Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OCD Artesia

FORM APPROVED
OMB NO. 1004-0135
Expires: July 31, 2010

## 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 reverse side.***

5. Lease Serial No.
NMNM0557371

6. If Indian, Allottee or Tribe Name

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

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

8. Well Name and No.
AAO FEDERAL 28

2. Name of Operator
APACHE CORPORATION
Contact: SORINA FLORES
E-Mail: sorina.flores@apachecorp.com

9. API Well No.
30-015-42358-00-X1

3a. Address
303 VETERANS AIRPARK LANE SUITE 3000
MIDLAND, TX 79705

3b. Phone No. (include area code)
Ph: 432-818-1167

10. Field and Pool, or Exploratory
RED LAKE

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 1 T18S R27E SESW 183FSL 2497FWL
32.461047 N Lat, 104.135682 W Lon

11. County or Parish, and State
EDDY COUNTY, NM

12. CHECK 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 | ☐ Fracture Treat | ☐ Reclamation | ☐ Well Integrity |
| ☐ Final Abandonment Notice | ☐ Casing Repair | ☐ New Construction | ☐ Recomplete | ☒ Other Change to Original A PD |
| | ☐ 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 shall 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 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

BLM-CO-1463 NATIONWIDE/NMB000736

Apache request to change CSG/CMT/BOP program as follows:
IN THE EVENT CMT IS CIRC TO SURF ON PRIMARY CMT JOB FOR SURF CSG:

CSG PROG: All csg is new & API appvd

| HOLE | DEPTH | OD | WT | GRADE | COLLAR | DESIGN | COLPS | BURST | TENSION |
|---|---|---|---|---|---|---|---|---|---|
| MW | | | | | | RATE/SF | RATE/SF | RATE/SF | |
| 17-1/2" | 0-350' | 13-3/8" | 48# | H40 | STC | 8.8ppg | 770psi | 1730psi | 322000# |
| 4.625 | | 7.06 | | 22.15 | | | | | |
| 7-7/8" | 0-4609' | 5-1/2" | 17# | J55 | LTC | 10.0ppg | 4910psi | 5320psi | 247000# |
| 4600'TVD | | | | | | 2.054 | 2.23 | 3.67 | |

Accepted for record
NMOCD TCS 6-23-14
SEE ATTACHED FOR CONDITIONS OF APPROVAL

NM OIL CONSERVATION
ARTESIA DISTRICT
JUN 20 2014

RECEIVED

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

**Electronic Submission #249377 verified by the BLM Well Information System**
**For APACHE CORPORATION, sent to the Carlsbad**
**Committed to AFMSS for processing by CATHY QUEEN on 06/12/2014 (14CQ0441SE)**

Name *(Printed/Typed)* SORINA FLORES — Title SUBMITTING CONTACT

Signature (Electronic Submission) — Date 06/12/2014

APPROVED
JUN 1 2 2014
BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

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

Approved By _____ Title _____ Date

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

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.

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

## Additional data for EC transaction #249377 that would not fit on the form

**32. Additional remarks, continued**

**Calc safety factors based on: Burst -Full evacuation of annulus & csg filled with mud. Collapse -Mud in annulus & full evacuation of csg. Tension -Annulus & csg filled with mud.

CMT PROGRAM:
13-3/8" Surf (cmt to surf/100% excess cmt)
Single slurry: 420sx Cl C w/1% CaCL2+0.25% R38 (18.8wt,1.34yld,6.33gal/sk)
Comp Strength: 12hr-813psi 24hr-1205psi
*If lost circ is encountered while drlg, 17-1/2" hole, 200sx Cl C
Thixotropic cmt (14.4wt,1.55yld,6.65gal/sk) may be pmpd ahead of cmt
slurry shown above.

5-1/2" Prod (Cmt to surf/20% excess cmt)
Lead: 410sx(35:65)Poz C w/5%Salt+ 0.25% R38+ 6% Bentonite(12.4wt,2.1yld,
10.57gal/sk) Comp Strength: 12hr-589psi 24hr-947psi
Tail: 270sx (50:50) Poz C w/5% Salt + 0.25% R38 + 2% Bentonite(14.2wt,
1.28yld, 5.88gal/sk) Comp Strengths: 12hr-1379psi 24hr-2332psi

PROPOSED CONTROL EQUIP
An 11" 3M psi WP BOP stack consisting of an annular bag type preventer, middle pipe rams, & bottom blind rams will be nippled up on the 13-3/8" surf csg head & tested to 70% of csg burst. BOP will be utilized continuously until TD is reached. Max surf pressure is not expected to exceed 2000psi. BHP is calc to be approx 2024psi. All BOPs & associated equip will be tested per BLM Drilling Ops Order #2. BOP will be operated & checked each 24-hr period & blind rams will be operated & checked when the drill pipe is out of the hole. Function tests will be documented on the daily driller's log. A 3000psi choke manifold with a 3" panic line will be installed. A full opening stabbing valve & kelly cock will be on the derrick floor in case of need. No abnormal pressures or temps are expected in this well. No nearby wells have encountered any well control problems.

IN THE EVENT CMT IS NOT CIRC TO SURF ON PRIMARY CMT JOB FOR SURF CSG:

| HOLE | DEPTH | OD | WT | GRADE | COLLAR | DESIGN | COLPS | BURST | TENSION |
|---|---|---|---|---|---|---|---|---|---|
| MW | | RATE/SF | RATE/SF | RATE/SF | | | | | |
| 17-1/2" | 0-350' | 13-3/8" | 48# | H40 | STC | 8.8ppg | 770psi | 1730psi | 322000# |
| 4.625 | | 7.06 | 22.15 | | | | | | |
| 11" | 0-400' | 8-5/8" | 24# | J55 | STC | 8.8ppg | 1370psi | 2950psi | 244000# |
| 4600'TVD | | | | 7.486 | 10.54 | 29.37 | | | |
| 7-7/8" | 0-4609' | 5-1/2" | 17# | j55 | LTC | 10.0ppg | 4910psi | 5320psi | 247000# |
| 4600'TVD | | | | 2.054 | 2.23 | 3.67 | | | |

**Calc safety factors based on: Burst -Full evacuation of annulus & csg filled with mud. Collapse -Mud in annulus & full evacuation of csg. Tension -Annulus & csg filled with mud.

CMT PROGRAM
13-3/8" Surf (cmt to surf/100% excess cmt)
Single slurry: 420sx Cl C w/1% CaCL2+0.25% R38 (18.8wt,1.34yld,6.33gal/sk)
Comp Strength: 12hr-813psi 24hr-1205psi
*If lost circ is encountered while drlg, 17-1/2" hole, 200sx Cl C
Thixotropic cmt (14.4wt,1.55yld,6.65gal/sk) may be pmpd ahead of cmt
slurry shown above.

***Rest of CMT PROGRAM & PROPOSED CONTROL EQUIP on attachment due to lack of space. Have also added a new directional plan.***

**Apache proposes to change the casing/cement/BOP program as shown below.**

**In the event that cement IS circulated to surface on the primary cement job for the surface casing:**

## 1. Casing Program: All casing is new & API approved

| HOLE SIZE | DEPTH | OD CSG | WEIGHT | GRADE | COLLAR | DESIGN MW | COLLAPSE Rating/SF* | BURST Rating/SF* | TENSION Rating/SF* |
|---|---|---|---|---|---|---|---|---|---|
| 17-1/2" | 0' – 350' | 13-3/8" | 48# | H-40 | STC | 8.8 ppg | 770 psi 4.625 | 1730 psi 7.06 | 322000 lbs 22.15 |
| 7-7/8" | 0'-4609' (4600' TVD) | 5-1/2" | 17# | J-55 | LTC | 10.0 ppg | 4910 psi 2.054 | 5320 psi 2.23 | 247000 lbs 3.72 |

*Calculated Safety Factors based on:
Burst: Full evacuation of annulus and casing filled with mud
Collapse: Mud in annulus and full evacuation of casing
Tension: Annulus and casing filled with mud

## 2. CEMENT PROGRAM:

### A. 13-3/8" Surface (Cmt to surf / 100% excess cmt):

Single Slurry: 420 sx Class C w/ 1% CaCl2 + 0.25% R38 *(14.8 wt, 1.34 yld, 6.33 gal water/sk)*
*Comp Strengths :* ***12 hr*** *– 813 psi* ***24 hr*** *– 1205 psi*

If lost circulation is encountered while drilling the 17-1/2" hole, 200 sx Class C thixotropic cement *(14.4 wt, 1.55 yld, 6.65 gal water/sk) may be pumped ahead of the cement slurry shown above.*

### B. 5-1/2" Production (Cmt to surf / 20 % excess cmt):

Lead: 410 sx (35:65) Poz C w/ 5% Salt + 0.25% R38 + 6% Bentonite *(12.4 wt, 2.1 yld, 10.57 gal water/sk)*
*Compressive Strengths:* ***12 hr*** *– 589 psi* ***24 hr*** *– 947 psi*

Tail: 270 sx (50:50) Poz C w/ 5% Salt + 0.25% R38 + 2% Bentonite *(14.2 wt, 1.28 yld, 5.88 gal water/sk)*
*Compressive Strengths:* ***12 hr*** *– 1379 psi* ***24 hr*** *– 2332 psi*

## 3. PROPOSED CONTROL EQUIPMENT

An 11" 3M psi WP BOP stack consisting of an annular bag type preventer, middle pipe rams, and bottom blind rams will be nippled up on the 13-3/8" surface casing head and tested to 70% of casing burst. The BOP will be utilized continuously until TD is reached. The maximum surface pressure is not expected to exceed 2000 psi. BHP is calculated to be approximately 2024 psi. All BOPs and associated equipment will be tested per BLM *Drilling Operations Order #2*. The BOP will be operated and checked each 24-hour period and the blind rams will be operated and checked when the drill pipe is out of the hole. Function tests will be documented on the daily driller's log. A 3000 psi choke manifold with a 3" panic line will be installed. A full opening stabbing valve & kelly cock will be on the derrick floor in case of need. No abnormal pressures or temperatures are expected in this well. No nearby wells have encountered any well control problems.

**In the event that cement IS NOT circulated to surface on the primary cement job for the surface casing:**

## 1. Casing Program: All casing is new & API approved

| HOLE SIZE | DEPTH | OD CSG | WEIGHT | GRADE | COLLAR | DESIGN MW | COLLAPSE Rating/SF* | BURST Rating/SF* | TENSION Rating/SF* |
|---|---|---|---|---|---|---|---|---|---|
| 17-1/2" | 0' – 350' | 13-3/8" | 48# | H-40 | STC | 8.8 ppg | 770 psi 4.625 | 1730 psi 9.77 | 322000 lbs 22.15 |
| 11" | 0' – 400' | 8-5/8" | 24# | J-55 | STC | 8.8 ppg | 1370 psi 7.486 | 2950 psi 10.54 | 244000 lbs 29.37 |
| 7-7/8" | 0'-4609' (4600' TVD) | 5-1/2" | 17# | J-55 | LTC | 10.0 ppg | 4910 psi 2.054 | 5320 psi 2.23 | 247000 lbs 3.72 |

*Calculated Safety Factors based on:
Burst: Full evacuation of annulus and casing filled with mud
Collapse: Mud in annulus and full evacuation of casing
Tension: Annulus and casing filled with mud

## 2. CEMENT PROGRAM:

### A. 13-3/8" Surface (Cmt to surf / 100% excess cmt):

Single Slurry: 420 sx Class C w/ 1% CaCl2 + 0.25% R38 *(14.8 wt, 1.34 yld, 6.33 gal water/sk)*
*Comp Strengths :* ***12 hr*** *– 813 psi* ***24 hr*** *– 1205 psi*

If lost circulation is encountered while drilling the 17-1/2" hole, 200 sx Class C thixotropic cement (*14.4 wt, 1.55 yld, 6.65 gal water/sk) may be pumped ahead of the cement slurry shown above.*

### B. 8-5/8" Intermediate (Cmt to surf / 50% excess cmt):

Single Slurry: 220 sx Class C w/ 1% CaCl2 + 0.25% R38 *(14.8 wt, 1.34 yld, 6.33 gal water/sk)*
*Comp Strengths :* ***12 hr*** *– 813 psi* ***24 hr*** *– 1205 psi*

### C. 5-1/2" Production (Cmt to surf / 20 % excess cmt):

See COA

Lead: 310 sx (35:65) Poz C w/ 5% Salt + 0.25% R38 + 6% Bentonite *(12.4 wt, 2.1 yld, 10.57 gal water/sk)*
*Compressive Strengths:* ***12 hr*** *– 589 psi* ***24 hr*** *– 947 psi*

Tail: 270 sx (50:50) Poz C w/ 5% Salt + 0.25% R38 + 2% Bentonite *(14.2 wt, 1.28 yld, 5.88 gal water/sk)*
*Compressive Strengths:* ***12 hr*** *– 1379 psi* ***24 hr*** *– 2332 psi*

## 3. PROPOSED CONTROL EQUIPMENT

An 11" 3M psi WP BOP stack consisting of an annular bag type preventer, middle pipe rams, and bottom blind rams will be nippled up on the 13-3/8" surface casing head and tested to 70% of casing burst. After intermediate casing is set and cemented the BOP will be nippled up on the casing spool and tested to 2000 psi. The BOPE will be utilized continuously until TD is reached. The maximum surface pressure is not expected to exceed 2000 psi. BHP is calculated to be approximately 2024 psi. All BOP's and associated equipment will be tested per BLM *Drilling Operations Order #2*. The BOP will be operated and checked each 24-hour period and the blind rams will be operated and checked when the drill pipe is out of the hole. Function tests will be documented on the daily driller's log. A 3000 psi choke manifold with a 3" panic line will be installed. A full opening stabbing valve & kelly cock will be on the derrick floor in case of need. No abnormal pressures or temperatures are expected in this well. No nearby wells have encountered any well control problems.

# Apache Corporation

**Eddy County, New Mexico (NAD 83)**
**Sec 1, T18S, R27E**
**AAO Federal #28**

**Wellbore #1**

**Plan: Design #3**

# DDC Well Planning Report

**10 June, 2014**

The DIRECTIONAL DRILLING COMPANY

| | | | |
|---|---|---|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well AAO Federal #28 |
| Company: | Apache Corporation | TVD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Project: | Eddy County, New Mexico (NAD 83) | MD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Site: | Sec 1, T18S, R27E | North Reference: | Grid |
| Well: | AAO Federal #28 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Design #3 | | |

**Project** Eddy County, New Mexico (NAD 83)

| | | | |
|---|---|---|---|
| Map System: | US State Plane 1983 | System Datum: | Mean Sea Level |
| Geo Datum: | North American Datum 1983 | | |
| Map Zone: | New Mexico Eastern Zone | | |

**Site** Sec 1, T18S, R27E

| | | | | | |
|---|---|---|---|---|---|
| Site Position: | | Northing: | 643,718.88 usft | Latitude: | 32° 46' 10.477 N |
| From: | Map | Easting: | 572,345.53 usft | Longitude: | 104° 13' 56.827 W |
| Position Uncertainty: | 0.0 usft | Slot Radius: | 13-3/16 " | Grid Convergence: | 0.05 ° |

**Well** AAO Federal #28

| | | | | | | |
|---|---|---|---|---|---|---|
| Well Position | +N/-S | 0.0 usft | Northing: | 643,718.88 usft | Latitude: | 32° 46' 10.477 N |
| | +E/-W | 0.0 usft | Easting: | 572,345.53 usft | Longitude: | 104° 13' 56.827 W |
| Position Uncertainty | | 0.0 usft | Wellhead Elevation: | | Ground Level: | 3,631.0 usft |

**Wellbore** Wellbore #1

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF2010 | 1/8/2014 | 7.62 | 60.51 | 48,613 |

**Design** Design #3

Audit Notes:

| | | | | | |
|---|---|---|---|---|---|
| Version: | | Phase: | PLAN | Tie On Depth: | 0.0 |

| Vertical Section: | Depth From (TVD) (usft) | +N/-S (usft) | +E/-W (usft) | Direction (°) |
|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | 312.04 |

**Plan Sections**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | TFO (°) | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 500.0 | 0.00 | 0.00 | 500.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 895.3 | 3.95 | 308.90 | 894.9 | 8.6 | -10.6 | 1.00 | 1.00 | -12.93 | 308.90 | |
| 4,609.1 | 3.95 | 308.90 | 4,600.0 | 169.3 | -209.8 | 0.00 | 0.00 | 0.00 | 0.00 | PBHL AAO Federal #. |

| | | | |
|---|---|---|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well AAO Federal #28 |
| Company: | Apache Corporation | TVD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Project: | Eddy County, New Mexico (NAD 83) | MD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Site: | Sec 1- T18S -R27E | North Reference: | Grid |
| Well: | AAO Federal #28 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Design #3 | | |

Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| Build @ 1°/100' | | | | | | | | | |
| 500.0 | 0.00 | 0.00 | 500.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 600.0 | 1.00 | 308.90 | 600.0 | 0.5 | -0.7 | 0.9 | 1.00 | 1.00 | 0.00 |
| 700.0 | 2.00 | 308.90 | 700.0 | 2.2 | -2.7 | 3.5 | 1.00 | 1.00 | 0.00 |
| 800.0 | 3.00 | 308.90 | 799.9 | 4.9 | -6.1 | 7.8 | 1.00 | 1.00 | 0.00 |
| End of Build @ 3.95° Inc. | | | | | | | | | |
| 895.3 | 3.95 | 308.90 | 894.9 | 8.6 | -10.6 | 13.6 | 1.00 | 1.00 | 0.00 |
| 900.0 | 3.95 | 308.90 | 899.7 | 8.8 | -10.9 | 13.9 | 0.00 | 0.00 | 0.00 |
| 1,000.0 | 3.95 | 308.90 | 999.4 | 13.1 | -16.2 | 20.8 | 0.00 | 0.00 | 0.00 |
| 1,100.0 | 3.95 | 308.90 | 1,099.2 | 17.4 | -21.6 | 27.7 | 0.00 | 0.00 | 0.00 |
| 1,200.0 | 3.95 | 308.90 | 1,199.0 | 21.8 | -27.0 | 34.6 | 0.00 | 0.00 | 0.00 |
| 1,300.0 | 3.95 | 308.90 | 1,298.7 | 26.1 | -32.3 | 41.5 | 0.00 | 0.00 | 0.00 |
| 1,400.0 | 3.95 | 308.90 | 1,398.5 | 30.4 | -37.7 | 48.3 | 0.00 | 0.00 | 0.00 |
| 1,500.0 | 3.95 | 308.90 | 1,498.2 | 34.7 | -43.0 | 55.2 | 0.00 | 0.00 | 0.00 |
| 1,600.0 | 3.95 | 308.90 | 1,598.0 | 39.1 | -48.4 | 62.1 | 0.00 | 0.00 | 0.00 |
| 1,700.0 | 3.95 | 308.90 | 1,697.8 | 43.4 | -53.8 | 69.0 | 0.00 | 0.00 | 0.00 |
| 1,800.0 | 3.95 | 308.90 | 1,797.5 | 47.7 | -59.1 | 75.9 | 0.00 | 0.00 | 0.00 |
| 1,900.0 | 3.95 | 308.90 | 1,897.3 | 52.1 | -64.5 | 82.8 | 0.00 | 0.00 | 0.00 |
| 2,000.0 | 3.95 | 308.90 | 1,997.1 | 56.4 | -69.9 | 89.6 | 0.00 | 0.00 | 0.00 |
| 2,100.0 | 3.95 | 308.90 | 2,096.8 | 60.7 | -75.2 | 96.5 | 0.00 | 0.00 | 0.00 |
| 2,200.0 | 3.95 | 308.90 | 2,196.6 | 65.0 | -80.6 | 103.4 | 0.00 | 0.00 | 0.00 |
| 2,300.0 | 3.95 | 308.90 | 2,296.3 | 69.4 | -86.0 | 110.3 | 0.00 | 0.00 | 0.00 |
| 2,400.0 | 3.95 | 308.90 | 2,396.1 | 73.7 | -91.3 | 117.2 | 0.00 | 0.00 | 0.00 |
| 2,500.0 | 3.95 | 308.90 | 2,495.9 | 78.0 | -96.7 | 124.1 | 0.00 | 0.00 | 0.00 |
| 2,600.0 | 3.95 | 308.90 | 2,595.6 | 82.4 | -102.1 | 130.9 | 0.00 | 0.00 | 0.00 |
| 2,700.0 | 3.95 | 308.90 | 2,695.4 | 86.7 | -107.4 | 137.8 | 0.00 | 0.00 | 0.00 |
| 2,800.0 | 3.95 | 308.90 | 2,795.2 | 91.0 | -112.8 | 144.7 | 0.00 | 0.00 | 0.00 |
| 2,900.0 | 3.95 | 308.90 | 2,894.9 | 95.3 | -118.1 | 151.6 | 0.00 | 0.00 | 0.00 |
| 3,000.0 | 3.95 | 308.90 | 2,994.7 | 99.7 | -123.5 | 158.5 | 0.00 | 0.00 | 0.00 |
| 3,100.0 | 3.95 | 308.90 | 3,094.4 | 104.0 | -128.9 | 165.4 | 0.00 | 0.00 | 0.00 |
| 3,200.0 | 3.95 | 308.90 | 3,194.2 | 108.3 | -134.2 | 172.2 | 0.00 | 0.00 | 0.00 |
| 3,300.0 | 3.95 | 308.90 | 3,294.0 | 112.7 | -139.6 | 179.1 | 0.00 | 0.00 | 0.00 |
| 3,400.0 | 3.95 | 308.90 | 3,393.7 | 117.0 | -145.0 | 186.0 | 0.00 | 0.00 | 0.00 |
| 3,500.0 | 3.95 | 308.90 | 3,493.5 | 121.3 | -150.3 | 192.9 | 0.00 | 0.00 | 0.00 |
| 3,600.0 | 3.95 | 308.90 | 3,593.3 | 125.6 | -155.7 | 199.8 | 0.00 | 0.00 | 0.00 |
| Top of Glorietta | | | | | | | | | |
| 3,603.8 | 3.95 | 308.90 | 3,597.0 | 125.8 | -155.9 | 200.0 | 0.00 | 0.00 | 0.00 |
| 3,700.0 | 3.95 | 308.90 | 3,693.0 | 130.0 | -161.1 | 206.7 | 0.00 | 0.00 | 0.00 |
| 3,800.0 | 3.95 | 308.90 | 3,792.8 | 134.3 | -166.4 | 213.5 | 0.00 | 0.00 | 0.00 |
| 3,900.0 | 3.95 | 308.90 | 3,892.5 | 138.6 | -171.8 | 220.4 | 0.00 | 0.00 | 0.00 |
| 4,000.0 | 3.95 | 308.90 | 3,992.3 | 143.0 | -177.2 | 227.3 | 0.00 | 0.00 | 0.00 |
| 4,100.0 | 3.95 | 308.90 | 4,092.1 | 147.3 | -182.5 | 234.2 | 0.00 | 0.00 | 0.00 |
| 4,200.0 | 3.95 | 308.90 | 4,191.8 | 151.6 | -187.9 | 241.1 | 0.00 | 0.00 | 0.00 |
| 4,300.0 | 3.95 | 308.90 | 4,291.6 | 155.9 | -193.2 | 247.9 | 0.00 | 0.00 | 0.00 |
| 4,400.0 | 3.95 | 308.90 | 4,391.4 | 160.3 | -198.6 | 254.8 | 0.00 | 0.00 | 0.00 |
| 4,500.0 | 3.95 | 308.90 | 4,491.1 | 164.6 | -204.0 | 261.7 | 0.00 | 0.00 | 0.00 |
| PBHL @ 4609' MD / 4600' TVD | | | | | | | | | |
| 4,609.1 | 3.95 | 308.90 | 4,600.0 | 169.3 | -209.8 | 269.2 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well AAO Federal #28 |
| Company: | Apache Corporation | TVD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Project: | Eddy County, New Mexico (NAD 83) | MD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Site: | Sec 1, T18S, R27E | North Reference: | Grid |
| Well: | AAO Federal #28 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Design #3 | | |

**Design Targets**

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| PBHL AAO Federal #28<br>- plan hits target center<br>- Point | 0.00 | 0.00 | 4,600.0 | 169.3 | -209.8 | 643,888.20 | 572,135.70 | 32° 46' 12.154 N | 104° 13' 59.283 W |

**Formations**

| Measured Depth (usft) | Vertical Depth (usft) | Name | Lithology | Dip (°) | Dip Direction (°) |
|---|---|---|---|---|---|
| 3,603.8 | 3,597.0 | Top of Glorietta | | 0.00 | 308.90 |

**Plan Annotations**

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates +N/-S (usft) | Local Coordinates +E/-W (usft) | Comment |
|---|---|---|---|---|
| 500.0 | 500.0 | 0.0 | 0.0 | Build @ 1°/100' |
| 895.3 | 894.9 | 8.6 | -10.6 | End of Build @ 3.95° Inc. |
| 4,609.1 | 4,600.0 | 169.3 | -209.8 | PBHL @ 4609' MD / 4600' TVD |

# Apache Corporation

**Eddy County, New Mexico (NAD 83)**
**Sec 1, T18S, R27E**
**AAO Federal #28**

**Wellbore #1**

**Plan: Design #2**

# DDC Curve Report

**08 January, 2014**

The DIRECTIONAL DRILLING COMPANY

| | | | |
|---|---|---|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well AAO Federal #28 |
| Company: | Apache Corporation | TVD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Project: | Eddy County, New Mexico (NAD 83) | MD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Site: | Sec 1, T18S, R27E | North Reference: | Grid |
| Well: | AAO Federal #28 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Design #2 | | |

**Project** Eddy County, New Mexico (NAD 83)

| | | | |
|---|---|---|---|
| Map System: | US State Plane 1983 | System Datum: | Mean Sea Level |
| Geo Datum: | North American Datum 1983 | | |
| Map Zone: | New Mexico Eastern Zone | | |

**Site** Sec 1, T18S, R27E

| | | | | | |
|---|---|---|---|---|---|
| Site Position: | | Northing: | 643,718.88 usft | Latitude: | 32° 46' 10.477 N |
| From: | Map | Easting: | 572,345.53 usft | Longitude: | 104° 13' 56.827 W |
| Position Uncertainty: | 0.0 usft | Slot Radius: | 13-3/16 " | Grid Convergence: | 0.05 ° |

**Well** AAO Federal #28

| | | | | | | |
|---|---|---|---|---|---|---|
| Well Position | +N/-S | 0.0 usft | Northing: | 643,718.88 usft | Latitude: | 32° 46' 10.477 N |
| | +E/-W | 0.0 usft | Easting: | 572,345.53 usft | Longitude: | 104° 13' 56.827 W |
| Position Uncertainty | | 0.0 usft | Wellhead Elevation: | | Ground Level: | 3,631.0 usft |

**Wellbore** Wellbore #1

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF2010 | 1/8/2014 | 7.62 | 60.51 | 48,613 |

**Design** Design #2

Audit Notes:

| | | | | | |
|---|---|---|---|---|---|
| Version: | | Phase: | PLAN | Tie On Depth: | 0.0 |

| Vertical Section: | Depth From (TVD) (usft) | +N/-S (usft) | +E/-W (usft) | Direction (°) |
|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | 312.04 |

**Plan Sections**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | TFO (°) | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 778.0 | 0.00 | 0.00 | 778.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1,578.0 | 8.00 | 312.04 | 1,575.4 | 37.3 | -41.4 | 1.00 | 1.00 | 0.00 | 312.04 | |
| 2,595.1 | 8.00 | 312.04 | 2,582.6 | 132.1 | -146.5 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3,395.1 | 0.00 | 0.00 | 3,380.0 | 169.5 | -187.9 | 1.00 | -1.00 | 0.00 | 180.00 | VP AAO Federal #2 |
| 4,515.1 | 0.00 | 0.00 | 4,500.0 | 169.5 | -187.9 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | | | |
|---|---|---|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well AAO Federal #28 |
| Company: | Apache Corporation | TVD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Project: | Eddy County, New Mexico (NAD 83) | MD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Site: | Sec 1, T18S, R27E | North Reference: | Grid |
| Well: | AAO Federal #28 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Design #2 | | |

Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| KOP @ 778' / Build @ 1°/100' | | | | | | | | | |
| 778.0 | 0.00 | 0.00 | 778.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 780.0 | 0.02 | 312.04 | 780.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.00 |
| 810.0 | 0.32 | 312.04 | 810.0 | 0.1 | -0.1 | 0.1 | 1.00 | 1.00 | 0.00 |
| 840.0 | 0.62 | 312.04 | 840.0 | 0.2 | -0.2 | 0.3 | 1.00 | 1.00 | 0.00 |
| 870.0 | 0.92 | 312.04 | 870.0 | 0.5 | -0.5 | 0.7 | 1.00 | 1.00 | 0.00 |
| 900.0 | 1.22 | 312.04 | 900.0 | 0.9 | -1.0 | 1.3 | 1.00 | 1.00 | 0.00 |
| 930.0 | 1.52 | 312.04 | 930.0 | 1.4 | -1.5 | 2.0 | 1.00 | 1.00 | 0.00 |
| 960.0 | 1.82 | 312.04 | 960.0 | 1.9 | -2.1 | 2.9 | 1.00 | 1.00 | 0.00 |
| 990.0 | 2.12 | 312.04 | 990.0 | 2.6 | -2.9 | 3.9 | 1.00 | 1.00 | 0.00 |
| 1,020.0 | 2.42 | 312.04 | 1,019.9 | 3.4 | -3.8 | 5.1 | 1.00 | 1.00 | 0.00 |
| 1,050.0 | 2.72 | 312.04 | 1,049.9 | 4.3 | -4.8 | 6.5 | 1.00 | 1.00 | 0.00 |
| 1,080.0 | 3.02 | 312.04 | 1,079.9 | 5.3 | -5.9 | 8.0 | 1.00 | 1.00 | 0.00 |
| 1,110.0 | 3.32 | 312.04 | 1,109.8 | 6.4 | -7.1 | 9.6 | 1.00 | 1.00 | 0.00 |
| 1,140.0 | 3.62 | 312.04 | 1,139.8 | 7.7 | -8.5 | 11.4 | 1.00 | 1.00 | 0.00 |
| 1,170.0 | 3.92 | 312.04 | 1,169.7 | 9.0 | -10.0 | 13.4 | 1.00 | 1.00 | 0.00 |
| 1,200.0 | 4.22 | 312.04 | 1,199.6 | 10.4 | -11.5 | 15.5 | 1.00 | 1.00 | 0.00 |
| 1,230.0 | 4.52 | 312.04 | 1,229.5 | 11.9 | -13.2 | 17.8 | 1.00 | 1.00 | 0.00 |
| 1,260.0 | 4.82 | 312.04 | 1,259.4 | 13.6 | -15.0 | 20.3 | 1.00 | 1.00 | 0.00 |
| 1,290.0 | 5.12 | 312.04 | 1,289.3 | 15.3 | -17.0 | 22.9 | 1.00 | 1.00 | 0.00 |
| 1,320.0 | 5.42 | 312.04 | 1,319.2 | 17.2 | -19.0 | 25.6 | 1.00 | 1.00 | 0.00 |
| 1,350.0 | 5.72 | 312.04 | 1,349.1 | 19.1 | -21.2 | 28.5 | 1.00 | 1.00 | 0.00 |
| 1,380.0 | 6.02 | 312.04 | 1,378.9 | 21.2 | -23.5 | 31.6 | 1.00 | 1.00 | 0.00 |
| 1,410.0 | 6.32 | 312.04 | 1,408.7 | 23.3 | -25.9 | 34.8 | 1.00 | 1.00 | 0.00 |
| 1,440.0 | 6.62 | 312.04 | 1,438.5 | 25.6 | -28.4 | 38.2 | 1.00 | 1.00 | 0.00 |
| 1,470.0 | 6.92 | 312.04 | 1,468.3 | 28.0 | -31.0 | 41.7 | 1.00 | 1.00 | 0.00 |
| 1,500.0 | 7.22 | 312.04 | 1,498.1 | 30.4 | -33.7 | 45.4 | 1.00 | 1.00 | 0.00 |
| 1,530.0 | 7.52 | 312.04 | 1,527.8 | 33.0 | -36.6 | 49.3 | 1.00 | 1.00 | 0.00 |
| 1,560.0 | 7.82 | 312.04 | 1,557.6 | 35.7 | -39.6 | 53.3 | 1.00 | 1.00 | 0.00 |
| End of Build @ 8° Inc. | | | | | | | | | |
| 1,578.0 | 8.00 | 312.04 | 1,575.4 | 37.3 | -41.4 | 55.8 | 1.00 | 1.00 | 0.00 |
| 1,590.0 | 8.00 | 312.04 | 1,587.3 | 38.5 | -42.7 | 57.4 | 0.00 | 0.00 | 0.00 |
| 1,620.0 | 8.00 | 312.04 | 1,617.0 | 41.3 | -45.8 | 61.6 | 0.00 | 0.00 | 0.00 |
| 1,650.0 | 8.00 | 312.04 | 1,646.7 | 44.1 | -48.9 | 65.8 | 0.00 | 0.00 | 0.00 |
| 1,680.0 | 8.00 | 312.04 | 1,676.4 | 46.8 | -52.0 | 70.0 | 0.00 | 0.00 | 0.00 |
| 1,710.0 | 8.00 | 312.04 | 1,706.1 | 49.6 | -55.1 | 74.1 | 0.00 | 0.00 | 0.00 |
| 1,740.0 | 8.00 | 312.04 | 1,735.8 | 52.4 | -58.2 | 78.3 | 0.00 | 0.00 | 0.00 |
| 1,770.0 | 8.00 | 312.04 | 1,765.5 | 55.2 | -61.3 | 82.5 | 0.00 | 0.00 | 0.00 |
| 1,800.0 | 8.00 | 312.04 | 1,795.2 | 58.0 | -64.4 | 86.7 | 0.00 | 0.00 | 0.00 |
| 1,830.0 | 8.00 | 312.04 | 1,825.0 | 60.8 | -67.5 | 90.8 | 0.00 | 0.00 | 0.00 |
| 1,860.0 | 8.00 | 312.04 | 1,854.7 | 63.6 | -70.6 | 95.0 | 0.00 | 0.00 | 0.00 |
| 1,890.0 | 8.00 | 312.04 | 1,884.4 | 66.4 | -73.7 | 99.2 | 0.00 | 0.00 | 0.00 |
| 1,920.0 | 8.00 | 312.04 | 1,914.1 | 69.2 | -76.8 | 103.4 | 0.00 | 0.00 | 0.00 |
| 1,950.0 | 8.00 | 312.04 | 1,943.8 | 72.0 | -79.9 | 107.5 | 0.00 | 0.00 | 0.00 |
| 1,980.0 | 8.00 | 312.04 | 1,973.5 | 74.8 | -83.0 | 111.7 | 0.00 | 0.00 | 0.00 |
| 2,010.0 | 8.00 | 312.04 | 2,003.2 | 77.6 | -86.1 | 115.9 | 0.00 | 0.00 | 0.00 |
| 2,040.0 | 8.00 | 312.04 | 2,032.9 | 80.4 | -89.2 | 120.1 | 0.00 | 0.00 | 0.00 |
| 2,070.0 | 8.00 | 312.04 | 2,062.6 | 83.2 | -92.3 | 124.2 | 0.00 | 0.00 | 0.00 |
| 2,100.0 | 8.00 | 312.04 | 2,092.3 | 86.0 | -95.4 | 128.4 | 0.00 | 0.00 | 0.00 |
| 2,130.0 | 8.00 | 312.04 | 2,122.0 | 88.8 | -98.5 | 132.6 | 0.00 | 0.00 | 0.00 |
| 2,160.0 | 8.00 | 312.04 | 2,151.7 | 91.6 | -101.6 | 136.8 | 0.00 | 0.00 | 0.00 |
| 2,190.0 | 8.00 | 312.04 | 2,181.4 | 94.4 | -104.7 | 140.9 | 0.00 | 0.00 | 0.00 |
| 2,220.0 | 8.00 | 312.04 | 2,211.2 | 97.2 | -107.8 | 145.1 | 0.00 | 0.00 | 0.00 |
| 2,250.0 | 8.00 | 312.04 | 2,240.9 | 100.0 | -110.9 | 149.3 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well AAO Federal #28 |
| Company: | Apache Corporation | TVD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Project: | Eddy County, New Mexico (NAD 83) | MD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Site: | Sec 1, T18S, R27E | North Reference: | Grid |
| Well: | AAO Federal #28 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Design #2 | | |

Planned Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| 2,280.0 | 8.00 | 312.04 | 2,270.6 | 102.8 | -114.0 | 153.5 | 0.00 | 0.00 | 0.00 |
| 2,310.0 | 8.00 | 312.04 | 2,300.3 | 105.6 | -117.1 | 157.6 | 0.00 | 0.00 | 0.00 |
| 2,340.0 | 8.00 | 312.04 | 2,330.0 | 108.4 | -120.2 | 161.8 | 0.00 | 0.00 | 0.00 |
| 2,370.0 | 8.00 | 312.04 | 2,359.7 | 111.2 | -123.3 | 166.0 | 0.00 | 0.00 | 0.00 |
| 2,400.0 | 8.00 | 312.04 | 2,389.4 | 114.0 | -126.4 | 170.2 | 0.00 | 0.00 | 0.00 |
| 2,430.0 | 8.00 | 312.04 | 2,419.1 | 116.7 | -129.5 | 174.3 | 0.00 | 0.00 | 0.00 |
| 2,460.0 | 8.00 | 312.04 | 2,448.8 | 119.5 | -132.6 | 178.5 | 0.00 | 0.00 | 0.00 |
| 2,490.0 | 8.00 | 312.04 | 2,478.5 | 122.3 | -135.7 | 182.7 | 0.00 | 0.00 | 0.00 |
| 2,520.0 | 8.00 | 312.04 | 2,508.2 | 125.1 | -138.8 | 186.9 | 0.00 | 0.00 | 0.00 |
| 2,550.0 | 8.00 | 312.04 | 2,537.9 | 127.9 | -141.9 | 191.0 | 0.00 | 0.00 | 0.00 |
| 2,580.0 | 8.00 | 312.04 | 2,567.7 | 130.7 | -145.0 | 195.2 | 0.00 | 0.00 | 0.00 |
| End of Tangent / Drop @ 1°/100' | | | | | | | | | |
| 2,595.1 | 8.00 | 312.04 | 2,582.6 | 132.1 | -146.5 | 197.3 | 0.00 | 0.00 | 0.00 |
| 2,610.0 | 7.85 | 312.04 | 2,597.4 | 133.5 | -148.1 | 199.4 | 1.00 | -1.00 | 0.00 |
| 2,640.0 | 7.55 | 312.04 | 2,627.1 | 136.2 | -151.0 | 203.4 | 1.00 | -1.00 | 0.00 |
| 2,670.0 | 7.25 | 312.04 | 2,656.8 | 138.8 | -153.9 | 207.2 | 1.00 | -1.00 | 0.00 |
| 2,700.0 | 6.95 | 312.04 | 2,686.6 | 141.3 | -156.7 | 211.0 | 1.00 | -1.00 | 0.00 |
| 2,730.0 | 6.65 | 312.04 | 2,716.4 | 143.7 | -159.3 | 214.5 | 1.00 | -1.00 | 0.00 |
| 2,760.0 | 6.35 | 312.04 | 2,746.2 | 145.9 | -161.8 | 217.9 | 1.00 | -1.00 | 0.00 |
| 2,790.0 | 6.05 | 312.04 | 2,776.0 | 148.1 | -164.2 | 221.1 | 1.00 | -1.00 | 0.00 |
| 2,820.0 | 5.75 | 312.04 | 2,805.9 | 150.2 | -166.5 | 224.2 | 1.00 | -1.00 | 0.00 |
| 2,850.0 | 5.45 | 312.04 | 2,835.7 | 152.1 | -168.7 | 227.2 | 1.00 | -1.00 | 0.00 |
| 2,880.0 | 5.15 | 312.04 | 2,865.6 | 154.0 | -170.8 | 229.9 | 1.00 | -1.00 | 0.00 |
| 2,910.0 | 4.85 | 312.04 | 2,895.5 | 155.7 | -172.7 | 232.5 | 1.00 | -1.00 | 0.00 |
| 2,940.0 | 4.55 | 312.04 | 2,925.4 | 157.4 | -174.5 | 235.0 | 1.00 | -1.00 | 0.00 |
| 2,970.0 | 4.25 | 312.04 | 2,955.3 | 158.9 | -176.2 | 237.3 | 1.00 | -1.00 | 0.00 |
| 3,000.0 | 3.95 | 312.04 | 2,985.2 | 160.4 | -177.8 | 239.4 | 1.00 | -1.00 | 0.00 |
| 3,030.0 | 3.65 | 312.04 | 3,015.2 | 161.7 | -179.3 | 241.4 | 1.00 | -1.00 | 0.00 |
| 3,060.0 | 3.35 | 312.04 | 3,045.1 | 162.9 | -180.7 | 243.3 | 1.00 | -1.00 | 0.00 |
| 3,090.0 | 3.05 | 312.04 | 3,075.1 | 164.0 | -181.9 | 244.9 | 1.00 | -1.00 | 0.00 |
| 3,120.0 | 2.75 | 312.04 | 3,105.0 | 165.1 | -183.0 | 246.5 | 1.00 | -1.00 | 0.00 |
| 3,150.0 | 2.45 | 312.04 | 3,135.0 | 166.0 | -184.0 | 247.8 | 1.00 | -1.00 | 0.00 |
| 3,180.0 | 2.15 | 312.04 | 3,165.0 | 166.8 | -184.9 | 249.0 | 1.00 | -1.00 | 0.00 |
| 3,210.0 | 1.85 | 312.04 | 3,194.9 | 167.5 | -185.7 | 250.1 | 1.00 | -1.00 | 0.00 |
| 3,240.0 | 1.55 | 312.04 | 3,224.9 | 168.1 | -186.4 | 251.0 | 1.00 | -1.00 | 0.00 |
| 3,270.0 | 1.25 | 312.04 | 3,254.9 | 168.6 | -186.9 | 251.7 | 1.00 | -1.00 | 0.00 |
| 3,300.0 | 0.95 | 312.04 | 3,284.9 | 168.9 | -187.4 | 252.3 | 1.00 | -1.00 | 0.00 |
| 3,330.0 | 0.65 | 312.04 | 3,314.9 | 169.2 | -187.7 | 252.7 | 1.00 | -1.00 | 0.00 |
| 3,360.0 | 0.35 | 312.04 | 3,344.9 | 169.4 | -187.9 | 253.0 | 1.00 | -1.00 | 0.00 |
| 3,390.0 | 0.05 | 312.04 | 3,374.9 | 169.5 | -187.9 | 253.1 | 1.00 | -1.00 | 0.00 |
| End of Drop @ Vertical @ 3380' TVD | | | | | | | | | |
| 3,395.1 | 0.00 | 0.00 | 3,380.0 | 169.5 | -187.9 | 253.1 | 1.00 | -1.00 | 0.00 |

Design Targets

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| VP AAO Federal #28<br>- plan hits target center<br>- Point | 0.00 | 0.00 | 3,380.0 | 169.5 | -187.9 | 643,888.35 | 572,157.59 | 32° 46' 12.155 N | 104° 13' 59.026 W |

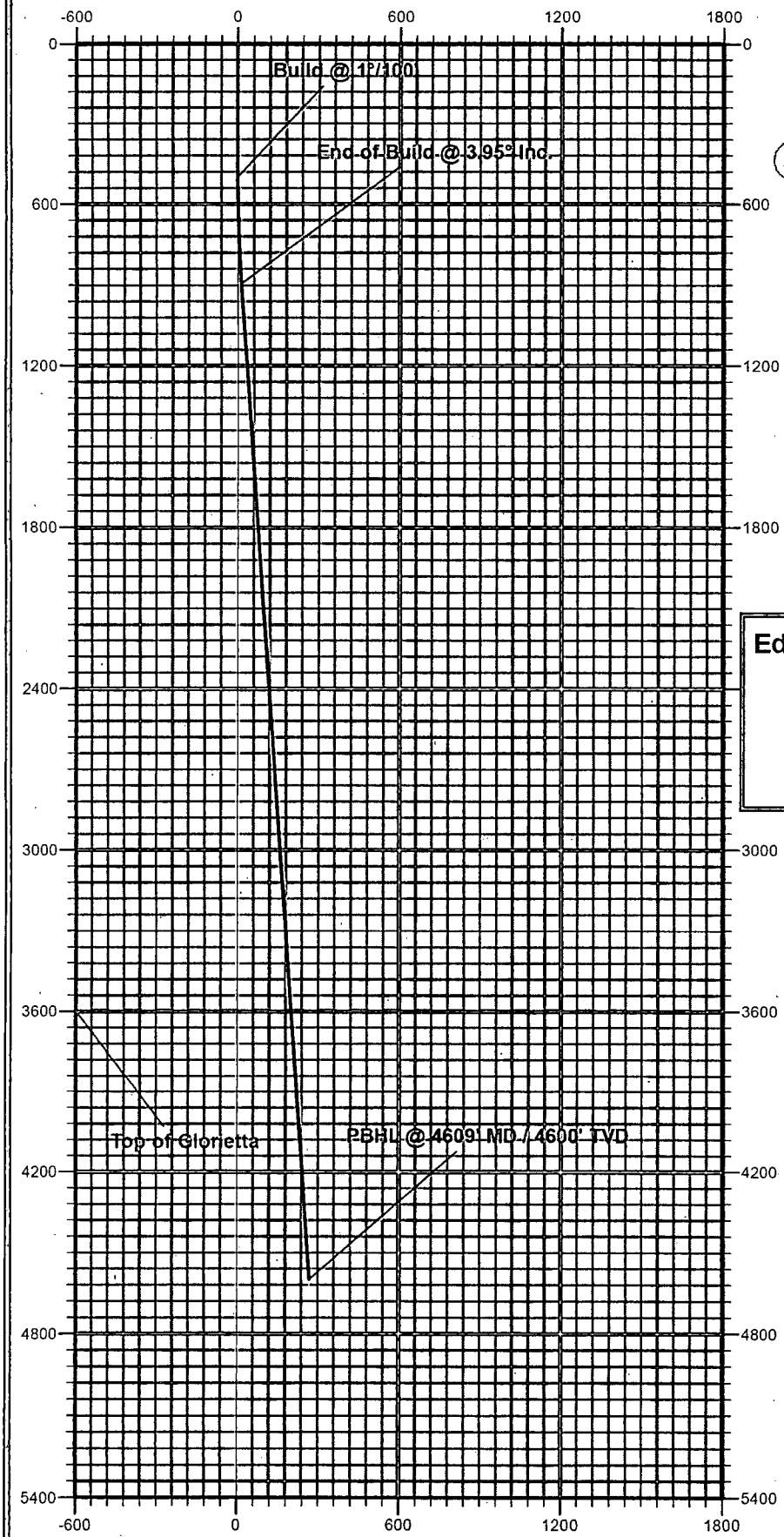
| | | | |
|---|---|---|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well AAO Federal #28 |
| Company: | Apache Corporation | TVD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Project: | Eddy County, New Mexico (NAD 83) | MD Reference: | WELL @ 3642.0usft (Capstar #118) |
| Site: | Sec 1, T18S, R27E | North Reference: | Grid |
| Well: | AAO Federal #28 | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | Wellbore #1 | | |
| Design: | Design #2 | | |

**Formations**

| Measured Depth (usft) | Vertical Depth (usft) | Name | Lithology | Dip (°) | Dip Direction (°) |
|---|---|---|---|---|---|
| 3,595.1 | 3,580.0 | Top of Glorietta | | 0.00 | 312.04 |

**Plan Annotations**

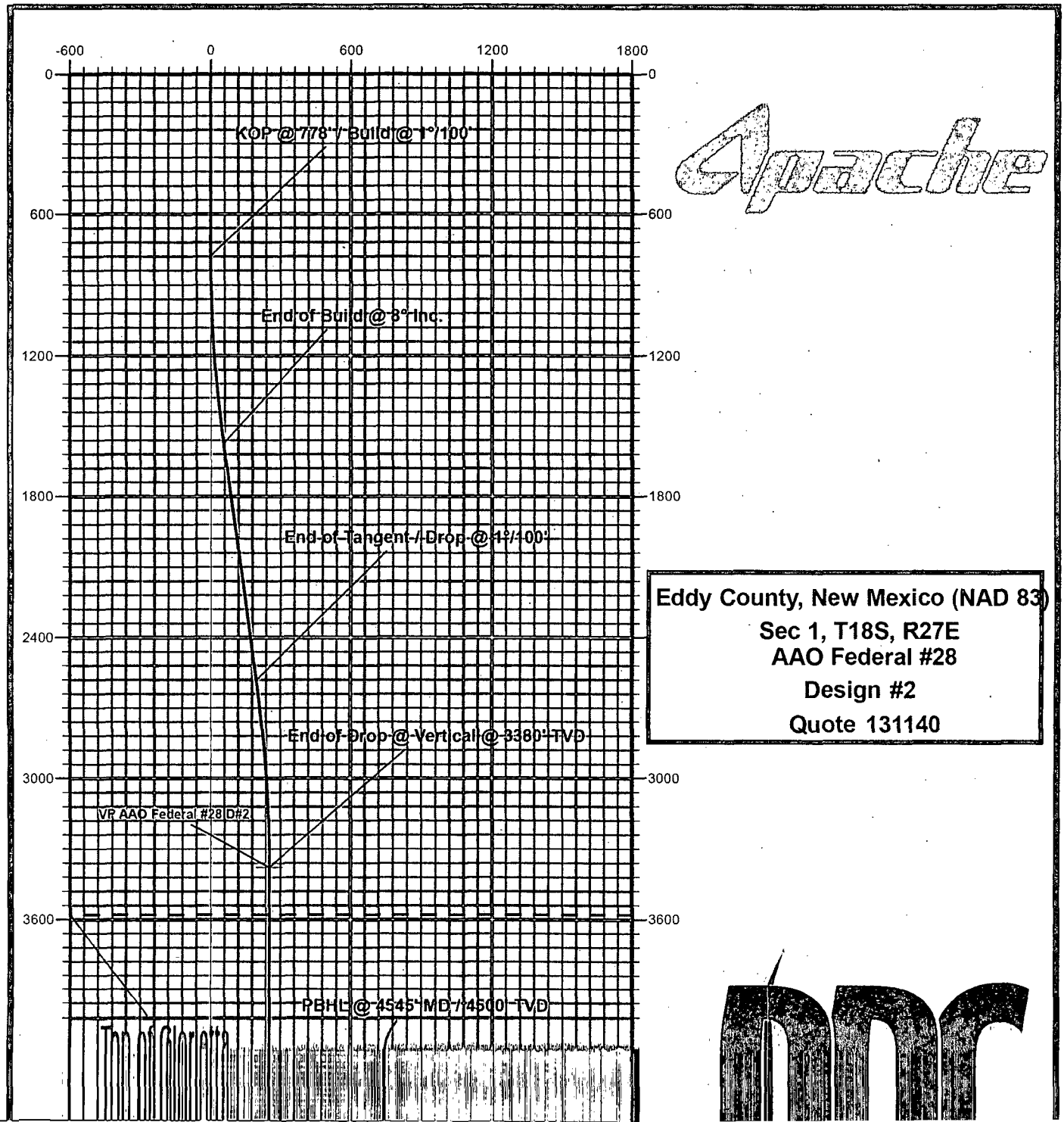
| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates +N/-S (usft) | Local Coordinates +E/-W (usft) | Comment |
|---|---|---|---|---|
| 778.0 | 778.0 | 0.0 | 0.0 | KOP @ 778' / Build @ 1°/100' |
| 1,578.0 | 1,575.4 | 37.3 | -41.4 | End of Build @ 8° Inc. |
| 2,595.1 | 2,582.6 | 132.1 | -146.5 | End of Tangent / Drop @ 1°/100' |
| 3,395.1 | 3,380.0 | 169.5 | -187.9 | End of Drop @ Vertical @ 3380' TVD |
| 4,515.1 | 4,500.0 | 169.5 | -187.9 | PBHL @ 4545' MD / 4500' TVD |




Apache

**Eddy County, New Mexico (NAD 83)**
**Sec 1, T18S, R27E**
**AAO Federal #28**
**Design #3**
**Quote 140596**

RDC
The DIRECTIONAL DRILLING COMPANY



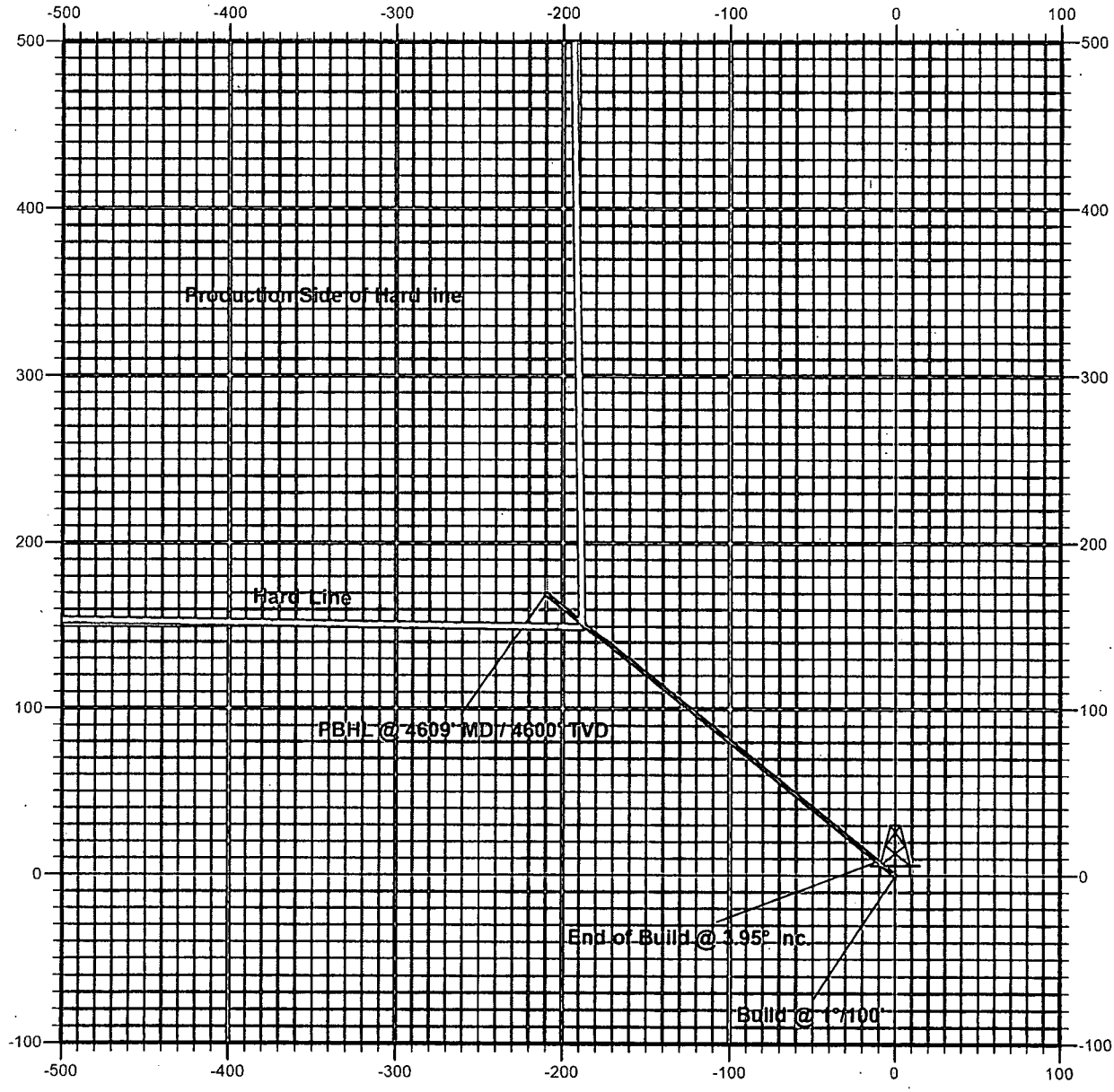

Apache

**Eddy County, New Mexico (NAD 83)**
**Sec 1, T18S, R27E**
**AAO Federal #28**
**Design #2**
**Quote 131140**

Apache

DDC
The DIRECTIONAL DRILLING COMPANY

**Eddy County, New Mexico (NAD 83)**
**Sec 1, T18S, R27E**
**AAO Federal #28**
**Quote 140596**
**Design #3**



Apache

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**Eddy County, New Mexico (NAD 83)**
**Sec 1, T18S, R27E**
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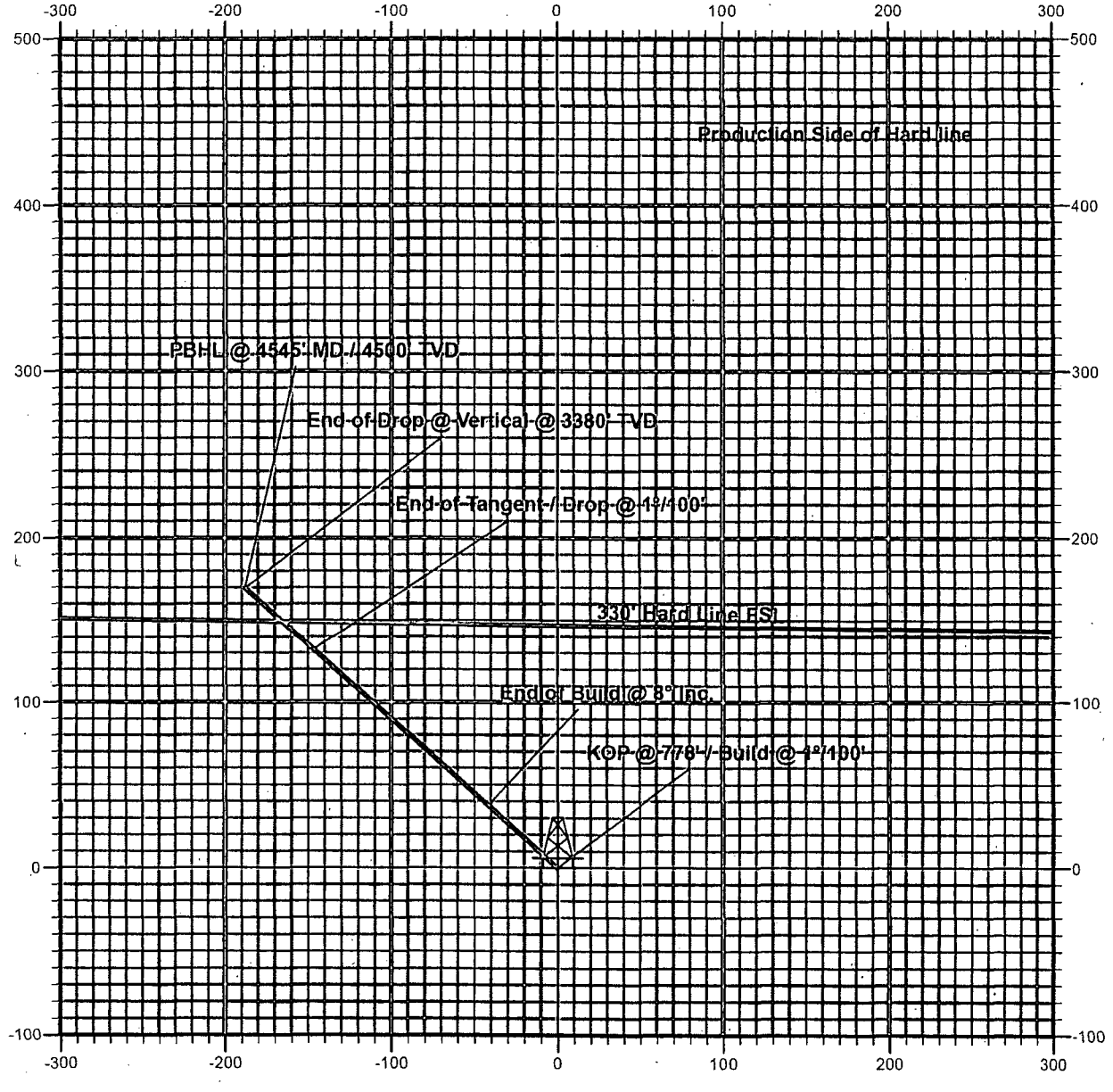
**Quote 131140**
**Design #2**



Apache

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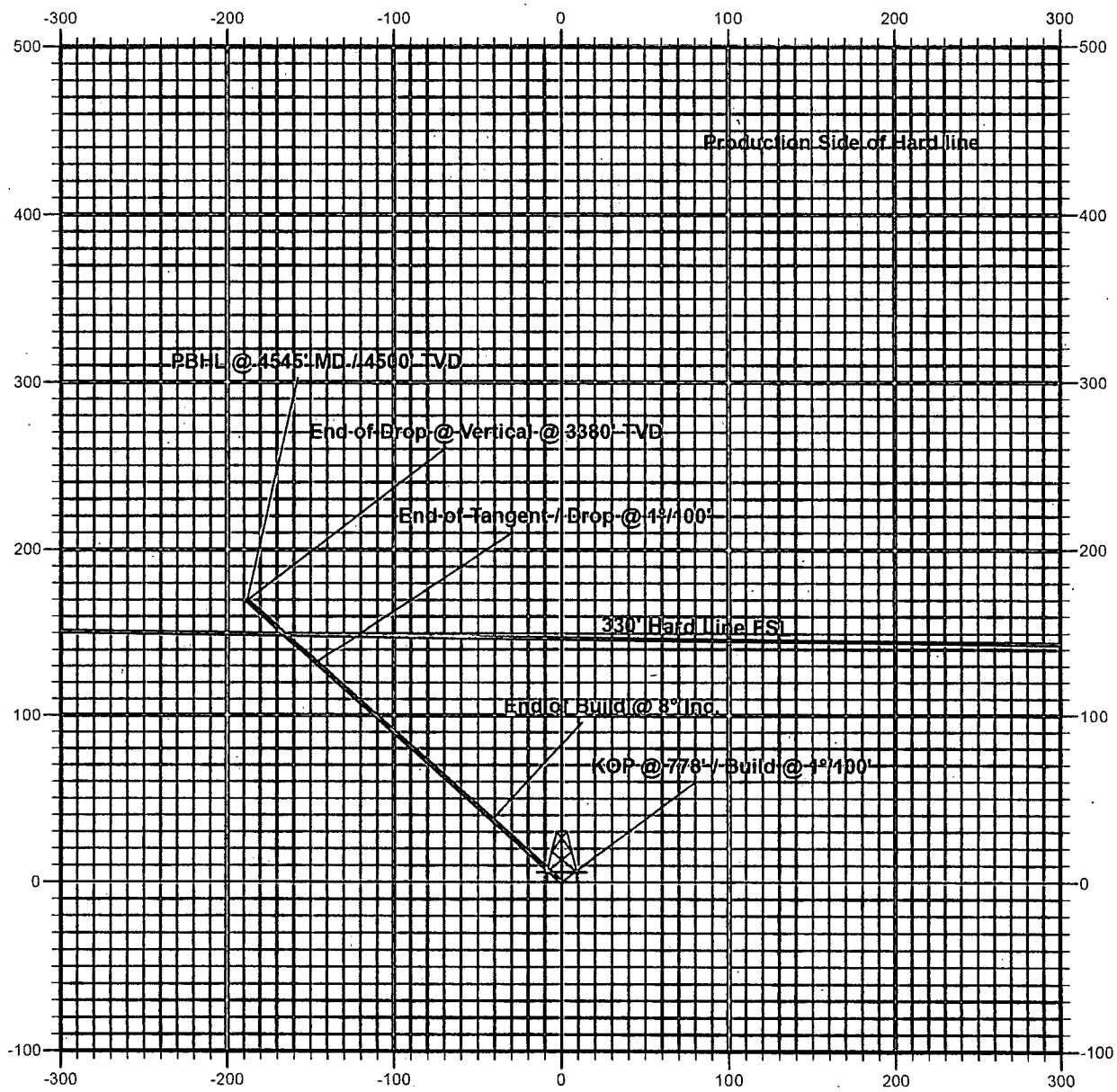

# CONDITIONS OF APPROVAL

| | |
|---|---|
| OPERATOR'S NAME: | Apache Corporation |
| LEASE NO.: | NMNM-0557371 |
| WELL NAME & NO.: | AAO Federal 28 |
| SURFACE HOLE FOOTAGE: | 0183' FSL & 2497' FWL |
| BOTTOM HOLE FOOTAGE | 0330' FSL & 2310' FWL |
| LOCATION: | Section 01, T. 18 S., R 27 E., NMPM |
| COUNTY: | Eddy County, New Mexico |
| API: | 30-015-42358 |

**The original COAs still stand with the following drilling modifications:**

## I. DRILLING

### A. DRILLING OPERATIONS REQUIREMENTS

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

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

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

1. A Hydrogen Sulfide (H2S) Drilling Plan shall be activated 500 feet prior to drilling into the **Yates** 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.**

2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval. **If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a "Major" violation.**

3. **The record of the drilling rate along with the GR/N well log run from TD to surface 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.**

B. CASING

**Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size. 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.).**
**Centralizers required on surface casing per Onshore Order 2.III.B.1.f.**

**Wait on cement (WOC) time prior to drilling out for a primary cement job will be a minimum 18 hours for a water basin, 24 hours in the potash area, or 500 pounds compressive strength, whichever is greater for all casing strings. DURING THIS WOC TIME, NO DRILL PIPE, ETC. SHALL BE RUN IN THE HOLE. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. IF OPERATOR DOES NOT HAVE THE WELL SPECIFIC CEMENT DETAILS ONSITE PRIOR TO PUMPING THE CEMENT FOR EACH CASING STRING, THE WOC WILL BE 30 HOURS. See individual casing strings for details regarding lead cement slurry requirements.**

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

**Possible water flows in the Artesia Group and Queen.**
**Possible lost circulation in the Artesia Group, Grayburg, and San Andres.**

A MINIMUM OF TWO CASING STRINGS CEMENTED TO SURFACE IS REQUIRED IN HIGH CAVE/KARST AREAS. THE CEMENT MUST BE IN A SOLID SHEATH. THEREFORE, ONE INCH OPERATIONS ARE NOT SUFFICIENT TO PROTECT CAVE KARST RESOURCES. A CASING DESIGN THAT HAS A ONE INCH JOB PERFORMED DOES NOT COUNT AS A SOLID SHEATH.

WHERE THE SURACE CASING HAD A SUCCESSFUL CEMENT JOB; IF LOST CIRCULATION (TOTAL LOSS) OCCURS WHILE DRILLING THE 7-7/8'' PRODUCTION HOLE, THE CEMENT PROGRAM FOR THE 5-1/2'' PRODUCTION CASING WILL NEED TO BE MODIFIED AND THE BLM IS TO BE CONTACTED PRIOR TO RUNNING THE CASING. A DV TOOL WILL BE REQUIRED.

1. The **13-3/8** inch surface casing shall be set at approximately **350** feet 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 is to include the lead cement slurry.**

    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.

**Contingency intermediate casing:**

2. The **8-5/8** inch intermediate casing shall be set at approximately **400** feet 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 is to include the lead cement slurry.**

    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.

3. The minimum required fill of cement behind the **5-1/2** inch production casing is:

    ☒ Cement to surface. If cement does not circulate, contact the appropriate BLM office. **Excess calculates to 21% - Additional cement may be required.**

4. 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.

## C. 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. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi (**Installing 3M system, testing to 2,000 psi**).

3. 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. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**.

    c. 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.

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

    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 if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

## D. DRILL STEM TEST

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

## E. 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.

**JAM 061314**