | 359.63 | 12430.00 | 2533.42 | 2539.39 | 916.07 | 0.00 | 407038.92 | 770377.21 | N 32 7 0.72 | W 103 35 36.73 |
| | 14900.00 | 90.00 | 359.63 | 12430.00 | 2633.42 | 2639.39 | 915.42 | 0.00 | 407138.91 | 770376.56 | N 32 7 1.71 | W 103 35 36.73 |
| | 15000.00 | 90.00 | 359.63 | 12430.00 | 2733.42 | 2739.39 | 914.77 | 0.00 | 407238.90 | 770375.91 | N 32 7 2.70 | W 103 35 36.73 |
| | 15100.00 | 90.00 | 359.63 | 12430.00 | 2833.42 | 2839.38 | 914.13 | 0.00 | 407338.90 | 770375.27 | N 32 7 3.69 | W 103 35 36.73 |
| | 15200.00 | 90.00 | 359.63 | 12430.00 | 2933.42 | 2939.38 | 913.48 | 0.00 | 407438.89 | 770374.62 | N 32 7 4.68 | W 103 35 36.73 |
| | 15300.00 | 90.00 | 359.63 | 12430.00 | 3033.42 | 3039.38 | 912.84 | 0.00 | 407538.89 | 770373.98 | N 32 7 5.67 | W 103 35 36.73 |
| | 15400.00 | 90.00 | 359.63 | 12430.00 | 3133.42 | 3139.38 | 912.19 | 0.00 | 407638.88 | 770373.33 | N 32 7 6.66 | W 103 35 36.73 |
| | 15500.00 | 90.00 | 359.63 | 12430.00 | 3233.42 | 3239.38 | 911.55 | 0.00 | 407738.88 | 770372.69 | N 32 7 7.65 | W 103 35 36.73 |
| | 15600.00 | 90.00 | 359.63 | 12430.00 | 3333.42 | 3339.37 | 910.90 | 0.00 | 407838.87 | 770372.04 | N 32 7 8.64 | W 103 35 36.73 |
| | 15700.00 | 90.00 | 359.63 | 12430.00 | 3433.42 | 3439.37 | 910.25 | 0.00 | 407938.87 | 770371.39 | N 32 7 9.63 | W 103 35 36.73 |
| | 15800.00 | 90.00 | 359.63 | 12430.00 | 3533.42 | 3539.37 | 909.61 | 0.00 | 408038.86 | 770370.75 | N 32 7 10.62 | W 103 35 36.73 |
| | 15900.00 | 90.00 | 359.63 | 12430.00 | 3633.42 | 3639.37 | 908.96 | 0.00 | 408138.86 | 770370.10 | N 32 7 11.61 | W 103 35 36.73 |
| | 16000.00 | 90.00 | 359.63 | 12430.00 | 3733.42 | 3739.37 | 908.32 | 0.00 | 408238.85 | 770369.46 | N 32 7 12.60 | W 103 35 36.72 |
| | 16100.00 | 90.00 | 359.63 | 12430.00 | 3833.42 | 3839.36 | 907.67 | 0.00 | 408338.85 | 770368.81 | N 32 7 13.59 | W 103 35 36.72 |
| | 16200.00 | 90.00 | 359.63 | 12430.00 | 3933.42 | 3939.36 | 907.03 | 0.00 | 408438.84 | 770368.17 | N 32 7 14.58 | W 103 35 36.72 |
| | 16300.00 | 90.00 | 359.63 | 12430.00 | 4033.42 | 4039.36 | 906.38 | 0.00 | 408538.83 | 770367.52 | N 32 7 15.57 | W 103 35 36.72 |
| | 16400.00 | 90.00 | 359.63 | 12430.00 | 4133.42 | 4139.36 | 905.73 | 0.00 | 408638.83 | 770366.87 | N 32 7 16.56 | W 103 35 36.72 |
| | 16500.00 | 90.00 | 359.63 | 12430.00 | 4233.42 | 4239.35 | 905.09 | 0.00 | 408738.82 | 770366.23 | N 32 7 17.55 | W 103 35 36.72 |
| | 16600.00 | 90.00 | 359.63 | 12430.00 | 4333.42 | 4339.35 | 904.44 | 0.00 | 408838.82 | 770365.58 | N 32 7 18.54 | W 103 35 36.72 |
| | 16700.00 | 90.00 | 359.63 | 12430.00 | 4433.42 | 4439.35 | 903.80 | 0.00 | 408938.81 | 770364.94 | N 32 7 19.53 | W 103 35 36.72 |
| | 16800.00 | 90.00 | 359.63 | 12430.00 | 4533.42 | 4539.35 | 903.15 | 0.00 | 409038.81 | 770364.29 | N 32 7 20.52 | W 103 35 36.72 |
| | 16900.00 | 90.00 | 359.63 | 12430.00 | 4633.42 | 4639.35 | 902.51 | 0.00 | 409138.80 | 770363.65 | N 32 7 21.50 | W 103 35 36.72 |
| | 17000.00 | 90.00 | 359.63 | 12430.00 | 4733.42 | 4739.34 | 901.86 | 0.00 | 409238.80 | 770363.00 | N 32 7 22.49 | W 103 35 36.72 |
| | 17100.00 | 90.00 | 359.63 | 12430.00 | 4833.42 | 4839.34 | 901.21 | 0.00 | 409338.79 | 770362.35 | N 32 7 23.48 | W 103 35 36.72 |
| | 17200.00 | 90.00 | 359.63 | 12430.00 | 4933.42 | 4939.34 | 900.57 | 0.00 | 409438.79 | 770361.71 | N 32 7 24.47 | W 103 35 36.72 |
| | 17300.00 | 90.00 | 359.63 | 12430.00 | 5033.42 | 5039.34 | 899.92 | 0.00 | 409538.78 | 770361.06 | N 32 7 25.46 | W 103 35 36.72 |
| | 17400.00 | 90.00 | 359.63 | 12430.00 | 5133.42 | 5139.34 | 899.28 | 0.00 | 409638.77 | 770360.42 | N 32 7 26.45 | W 103 35 36.72 |
| | 17500.00 | 90.00 | 359.63 | 12430.00 | 5233.42 | 5239.33 | 898.63 | 0.00 | 409738.77 | 770359.77 | N 32 7 27.44 | W 103 35 36.72 |
| | 17600.00 | 90.00 | 359.63 | 12430.00 | 5333.42 | 5339.33 | 897.99 | 0.00 | 409838.76 | 770359.13 | N 32 7 28.43 | W 103 35 36.72 |
| | 17700.00 | 90.00 | 359.63 | 12430.00 | 5433.42 | 5439.33 | 897.34 | 0.00 | 409938.76 | 770358.48 | N 32 7 29.42 | W 103 35 36.72 |
| | 17800.00 | 90.00 | 359.63 | 12430.00 | 5533.42 | 5539.33 | 896.69 | 0.00 | 410038.75 | 770357.83 | N 32 7 30.41 | W 103 35 36.72 |
| | 17900.00 | 90.00 | 359.63 | 12430.00 | 5633.42 | 5639.33 | 896.05 | 0.00 | 410138.75 | 770357.19 | N 32 7 31.40 | W 103 35 36.72 |
| | 18000.00 | 90.00 | 359.63 | 12430.00 | 5733.42 | 5739.32 | 895.40 | 0.00 | 410238.74 | 770356.54 | N 32 7 32.39 | W 103 35 36.72 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 18100.00 | 90.00 | 359.63 | 12430.00 | 5833.42 | 5839.32 | 894.76 | 0.00 | 410338.74 | 770355.90 | N 32 7 33.38 | W 103 35 36.71 |
| | 18200.00 | 90.00 | 359.63 | 12430.00 | 5933.42 | 5939.32 | 894.11 | 0.00 | 410438.73 | 770355.25 | N 32 7 34.37 | W 103 35 36.71 |
| | 18300.00 | 90.00 | 359.63 | 12430.00 | 6033.42 | 6039.32 | 893.46 | 0.00 | 410538.73 | 770354.61 | N 32 7 35.36 | W 103 35 36.71 |
| | 18400.00 | 90.00 | 359.63 | 12430.00 | 6133.42 | 6139.32 | 892.82 | 0.00 | 410638.72 | 770353.96 | N 32 7 36.35 | W 103 35 36.71 |
| | 18500.00 | 90.00 | 359.63 | 12430.00 | 6233.42 | 6239.31 | 892.17 | 0.00 | 410738.72 | 770353.31 | N 32 7 37.34 | W 103 35 36.71 |
| | 18600.00 | 90.00 | 359.63 | 12430.00 | 6333.42 | 6339.31 | 891.53 | 0.00 | 410838.71 | 770352.67 | N 32 7 38.33 | W 103 35 36.71 |
| | 18700.00 | 90.00 | 359.63 | 12430.00 | 6433.42 | 6439.31 | 890.88 | 0.00 | 410938.70 | 770352.02 | N 32 7 39.32 | W 103 35 36.71 |
| | 18800.00 | 90.00 | 359.63 | 12430.00 | 6533.42 | 6539.31 | 890.24 | 0.00 | 411038.70 | 770351.38 | N 32 7 40.31 | W 103 35 36.71 |
| | 18900.00 | 90.00 | 359.63 | 12430.00 | 6633.42 | 6639.30 | 889.59 | 0.00 | 411138.69 | 770350.73 | N 32 7 41.30 | W 103 35 36.71 |
| | 19000.00 | 90.00 | 359.63 | 12430.00 | 6733.42 | 6739.30 | 888.94 | 0.00 | 411238.69 | 770350.09 | N 32 7 42.28 | W 103 35 36.71 |
| | 19100.00 | 90.00 | 359.63 | 12430.00 | 6833.42 | 6839.30 | 888.30 | 0.00 | 411338.68 | 770349.44 | N 32 7 43.27 | W 103 35 36.71 |
| | 19200.00 | 90.00 | 359.63 | 12430.00 | 6933.42 | 6939.30 | 887.65 | 0.00 | 411438.68 | 770348.79 | N 32 7 44.26 | W 103 35 36.71 |
| | 19300.00 | 90.00 | 359.63 | 12430.00 | 7033.42 | 7039.30 | 887.01 | 0.00 | 411538.67 | 770348.15 | N 32 7 45.25 | W 103 35 36.71 |
| | 19400.00 | 90.00 | 359.63 | 12430.00 | 7133.42 | 7139.29 | 886.36 | 0.00 | 411638.67 | 770347.50 | N 32 7 46.24 | W 103 35 36.71 |
| | 19500.00 | 90.00 | 359.63 | 12430.00 | 7233.42 | 7239.29 | 885.72 | 0.00 | 411738.66 | 770346.86 | N 32 7 47.23 | W 103 35 36.71 |
| | 19600.00 | 90.00 | 359.63 | 12430.00 | 7333.42 | 7339.29 | 885.07 | 0.00 | 411838.66 | 770346.21 | N 32 7 48.22 | W 103 35 36.71 |
| | 19700.00 | 90.00 | 359.63 | 12430.00 | 7433.42 | 7439.29 | 884.42 | 0.00 | 411938.65 | 770345.57 | N 32 7 49.21 | W 103 35 36.71 |
| | 19800.00 | 90.00 | 359.63 | 12430.00 | 7533.42 | 7539.29 | 883.78 | 0.00 | 412038.64 | 770344.92 | N 32 7 50.20 | W 103 35 36.71 |
| | 19900.00 | 90.00 | 359.63 | 12430.00 | 7633.42 | 7639.28 | 883.13 | 0.00 | 412138.64 | 770344.27 | N 32 7 51.19 | W 103 35 36.71 |
| | 20000.00 | 90.00 | 359.63 | 12430.00 | 7733.42 | 7739.28 | 882.49 | 0.00 | 412238.63 | 770343.63 | N 32 7 52.18 | W 103 35 36.71 |
| | 20100.00 | 90.00 | 359.63 | 12430.00 | 7833.42 | 7839.28 | 881.84 | 0.00 | 412338.63 | 770342.98 | N 32 7 53.17 | W 103 35 36.71 |
| | 20200.00 | 90.00 | 359.63 | 12430.00 | 7933.42 | 7939.28 | 881.20 | 0.00 | 412438.62 | 770342.34 | N 32 7 54.16 | W 103 35 36.70 |
| | 20300.00 | 90.00 | 359.63 | 12430.00 | 8033.42 | 8039.28 | 880.55 | 0.00 | 412538.62 | 770341.69 | N 32 7 55.15 | W 103 35 36.70 |
| | 20400.00 | 90.00 | 359.63 | 12430.00 | 8133.42 | 8139.27 | 879.90 | 0.00 | 412638.61 | 770341.04 | N 32 7 56.14 | W 103 35 36.70 |
| | 20500.00 | 90.00 | 359.63 | 12430.00 | 8233.42 | 8239.27 | 879.26 | 0.00 | 412738.61 | 770340.40 | N 32 7 57.13 | W 103 35 36.70 |
| | 20600.00 | 90.00 | 359.63 | 12430.00 | 8333.42 | 8339.27 | 878.61 | 0.00 | 412838.60 | 770339.75 | N 32 7 58.12 | W 103 35 36.70 |
| | 20700.00 | 90.00 | 359.63 | 12430.00 | 8433.42 | 8439.27 | 877.97 | 0.00 | 412938.60 | 770339.11 | N 32 7 59.11 | W 103 35 36.70 |
| | 20800.00 | 90.00 | 359.63 | 12430.00 | 8533.42 | 8539.27 | 877.32 | 0.00 | 413038.59 | 770338.46 | N 32 8 0.10 | W 103 35 36.70 |
| | 20900.00 | 90.00 | 359.63 | 12430.00 | 8633.42 | 8639.26 | 876.68 | 0.00 | 413138.59 | 770337.82 | N 32 8 1.09 | W 103 35 36.70 |
| | 21000.00 | 90.00 | 359.63 | 12430.00 | 8733.42 | 8739.26 | 876.03 | 0.00 | 413238.58 | 770337.17 | N 32 8 2.08 | W 103 35 36.70 |
| | 21100.00 | 90.00 | 359.63 | 12430.00 | 8833.42 | 8839.26 | 875.38 | 0.00 | 413338.57 | 770336.52 | N 32 8 3.07 | W 103 35 36.70 |
| | 21200.00 | 90.00 | 359.63 | 12430.00 | 8933.42 | 8939.26 | 874.74 | 0.00 | 413438.57 | 770335.88 | N 32 8 4.05 | W 103 35 36.70 |
| | 21300.00 | 90.00 | 359.63 | 12430.00 | 9033.42 | 9039.25 | 874.09 | 0.00 | 413538.56 | 770335.23 | N 32 8 5.04 | W 103 35 36.70 |
| | 21400.00 | 90.00 | 359.63 | 12430.00 | 9133.42 | 9139.25 | 873.45 | 0.00 | 413638.56 | 770334.59 | N 32 8 6.03 | W 103 35 36.70 |
| | 21500.00 | 90.00 | 359.63 | 12430.00 | 9233.42 | 9239.25 | 872.80 | 0.00 | 413738.55 | 770333.94 | N 32 8 7.02 | W 103 35 36.70 |
| | 21600.00 | 90.00 | 359.63 | 12430.00 | 9333.42 | 9339.25 | 872.16 | 0.00 | 413838.55 | 770333.30 | N 32 8 8.01 | W 103 35 36.70 |
| | 21700.00 | 90.00 | 359.63 | 12430.00 | 9433.42 | 9439.25 | 871.51 | 0.00 | 413938.54 | 770332.65 | N 32 8 9.00 | W 103 35 36.70 |
| | 21800.00 | 90.00 | 359.63 | 12430.00 | 9533.42 | 9539.24 | 870.86 | 0.00 | 414038.54 | 770332.00 | N 32 8 9.99 | W 103 35 36.70 |
| | 21900.00 | 90.00 | 359.63 | 12430.00 | 9633.42 | 9639.24 | 870.22 | 0.00 | 414138.53 | 770331.36 | N 32 8 10.98 | W 103 35 36.70 |
| | 22000.00 | 90.00 | 359.63 | 12430.00 | 9733.42 | 9739.24 | 869.57 | 0.00 | 414238.53 | 770330.71 | N 32 8 11.97 | W 103 35 36.70 |
| | 22100.00 | 90.00 | 359.63 | 12430.00 | 9833.42 | 9839.24 | 868.93 | 0.00 | 414338.52 | 770330.07 | N 32 8 12.96 | W 103 35 36.70 |
| | 22200.00 | 90.00 | 359.63 | 12430.00 | 9933.42 | 9939.24 | 868.28 | 0.00 | 414438.51 | 770329.42 | N 32 8 13.95 | W 103 35 36.70 |
| | 22300.00 | 90.00 | 359.63 | 12430.00 | 10033.42 | 10039.23 | 867.64 | 0.00 | 414538.51 | 770328.78 | N 32 8 14.94 | W 103 35 36.69 |
| Cimarex Vaca Draw 20-17 Federal #4H - PBHL [100' FNL, 2407' FEL] | 22335.03 | 90.00 | 359.63 | 12430.00 | 10068.45 | 10074.27 | 867.41 | 0.00 | 414573.54 | 770328.55 | N 32 8 15.29 | W 103 35 36.69 |

**Survey Type:** Def Plan

**Survey Error Model:** ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma

**Survey Program:**

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Description** | | **Part** | **MD From (ft)** | **MD To (ft)** | **EOU Freq (ft)** | **Hole Size (in)** | **Casing Diameter (in)** | **Expected Max Inclination (deg)** | **Survey Tool Type** | | **Borehole / Survey** | |
| | | 1 | 0.000 | 26.000 | 1/100.000 | 30.000 | 30.000 | | NAL_MWD_IFR1+MS-Depth Only | | Original Borehole / Cimarex Vaca Draw 20-17 Federal #4H Rev2 RM 24Oct18 | |
| | | 1 | 26.000 | 22335.032 | 1/100.000 | 30.000 | 30.000 | | NAL_MWD_IFR1+MS | | Original Borehole / Cimarex Vaca Draw 20-17 Federal #4H Rev2 | |

Schlumberger

CIMAREX

# Cimarex Vaca Draw 20-17 Federal #4H Rev2 RM 24Oct18 Anti-Collision Summary Report

| | | | |
|---|---|---|---|
| **Analysis Date-24hr Time:** | October 25, 2018 - 09:53 | **Analysis Method:** | 3D Least Distance |
| **Client:** | Cimarex | **Reference Trajectory:** | Cimarex Vaca Draw 20-17 Federal #4H Rev2 RM 24Oct18 (Def Plan) |
| **Field:** | NM Lea County (NAD 83) | **Depth Interval:** | Every 10.00 Measured Depth (ft) |
| **Structure:** | Cimarex Vaca Draw 20-17 Federal #4H | **Rule Set:** | NAL Procedure: D&M AntiCollision Standard S002 |
| **Slot:** | Cimarex Vaca Draw 20-17 Federal #4H | **Min Pts:** | All local minima indicated. |
| **Well:** | Cimarex Vaca Draw 20-17 Federal #4H | **Version / Patch:** | 2.10.740.0 |
| **Borehole:** | Original Borehole | **Database \ Project:** | US1153APP452.dir.slb.com\drilling-NM Lea County 2.10 |
| **Scan MD Range:** | 0.00ft ~ 22335.03ft | | |

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

**Offset Selection Criteria**

Wellhead distance scan: Not performed!

Selection filters: Definitive Surveys - Definitive Plans - Definitive surveys exclude definitive plans - All Non-Def Surveys when no Def-Survey is set in a borehole - All Non-Def Plans when no Def-Plan is set in a borehole

**Offset Trajectories Summary**

| Offset Trajectory | Separation | | | Allow | Sep. | Controlling | Reference Trajectory | | Risk Level | | | Alert | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ct-Ct (ft) | MAS (ft) | EOU (ft) | Dev. (ft) | Fact. | Rule | MD (ft) | TVD (ft) | Alert | Minor | Major | | |
| Results highlighted: Sep-Factor separation <= 1.50 ft | | | | | | | | | | | | | |
| Cimarex Vaca Draw 20-17 Federal #3H Rev2 RM 24Oct18 (Def Plan) | | | | | | | | | | | | Warning Alert | |
| | 19.96 | 16.47 | 17.46 | 3.49 | N/A | MAS = 5.02 (m) | 0.00 | 0.00 | CtCt<=15m<15.00 | | | Enter Alert | |
| | 19.96 | 16.47 | 17.46 | 3.49 | 26196.57 | MAS = 5.02 (m) | 26.00 | 26.00 | | | | WRP | |
| | 19.96 | 16.47 | 8.43 | 3.49 | 1.93 | MAS = 5.02 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 19.98 | 16.47 | 8.40 | 3.51 | 1.93 | MAS = 5.02 (m) | 1510.00 | 1510.00 | | | | MINPT-O-EOU | |
| | 20.12 | 16.47 | 8.44 | 3.65 | 1.92 | MAS = 5.02 (m) | 1530.00 | 1530.00 | | | | MinPt-O-SF | |
| | 56.35 | 18.84 | 42.96 | 37.51 | 4.94 | OSF1.50 | 1960.00 | 1958.09 | OSF>5.00 | | | Exit Alert | |
| | 199.18 | 53.36 | 162.77 | 145.82 | 5.80 | OSF1.50 | 6530.00 | 6481.75 | | | | MinPt-O-SF | |
| | 425.93 | 81.68 | 370.64 | 344.25 | 8.02 | OSF1.50 | 12030.00 | 11964.76 | | | | MinPt-CtCt | |
| | 426.02 | 82.09 | 370.46 | 343.93 | 7.98 | OSF1.50 | 12090.00 | 12023.98 | | | | MINPT-O-EOU | |
| | 426.07 | 82.16 | 370.47 | 343.91 | 7.98 | OSF1.50 | 12100.00 | 12033.72 | | | | MinPt-O-ADP | |
| | 427.87 | 82.81 | 371.82 | 345.05 | 7.94 | OSF1.50 | 12190.00 | 12118.60 | | | | MinPt-O-SF | |
| | 498.86 | 151.67 | 396.91 | 347.18 | 4.99 | OSF1.50 | 15670.00 | 12430.00 | OSF<5.00 | | | Enter Alert | |
| | 498.85 | 354.76 | 261.51 | 144.10 | 2.11 | OSF1.50 | 22335.03 | 12430.00 | | | | MinPts | |
| Cimarex Vaca Draw 20-17 Federal #2H Rev3 RM 24Oct18 (Def Plan) | | | | | | | | | | | | Warning Alert | |
| | 39.98 | 32.49 | 37.48 | 7.50 | N/A | MAS = 9.90 (m) | 0.00 | 0.00 | CtCt<=15m<15.00 | | | Enter Alert | |
| | 39.98 | 32.49 | 37.48 | 7.50 | 33740.14 | MAS = 9.90 (m) | 26.00 | 26.00 | | | | WRP | |
| | 39.98 | 32.49 | 28.45 | 7.50 | 4.15 | MAS = 9.90 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 40.00 | 32.49 | 28.42 | 7.51 | 4.13 | MAS = 9.90 (m) | 1510.00 | 1510.00 | | | | MINPT-O-EOU | |
| | 40.61 | 32.49 | 28.79 | 8.12 | 4.09 | MAS = 9.90 (m) | 1560.00 | 1560.00 | | | | MinPt-O-SF | |
| | 52.70 | 32.49 | 40.08 | 20.21 | 4.96 | MAS = 9.90 (m) | 1770.00 | 1769.60 | OSF>5.00 | | | Exit Alert | |
| | 841.46 | 90.03 | 780.61 | 751.43 | 14.38 | OSF1.50 | 12180.00 | 12109.46 | | | | MINPT-O-EOU | |
| | 843.04 | 254.84 | 672.32 | 588.20 | 5.00 | OSF1.50 | 19220.00 | 12430.00 | OSF<5.00 | | | Enter Alert | |
| | 843.04 | 351.37 | 607.96 | 491.67 | 3.61 | OSF1.50 | 22335.03 | 12430.00 | | | | MinPts | |

| Offset Trajectory | Separation | | | Allow | Sep. | Controlling | Reference Trajectory | | Risk Level | | | Alert | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ct-Ct (ft) | MAS (ft) | EOU (ft) | Dev. (ft) | Fact. | Rule | MD (ft) | TVD (ft) | Alert | Minor | Major | | |
| Cimarex Vaca Draw 20-17 Federal #13H Rev3 RM 24Oct18 (Def Plan) | | | | | | | | | | | | | Pass |
| | 1221.28 | 32.81 | 1218.78 | 1188.47 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1221.28 | 32.81 | 1218.77 | 1188.47 | 103499.34 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1210.78 | 32.81 | 1198.64 | 1177.97 | 125.29 | MAS = 10.00 (m) | 1860.00 | 1859.05 | | | | MinPts | |
| | 1210.78 | 32.81 | 1198.62 | 1177.97 | 125.06 | MAS = 10.00 (m) | 1870.00 | 1868.97 | | | | MINPT-O-EOU | |
| | 1264.94 | 71.21 | 1216.64 | 1193.73 | 27.56 | OSF1.50 | 8700.00 | 8634.82 | | | | MinPt-O-SF | |
| | 1258.94 | 70.53 | 1211.08 | 1188.41 | 27.71 | OSF1.50 | 8910.00 | 8844.82 | | | | MinPt-O-ADP | |
| | 1257.41 | 88.36 | 1197.67 | 1169.05 | 21.92 | OSF1.50 | 12870.00 | 12425.37 | | | | MinPt-CtCt | |
| | 1256.82 | 348.06 | 1023.94 | 908.75 | 5.44 | OSF1.50 | 22335.03 | 12430.00 | | | | MinPts | |
| Cimarex Vaca Draw 20-17 Federal #8H Rev4 RM 24Oct18 (Def Plan) | | | | | | | | | | | | | Pass |
| | 1241.25 | 32.81 | 1238.75 | 1208.44 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1241.25 | 32.81 | 1238.74 | 1208.44 | 107218.14 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1241.25 | 32.81 | 1229.70 | 1208.44 | 136.93 | MAS = 10.00 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 1241.26 | 32.81 | 1229.67 | 1208.46 | 136.21 | MAS = 10.00 (m) | 1510.00 | 1510.00 | | | | MINPT-O-EOU | |
| | 1507.47 | 57.82 | 1468.09 | 1449.65 | 40.81 | OSF1.50 | 7020.00 | 6966.79 | | | | MinPt-O-SF | |
| | 1644.39 | 63.55 | 1601.18 | 1580.83 | 40.34 | OSF1.50 | 8063.80 | 8000.00 | | | | MinPt-O-SF | |
| | 1673.52 | 81.21 | 1618.55 | 1592.31 | 31.84 | OSF1.50 | 12040.00 | 11974.70 | | | | MINPT-O-EOU | |
| | 1673.69 | 81.41 | 1618.58 | 1592.28 | 31.77 | OSF1.50 | 12070.00 | 12004.38 | | | | MinPt-O-ADP | |
| | 1679.85 | 352.82 | 1443.80 | 1327.03 | 7.18 | OSF1.50 | 22335.03 | 12430.00 | | | | MinPts | |
| Cimarex Vaca Draw 20-17 Federal #7H Rev2 RM 24Oct18 (Def Plan) | | | | | | | | | | | | | Pass |
| | 1261.23 | 32.81 | 1258.73 | 1228.42 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1261.23 | 32.81 | 1258.71 | 1228.42 | 99390.53 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1261.23 | 32.81 | 1249.68 | 1228.42 | 139.11 | MAS = 10.00 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 1261.24 | 32.81 | 1249.65 | 1228.43 | 138.38 | MAS = 10.00 (m) | 1510.00 | 1510.00 | | | | MINPT-O-EOU | |
| | 2168.76 | 74.21 | 2118.46 | 2094.56 | 45.32 | OSF1.50 | 8100.00 | 8035.87 | | | | MinPt-O-SF | |
| | 2092.99 | 103.23 | 2023.34 | 1989.76 | 31.13 | OSF1.50 | 12560.00 | 12365.69 | | | | MinPt-CtCt | |
| | 2092.72 | 357.74 | 1853.40 | 1734.99 | 8.83 | OSF1.50 | 22335.03 | 12430.00 | | | | MinPts | |
| Cimarex Vaca Draw 20-17 Federal #6H MWD Final(Surcon Corrected) (Def Survey) | | | | | | | | | | | | | Pass |
| | 1319.81 | 32.81 | 1317.31 | 1287.00 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1319.78 | 32.81 | 1317.26 | 1286.97 | 59671.02 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1316.48 | 32.81 | 1310.96 | 1283.67 | 435.29 | MAS = 10.00 (m) | 710.00 | 710.00 | | | | MinPts | |
| | 1317.05 | 32.81 | 1310.68 | 1284.24 | 339.59 | MAS = 10.00 (m) | 910.00 | 910.00 | | | | MINPT-O-EOU | |
| | 1319.49 | 32.81 | 1311.27 | 1286.68 | 230.52 | MAS = 10.00 (m) | 1320.00 | 1320.00 | | | | MINPT-O-EOU | |
| | 1319.76 | 32.81 | 1310.83 | 1286.95 | 205.07 | MAS = 10.00 (m) | 1510.00 | 1510.00 | | | | MinPts | |
| | 2265.93 | 50.49 | 2231.43 | 2215.43 | 70.74 | OSF1.50 | 8063.80 | 8000.00 | | | | MinPt-O-SF | |
| | 2304.68 | 49.16 | 2271.08 | 2255.53 | 74.02 | OSF1.50 | 8840.00 | 8774.82 | | | | MinPt-O-SF | |
| | 2956.09 | 46.20 | 2924.45 | 2909.89 | 101.38 | OSF1.50 | 10820.00 | 10754.82 | | | | MinPt-O-SF | |
| | 3015.56 | 46.49 | 2983.73 | 2969.06 | 102.74 | OSF1.50 | 10930.00 | 10864.82 | | | | MinPt-O-SF | |
| | 4023.87 | 41.60 | 3995.31 | 3982.28 | 154.29 | OSF1.50 | 12750.00 | 12410.74 | | | | MinPt-O-SF | |
| | 4043.42 | 45.08 | 4012.54 | 3998.35 | 142.36 | OSF1.50 | 13260.00 | 12430.00 | | | | MinPts | |
| | 4048.04 | 48.43 | 4014.92 | 3999.61 | 132.11 | OSF1.50 | 13430.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 4049.47 | 50.09 | 4015.24 | 3999.38 | 127.56 | OSF1.50 | 13510.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 4043.79 | 62.26 | 4001.45 | 3981.53 | 101.44 | OSF1.50 | 14030.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4044.03 | 63.03 | 4001.18 | 3981.00 | 100.15 | OSF1.50 | 14090.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 4044.36 | 63.43 | 4001.24 | 3980.93 | 99.51 | OSF1.50 | 14120.00 | 12430.00 | | | | MinPt-O-ADP | |

| Offset Trajectory | Separation | | | Allow | Sep. | Controlling | Reference Trajectory | | Risk Level | | | Alert | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ct-Ct (ft) | MAS (ft) | EOU (ft) | Dev. (ft) | Fact. | Rule | MD (ft) | TVD (ft) | Alert | Minor | Major | | |
| | 4024.36 | 91.08 | 3962.81 | 3933.28 | 68.11 | OSF1.50 | 15140.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4024.55 | 91.75 | 3962.56 | 3932.81 | 67.60 | OSF1.50 | 15190.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 4024.89 | 92.15 | 3962.63 | 3932.75 | 67.30 | OSF1.50 | 15220.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 4038.32 | 116.86 | 3959.58 | 3921.45 | 52.93 | OSF1.50 | 16060.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4035.96 | 135.92 | 3944.52 | 3900.05 | 45.35 | OSF1.50 | 16720.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4036.76 | 138.38 | 3943.67 | 3898.37 | 44.53 | OSF1.50 | 16840.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 4038.47 | 149.29 | 3938.11 | 3889.18 | 41.24 | OSF1.50 | 17180.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4036.66 | 162.78 | 3927.30 | 3873.88 | 37.75 | OSF1.50 | 17640.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4037.59 | 174.76 | 3920.25 | 3862.83 | 35.14 | OSF1.50 | 18050.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4037.97 | 180.35 | 3916.90 | 3857.62 | 34.04 | OSF1.50 | 18240.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4031.81 | 223.30 | 3882.11 | 3808.51 | 27.37 | OSF1.50 | 19690.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4040.29 | 252.29 | 3871.26 | 3788.00 | 24.25 | OSF1.50 | 20660.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4030.83 | 295.55 | 3832.96 | 3735.28 | 20.62 | OSF1.50 | 22110.00 | 12430.00 | | | | MinPt-CtCt | |
| | 4030.91 | 295.77 | 3832.89 | 3735.14 | 20.60 | OSF1.50 | 22130.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 4031.08 | 295.97 | 3832.93 | 3735.10 | 20.59 | OSF1.50 | 22150.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 4037.36 | 297.56 | 3838.16 | 3739.81 | 20.51 | OSF1.50 | 22335.03 | 12430.00 | | | | MinPt-O-SF | |
| Cimarex Vaca Draw 20-17 Federal #5H Final MWD(Surcon Corrected) (Def Survey) | | | | | | | | | | | | | Pass |
| | 1339.81 | 32.81 | 1337.31 | 1307.00 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1339.79 | 32.81 | 1337.28 | 1306.99 | 75365.10 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1337.82 | 32.81 | 1333.08 | 1305.01 | 596.48 | MAS = 10.00 (m) | 550.00 | 550.00 | | | | MinPts | |
| | 1337.92 | 32.81 | 1332.34 | 1305.11 | 434.61 | MAS = 10.00 (m) | 750.00 | 750.00 | | | | MinPts | |
| | 1338.17 | 32.81 | 1331.97 | 1305.36 | 361.25 | MAS = 10.00 (m) | 880.00 | 880.00 | | | | MINPT-O-EOU | |
| | 1340.49 | 32.81 | 1331.52 | 1307.68 | 206.80 | MAS = 10.00 (m) | 1510.00 | 1510.00 | | | | MinPts | |
| | 1340.50 | 32.81 | 1331.51 | 1307.70 | 205.90 | MAS = 10.00 (m) | 1520.00 | 1520.00 | | | | MINPT-O-EOU | |
| | 1346.28 | 32.81 | 1337.02 | 1313.47 | 198.69 | MAS = 10.00 (m) | 1690.00 | 1689.86 | | | | MinPt-O-SF | |
| | 2362.47 | 50.79 | 2327.78 | 2311.68 | 73.31 | OSF1.50 | 8063.80 | 8000.00 | | | | MinPt-O-SF | |
| | 2388.90 | 48.98 | 2355.42 | 2339.93 | 77.02 | OSF1.50 | 8550.00 | 8484.82 | | | | MINPT-O-EOU | |
| | 2388.92 | 48.99 | 2355.42 | 2339.92 | 77.00 | OSF1.50 | 8560.00 | 8494.82 | | | | MinPt-O-ADP | |
| | 2399.43 | 50.79 | 2364.74 | 2348.64 | 74.45 | OSF1.50 | 9610.00 | 9544.82 | | | | MinPt-O-SF | |
| | 2713.64 | 50.29 | 2679.28 | 2663.34 | 85.09 | OSF1.50 | 10950.00 | 10884.82 | | | | MinPt-O-SF | |
| | 3505.38 | 46.11 | 3473.81 | 3459.27 | 120.49 | OSF1.50 | 12750.00 | 12410.74 | | | | MinPt-O-SF | |
| | 3512.84 | 46.64 | 3480.91 | 3466.19 | 119.28 | OSF1.50 | 13000.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3512.85 | 46.68 | 3480.89 | 3466.16 | 119.17 | OSF1.50 | 13010.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3512.88 | 46.73 | 3480.89 | 3466.15 | 119.06 | OSF1.50 | 13020.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3505.21 | 57.10 | 3466.31 | 3448.11 | 96.23 | OSF1.50 | 13670.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3505.41 | 57.68 | 3466.12 | 3447.73 | 95.22 | OSF1.50 | 13720.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3505.72 | 58.04 | 3466.19 | 3447.68 | 94.61 | OSF1.50 | 13750.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3502.64 | 71.76 | 3453.96 | 3430.88 | 75.80 | OSF1.50 | 14320.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3502.24 | 76.14 | 3450.65 | 3426.10 | 71.29 | OSF1.50 | 14500.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3502.20 | 79.41 | 3448.43 | 3422.79 | 68.26 | OSF1.50 | 14630.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3492.28 | 99.96 | 3424.81 | 3392.32 | 53.71 | OSF1.50 | 15400.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3492.57 | 100.88 | 3424.49 | 3391.69 | 53.21 | OSF1.50 | 15460.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3492.96 | 101.33 | 3424.57 | 3391.63 | 52.97 | OSF1.50 | 15490.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3497.11 | 113.03 | 3420.92 | 3384.08 | 47.42 | OSF1.50 | 15870.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3497.98 | 116.63 | 3419.39 | 3381.35 | 45.94 | OSF1.50 | 16030.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3499.00 | 117.85 | 3419.60 | 3381.15 | 45.47 | OSF1.50 | 16090.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3503.68 | 122.60 | 3421.12 | 3381.08 | 43.73 | OSF1.50 | 16270.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3495.19 | 143.82 | 3398.47 | 3351.37 | 37.07 | OSF1.50 | 16950.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3494.98 | 149.91 | 3394.20 | 3345.06 | 35.54 | OSF1.50 | 17160.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3491.65 | 175.59 | 3373.75 | 3316.05 | 30.24 | OSF1.50 | 18040.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3488.60 | 185.99 | 3363.78 | 3302.61 | 28.50 | OSF1.50 | 18390.00 | 12430.00 | | | | MinPt-CtCt | |

| Offset Trajectory | Separation | | | Allow | Sep. | Controlling | Reference Trajectory | | Risk Level | | | Alert | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ct-Ct (ft) | MAS (ft) | EOU (ft) | Dev. (ft) | Fact. | Rule | MD (ft) | TVD (ft) | Alert | Minor | Major | | |
| | 3491.72 | 198.32 | 3358.67 | 3293.40 | 26.73 | OSF1.50 | 18810.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3492.60 | 200.88 | 3357.85 | 3291.72 | 26.39 | OSF1.50 | 18930.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3495.51 | 261.06 | 3320.63 | 3234.44 | 20.26 | OSF1.50 | 20920.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3498.70 | 269.36 | 3318.29 | 3229.33 | 19.65 | OSF1.50 | 21240.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3506.53 | 280.06 | 3318.99 | 3226.47 | 18.94 | OSF1.50 | 21610.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3503.07 | 296.37 | 3304.65 | 3206.70 | 17.87 | OSF1.50 | 22100.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3503.16 | 296.67 | 3304.54 | 3206.49 | 17.85 | OSF1.50 | 22130.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3503.25 | 296.77 | 3304.57 | 3206.48 | 17.84 | OSF1.50 | 22140.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3509.68 | 298.09 | 3310.13 | 3211.60 | 17.80 | OSF1.50 | 22320.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3510.64 | 298.16 | 3311.03 | 3212.47 | 17.80 | OSF1.50 | 22335.03 | 12430.00 | | | | TD | |
| Cimarex Vaca Draw 20-17 Federal #1H Surcon 0ft-12740 (Def Survey) | | | | | | | | | | | | | Pass |
| | 1359.80 | 32.81 | 1357.30 | 1326.99 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1359.75 | 32.81 | 1357.22 | 1326.94 | 46998.66 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1357.77 | 32.81 | 1354.01 | 1324.96 | 1076.21 | MAS = 10.00 (m) | 310.00 | 310.00 | | | | MinPts | |
| | 1358.20 | 32.81 | 1353.64 | 1325.39 | 656.65 | MAS = 10.00 (m) | 460.00 | 460.00 | | | | MINPT-O-EOU | |
| | 1377.76 | 32.81 | 1368.04 | 1344.95 | 190.31 | MAS = 10.00 (m) | 1610.00 | 1609.97 | | | | MinPt-O-SF | |
| | 1414.68 | 32.81 | 1405.05 | 1381.87 | 198.09 | MAS = 10.00 (m) | 1908.32 | 1906.93 | | | | MinPt-O-SF | |
| | 2508.52 | 51.14 | 2473.60 | 2457.38 | 77.28 | OSF1.50 | 8063.80 | 8000.00 | | | | MinPt-O-SF | |
| | 2545.04 | 51.56 | 2509.83 | 2493.47 | 77.73 | OSF1.50 | 9600.00 | 9534.82 | | | | MinPt-CtCt | |
| | 2511.16 | 59.81 | 2470.45 | 2451.35 | 65.66 | OSF1.50 | 12140.00 | 12072.12 | | | | MinPt-CtCt | |
| | 2511.17 | 59.84 | 2470.44 | 2451.33 | 65.62 | OSF1.50 | 12150.00 | 12081.57 | | | | MINPT-O-EOU | |
| | 2511.20 | 59.88 | 2470.44 | 2451.32 | 65.59 | OSF1.50 | 12160.00 | 12090.94 | | | | MinPt-O-ADP | |
| | 2550.39 | 62.19 | 2508.10 | 2488.20 | 64.03 | OSF1.50 | 12690.00 | 12399.69 | | | | MinPt-O-SF | |
| | 2561.44 | 62.47 | 2518.96 | 2498.97 | 64.00 | OSF1.50 | 12750.00 | 12410.74 | | | | MinPt-O-SF | |
| | 10398.39 | 70.42 | 10350.61 | 10327.97 | 229.58 | OSF1.50 | 22335.03 | 12430.00 | | | | TD | |
| Cimarex Vaca Draw 20-17 Federal #1H ST01 Rev1 RM 15Feb18 (Def Plan) | | | | | | | | | | | | | Pass |
| | 1359.80 | 32.81 | 1357.30 | 1326.99 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1359.75 | 32.81 | 1357.22 | 1326.94 | 46998.66 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1357.77 | 32.81 | 1354.01 | 1324.96 | 1076.21 | MAS = 10.00 (m) | 310.00 | 310.00 | | | | MinPts | |
| | 1358.20 | 32.81 | 1353.64 | 1325.39 | 656.65 | MAS = 10.00 (m) | 460.00 | 460.00 | | | | MINPT-O-EOU | |
| | 1377.76 | 32.81 | 1368.04 | 1344.95 | 190.31 | MAS = 10.00 (m) | 1610.00 | 1609.97 | | | | MinPt-O-SF | |
| | 1414.68 | 32.81 | 1405.05 | 1381.87 | 198.09 | MAS = 10.00 (m) | 1908.32 | 1906.93 | | | | MinPt-O-SF | |
| | 2508.52 | 51.14 | 2473.60 | 2457.38 | 77.28 | OSF1.50 | 8063.80 | 8000.00 | | | | MinPt-O-SF | |
| | 2545.04 | 51.56 | 2509.83 | 2493.47 | 77.73 | OSF1.50 | 9600.00 | 9534.82 | | | | MinPt-CtCt | |
| | 2513.83 | 59.07 | 2473.61 | 2454.75 | 66.58 | OSF1.50 | 11950.00 | 11884.82 | | | | MinPt-CtCt | |
| | 2513.84 | 59.10 | 2473.61 | 2454.74 | 66.55 | OSF1.50 | 11960.00 | 11894.82 | | | | MinPts | |
| | 2514.38 | 59.35 | 2473.98 | 2455.02 | 66.27 | OSF1.50 | 12040.00 | 11974.70 | | | | MinPt-O-ADP | |
| | 2512.85 | 60.64 | 2471.59 | 2452.21 | 64.76 | OSF1.50 | 12390.00 | 12278.03 | | | | MinPt-CtCt | |
| | 2507.00 | 63.31 | 2463.96 | 2443.69 | 61.78 | OSF1.50 | 12750.00 | 12410.74 | | | | MinPt-CtCt | |
| | 2507.09 | 63.55 | 2463.89 | 2443.54 | 61.53 | OSF1.50 | 12780.00 | 12415.33 | | | | MINPT-O-EOU | |
| | 2507.41 | 64.31 | 2463.71 | 2443.10 | 60.79 | OSF1.50 | 12840.00 | 12422.65 | | | | MinPt-CtCt | |
| | 2507.53 | 64.68 | 2463.58 | 2442.85 | 60.43 | OSF1.50 | 12880.00 | 12426.14 | | | | MINPT-O-EOU | |
| | 2507.69 | 64.86 | 2463.61 | 2442.83 | 60.26 | OSF1.50 | 12900.00 | 12427.47 | | | | MinPt-O-ADP | |
| | 2503.05 | 328.78 | 2283.03 | 2174.27 | 11.50 | OSF1.50 | 22100.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2503.10 | 329.07 | 2282.88 | 2174.03 | 11.49 | OSF1.50 | 22120.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2503.17 | 329.16 | 2282.90 | 2174.01 | 11.48 | OSF1.50 | 22130.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2505.24 | 329.75 | 2284.58 | 2175.50 | 11.47 | OSF1.50 | 22210.00 | 12430.00 | | | | MinPt-O-SF | |
| | 2513.58 | 330.02 | 2292.74 | 2183.56 | 11.50 | OSF1.50 | 22335.03 | 12430.00 | | | | TD | |

| Offset Trajectory | Separation | | | Allow | Sep. | Controlling | Reference Trajectory | | Risk Level | | | Alert | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ct-Ct (ft) | MAS (ft) | EOU (ft) | Dev. (ft) | Fact. | Rule | MD (ft) | TVD (ft) | Alert | Minor | Major | | |
| Cimarex Vaca Draw 20-17 Federal #1H ST01 MWD Offset Update (Non-Def Survey) | | | | | | | | | | | | | Pass |
| | 1359.80 | 32.81 | 1357.30 | 1326.99 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1359.75 | 32.81 | 1357.22 | 1326.94 | 46998.66 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1357.77 | 32.81 | 1354.01 | 1324.96 | 1076.21 | MAS = 10.00 (m) | 310.00 | 310.00 | | | | MinPts | |
| | 1358.20 | 32.81 | 1353.64 | 1325.39 | 656.65 | MAS = 10.00 (m) | 460.00 | 460.00 | | | | MINPT-O-EOU | |
| | 1377.76 | 32.81 | 1368.04 | 1344.95 | 190.31 | MAS = 10.00 (m) | 1610.00 | 1609.97 | | | | MinPt-O-SF | |
| | 1414.68 | 32.81 | 1405.05 | 1381.87 | 198.09 | MAS = 10.00 (m) | 1908.32 | 1906.93 | | | | MinPt-O-SF | |
| | 2508.52 | 51.14 | 2473.60 | 2457.38 | 77.28 | OSF1.50 | 8063.80 | 8000.00 | | | | MinPt-O-SF | |
| | 2545.04 | 51.56 | 2509.83 | 2493.47 | 77.73 | OSF1.50 | 9600.00 | 9534.82 | | | | MinPt-CtCt | |
| | 2513.83 | 59.07 | 2473.61 | 2454.75 | 66.58 | OSF1.50 | 11950.00 | 11884.82 | | | | MinPt-CtCt | |
| | 2513.84 | 59.10 | 2473.61 | 2454.74 | 66.55 | OSF1.50 | 11960.00 | 11894.82 | | | | MinPts | |
| | 2514.38 | 59.35 | 2473.98 | 2455.02 | 66.27 | OSF1.50 | 12040.00 | 11974.70 | | | | MinPt-O-ADP | |
| | 2512.85 | 60.64 | 2471.59 | 2452.21 | 64.76 | OSF1.50 | 12390.00 | 12278.03 | | | | MinPt-CtCt | |
| | 2507.00 | 63.31 | 2463.96 | 2443.69 | 61.78 | OSF1.50 | 12750.00 | 12410.74 | | | | MinPt-CtCt | |
| | 2507.09 | 63.55 | 2463.89 | 2443.54 | 61.53 | OSF1.50 | 12780.00 | 12415.33 | | | | MINPT-O-EOU | |
| | 2507.41 | 64.31 | 2463.71 | 2443.10 | 60.79 | OSF1.50 | 12840.00 | 12422.65 | | | | MinPt-CtCt | |
| | 2507.53 | 64.68 | 2463.58 | 2442.85 | 60.43 | OSF1.50 | 12880.00 | 12426.14 | | | | MINPT-O-EOU | |
| | 2507.69 | 64.86 | 2463.61 | 2442.83 | 60.26 | OSF1.50 | 12900.00 | 12427.47 | | | | MinPt-O-ADP | |
| | 2507.24 | 70.56 | 2459.36 | 2436.68 | 55.20 | OSF1.50 | 13290.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2500.86 | 76.43 | 2449.07 | 2424.43 | 50.69 | OSF1.50 | 13620.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2501.07 | 76.96 | 2448.93 | 2424.11 | 50.33 | OSF1.50 | 13660.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2501.31 | 77.23 | 2448.99 | 2424.08 | 50.16 | OSF1.50 | 13680.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2509.55 | 86.87 | 2450.80 | 2422.68 | 44.57 | OSF1.50 | 14130.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2503.72 | 100.86 | 2435.65 | 2402.86 | 38.14 | OSF1.50 | 14730.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2504.27 | 102.63 | 2435.01 | 2401.64 | 37.48 | OSF1.50 | 14820.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2505.08 | 103.61 | 2435.17 | 2401.46 | 37.12 | OSF1.50 | 14870.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2484.12 | 141.26 | 2389.11 | 2342.86 | 26.83 | OSF1.50 | 16270.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2484.69 | 143.17 | 2388.41 | 2341.52 | 26.47 | OSF1.50 | 16360.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2486.60 | 147.62 | 2387.36 | 2338.99 | 25.68 | OSF1.50 | 16520.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2487.72 | 148.95 | 2387.59 | 2338.77 | 25.46 | OSF1.50 | 16580.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2490.32 | 152.00 | 2388.16 | 2338.32 | 24.96 | OSF1.50 | 16690.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2501.36 | 159.97 | 2393.86 | 2341.39 | 23.80 | OSF1.50 | 16980.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2502.94 | 169.28 | 2389.26 | 2333.67 | 22.49 | OSF1.50 | 17260.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2505.58 | 176.28 | 2387.22 | 2329.29 | 21.61 | OSF1.50 | 17530.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2506.74 | 177.68 | 2387.46 | 2329.06 | 21.44 | OSF1.50 | 17590.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2488.28 | 211.33 | 2346.56 | 2276.95 | 17.86 | OSF1.50 | 18720.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2488.64 | 212.50 | 2346.14 | 2276.14 | 17.76 | OSF1.50 | 18780.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2489.12 | 213.07 | 2346.24 | 2276.05 | 17.71 | OSF1.50 | 18810.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2510.33 | 225.93 | 2358.87 | 2284.39 | 16.84 | OSF1.50 | 19250.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2511.88 | 230.70 | 2357.25 | 2281.19 | 16.49 | OSF1.50 | 19370.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2511.95 | 230.92 | 2357.17 | 2281.03 | 16.48 | OSF1.50 | 19390.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2512.04 | 231.03 | 2357.19 | 2281.01 | 16.47 | OSF1.50 | 19400.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2517.51 | 232.20 | 2361.88 | 2285.31 | 16.42 | OSF1.50 | 19540.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3884.68 | 178.82 | 3764.63 | 3705.86 | 33.03 | OSF1.50 | 22335.03 | 12430.00 | | | | TD | |

# PECOS DISTRICT
# DRILLING CONDITIONS OF APPROVAL

| | |
|---|---|
| **OPERATOR'S NAME:** | **CIMAREX ENERGY COMPANY** |
| **LEASE NO.:** | **NMNM26394** |
| **WELL NAME & NO.:** | **4H –VACA DRAW 20 17 FEDERAL** |
| **SURFACE HOLE FOOTAGE:** | **390'/S & 1950'/W** |
| **BOTTOM HOLE FOOTAGE** | **100'/N & 2407'/E** |
| **LOCATION:** | **Section 20 T.25 S., R.33 E., NMP** |
| **COUNTY:** | **LEA County, New Mexico** |

COA

| | | | |
|---|---|---|---|
| H2S | ◉ Yes | ○ No | |
| Potash | ◉ None | ○ Secretary | ○ R-111-P |
| Cave/Karst Potential | ◉ Low | ○ Medium | ○ High |
| Variance | ○ None | ◉ Flex Hose | ○ Other |
| Wellhead | ○ Conventional | ◉ Multibowl | ○ Both |
| Other | ☐ 4 String Area | ☐ Capitan Reef | ☐ WIPP |

**A. Hydrogen Sulfide**

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

**B. CASING**

1. The **10-3/4** inch surface casing shall be set at approximately **1034** feet (a minimum of 25 feet 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.

**Operator shall filled 1/3rd of casing with fluid while running intermediate casing to maintain collapse safety factor.**

2. The minimum required fill of cement behind the **7-5/8** inch intermediate casing is: Operator has proposed a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

    a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.

        - Second stage above DV tool:Cement to surface. If cement does not circulate, contact the appropriate BLM office.

**Variance is approved for annular spacing between a 7 5/8" x 5 ½".**

3. The minimum required fill of cement behind the **5-1/2** inch production casing is:
    - Cement should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification. **Additional cement maybe required. Excess calculates to be 14%.**

## C. PRESSURE CONTROL

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

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M)** psi.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **7-5/8** intermediate casing shoe shall be **10,000 (10M)** psi.

**Variance approved to use a 5M annular. The annular must be tested to full working pressure (5000 psi.)**

# 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)

☒ 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. **If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.**
    e. **Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.**

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

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

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

    c. The tests shall be done by an independent service company utilizing a test plug. The results of the test shall be reported to the appropriate BLM office.

    d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE.

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

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

f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes. This test shall be performed prior to the test at full stack pressure.

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

C. DRILLING MUD

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.

**Waste Minimization Plan (WMP)**

In the interest of resource development, submission of additional well gas capture development plan information is deferred but may be required by the BLM Authorized Officer at a later date.

**ZS 110418**

# 253320N SUNDRY VACA DRAW 20 17 FEDERAL 4H 30015 NMNM26394 CIMAREX ENERGY COMPANY 12-55 441226 11042018 ZS

KFC

| 10 3/4 | surface csg in a | | 14 3/4 | inch hole. | | Design Factors | | SURFACE | |
|---|---|---|---|---|---|---|---|---|---|
| Segment | #/ft | Grade | | Coupling | Body | Collapse | Burst | Length | Weight |
| "A" | 40.50 | J 55 | | BUTT | 15.02 | 3.34 | 0.54 | 1,034 | 41,877 |
| "B" | | | | | | | | 0 | 0 |
| w/8.4#/g mud, 30min Sfc Csg Test psig: | 1,500 | | | Tail Cmt | does not | circ to sfc. | | Totals: 1,034 | 41,877 |

Comparison of Proposed to Minimum Required Cement Volumes

| Hole Size | Annular Volume | 1 Stage Cmt Sx | 1 Stage CuFt Cmt | Min Cu Ft | 1 Stage % Excess | Drilling Mud Wt | Calc MASP | Req'd BOPE | Min Dist Hole-Cplg |
|---|---|---|---|---|---|---|---|---|---|
| 14 3/4 | 0.5563 | 509 | 835 | 601 | 39 | 8.80 | 3065 | 5M | 1.50 |

CSG FRAC GRADIENT= 3130/1034=3.02

Burst Frac Gradient(s) for Segment(s) A, B = , b All > 0.70, OK.

| 7 5/8 | casing inside the | | 10 3/4 | | | Design Factors | | INTERMEDIATE | |
|---|---|---|---|---|---|---|---|---|---|
| Segment | #/ft | Grade | | Coupling | Body | Collapse | Burst | Length | Weight |
| "A" | 29.70 | L 80 | | BUTT | 1.82 | 0.85 | 0.85 | 11,985 | 355,955 |
| "B" | 29.70 | L 80 | | #N/A | 44.11 | 0.96 | 0.85 | 625 | 18,563 |
| w/8.4#/g mud, 30min Sfc Csg Test psig: | | | | | | | Totals: | 12,610 | 374,517 |
| B s would be: | | | | | 22.90 | 0.95 | if it were a vertical wellbore. | | |

| No Pilot Hole Planned | MTD | Max VTD | Csg VD | Curve KOP | Dogleg° | Severity° | MEOC |
|---|---|---|---|---|---|---|---|
| | 12610 | 12381 | 12381 | 11985 | 75 | -1 | 0 |

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 1034 overlap.

| Hole Size | Annular Volume | 1 Stage Cmt Sx | 1 Stage CuFt Cmt | Min Cu Ft | 1 Stage % Excess | Drilling Mud Wt | Calc MASP | Req'd BOPE | Min Dist Hole-Cplg |
|---|---|---|---|---|---|---|---|---|---|
| 9 5/8 | 0.1882 | look ↘ | 0 | 2431 | | 9.00 | 5337 | 10M | 0.56 |
| D V Tool(s): | | | 4900 | | | | sum of sx | Σ CuFt | Σ%excess |
| t by stage % : | | 66 | 54 | | | | 1626 | 3921 | 61 |

Class 'C' tail cmt yld > 1.35

MASP is within 10% of 5000psig, need

Burst Frac Gradient(s) for Segment(s): A, B, C, D = 0.57, 0.56, c, d <0.70 a Problem!!

ALT. COLLAPSE SF= .85*1.5=1.27; CURVE COLLAPSE SF IS GOOD BUT TOO CONSERVATIVE.

Tail cmt

| 5 1/2 | casing inside the | | 7 5/8 | A Buoyant | | Design Factors | | PRODUCTION | |
|---|---|---|---|---|---|---|---|---|---|
| Segment | #/ft | Grade | | Coupling | Joint | Collapse | Burst | Length | Weight |
| "A" | 20.00 | L 80 | | LT&C | 2.45 | 1.13 | 1.14 | 11,985 | 239,700 |
| "B" | 18.00 | P 110 | | BUTT | 9.05 | 1.57 | 1.69 | 10,350 | 186,300 |
| w/8.4#/g mud, 30min Sfc Csg Test psig: | 1,203 | | | | | | Totals: | 22,335 | 426,000 |

The cement volume(s) are intended to achieve a top of 12410 ft from surface or a 200 overlap.

| Hole Size | Annular Volume | 1 Stage Cmt Sx | 1 Stage CuFt Cmt | Min Cu Ft | 1 Stage % Excess | Drilling Mud Wt | Calc MASP | Req'd BOPE | Min Dist Hole-Cplg |
|---|---|---|---|---|---|---|---|---|---|
| 6 3/4 | 0.0835 | 732 | 952 | 835 | 14 | 12.50 | | | 0.35 |

Class 'H' tail cmt yld > 1.20