

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OCD Artesia

FORM APPROVED
OMB No. 1004-0137
Expires: October 31, 2014

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.

5. Lease Serial No.
SL: NM 54291 BHL: NM 58809
6. If Indian, Allottee or Tribe Name

SUBMIT IN TRIPLICATE – Other instructions on page 2.

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator
COG Operating LLC

3a. Address
2208 West Main Street
Artesia, NM 88210

3b. Phone No. (include area code)
575-748-6940

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
Section 10, T26S, R29E
SHL: 480' FNL & 1980' FEL BHL: 330' FSL & 1980' FEL

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

8. Well Name and No.
JR's Horz Federal Com #3H

9. API Well No.
30-015-37842

10. Field and Pool or Exploratory Area
Corral Canyon; Bone Spring, South

11. County or Parish, State
Eddy 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	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other _____
	☒ 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 recomple 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 recomple 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.)

COG Operating LLC respectfully requests permission to change the target depth and eliminate the pilot hole on this well.

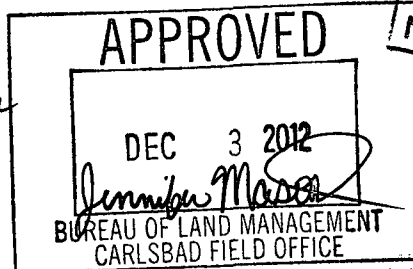
Attached are the following items:

1. New drilling and operations program with revised estimated geologic markers and new casing and cementing program
2. New directional drilling plan based on the proposed TVD

Proposed TVD: 8,770'
Proposed MD: 13,111'
No pilot hole

Accepted for record
NMOCD
10/5/2012

SEE ATTACHED FOR
CONDITIONS OF APPROVAL



14. I hereby certify that the foregoing is true and correct. Name (Printed/Typed)

Melanie J. Parker

Title Regulatory Coordinator

Signature

Date 09/21/2012

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.

(Instructions on page 2)

COG Operating LLC
DRILLING AND OPERATIONS PROGRAM
JR's Horz Federal Com 3H
SHL: 480' FNL & 1980' FEL
BHL: 330' FSL & 1980' FEL
Section 10, T26S R29E
Eddy County, New Mexico

In conjunction with Form 3160-3, Application for Permit to Drill subject well, COG Operating LLC submits the following eleven items of pertinent information in accordance with BLM requirements.

1. Geological surface formation: Permian
2. The estimated tops of geologic markers & estimated depths at which anticipated water, oil or gas formations are expected to be encountered are as follows:

Fresh Water	76'	
Rustler	389'	
Top of Salt	699'	
Base of Salt	2,820'	
Delaware	3,043'	Oil
Bone Spring	6,835'	Oil
Upper Avalon	7,209'	Oil
Lower Avalon	7,440'	Oil
1 st BS Sand	7,749'	Oil
2 nd BS Sand	8,612'	Oil
3 rd BS Sand	8,917'	Oil
TD TVD	8,770	
TD MD	13,111'	

No other formations are expected to give up oil, gas or fresh water in measurable quantities. The surface fresh water sands will be protected by setting 13-3/8" casing at 450' and circulating cement back to surface. All intervals will be isolated by setting 5 1/2" casing to total depth and tying back cement to a minimum of 500' into 9-5/8" csg.

3. Proposed Casing Program: All casing is new and API approved

Hole Size	Depths	Section	OD Casing	New/Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
17 1/2"	0' - 450'	Surface	13 3/8"	New	48#	STC	H-40	1.125	1.125	1.6
12 1/4"	0' - 3,060'	Intrmd	9 5/8"	New	36#	LTC	J-55	1.125	1.125	1.6
7 7/8"	0' - 13,311'	Production Curve & Lateral	5 1/2"	New	17#	LTC	P-110	1.125	1.125	1.6

- While running all casing strings, the pipe will be kept a minimum of 1/3 full at all times to avoid approaching the collapse pressure of casing.

4. Proposed Cement Program

- a. 13-3/8" Surface
480 sx Class C + 2% CaCl₂
(14.8 ppg / 1.34 cuft/sx)
**Calculated w/100% excess on OH volumes
- b. 9 5/8" Intermediate:
Lead: 720 sx Class C + 4% Gel + 2% CaCl₂
(13.5 ppg / 1.75 cuft/sx)
Tail: 170 sx Class C + 2% CaCl₂
(14.8 ppg / 1.34 cuft/sx)
**Calculated w/60% excess on OH volumes
- d. 5 1/2" Production
Lead: 650 sx 50:50:10 H + Salt+Gilsonite+CFR-3+ HR601
(11.8 ppg / 2.43 cuft/sx)
Tail: 1070 sx 50:50:2 H +Salt+GasStop +HR601 +CFR-3
(14.4 ppg / 1.25 cuft/sx)
**Calculated w/60% excess on OH volumes
- The above cement volumes could be revised pending the caliper measurement from the open hole logs.
 - The 9-5/8" intermediate string is designed to circulate to surface.
 - The production string will at least tie back 500' into 9-5/8" shoe.

5. Minimum Specifications for Pressure Control:

Nipple up on 13 3/8 with annular preventer tested to 50% of rated working pressure by independent tester and the rest of the 2M system tested to 2000 psi.

Nipple up on 9 5/8 with 3M system tested to 3000 psi by independent tester.

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. A 2" kill line and a minimum 3" choke line will be included in the drilling spool located below the ram-type BOP. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold with 3000 psi WP rating.

6. Estimated BHP:

Lateral TD = 3831 psi

7. Mud Program: The applicable depths and properties of this system are as follows:

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' – 450'	Fresh Water	8.4	29	N.C.
450' – 3,060'	Brine	10	29	N.C.
3,060 – 13,111' (Lateral)	Cut Brine	8.8 - 9.2	29	N.C.

The necessary mud products for weight addition and fluid loss control will be on location at all times.

8. Auxiliary Well Control and Monitoring Equipment:

- a. A Kelly cock will be in the drill string at all times.
- b. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times.
- c. Hydrogen Sulfide detection equipment will be in operation after drilling out the 13 3/8" casing shoe until the 5 1/2" casing is cemented. Breathing equipment will be on location upon drilling the 13 3/8" shoe until total depth is reached.

9. Testing, Logging and Coring Program:

- a. Drill stem tests will be based on geological sample shows.
- b. If open hole electrical logging is performed, the program will be:
 - i. Total Depth to Intermediate Casing: Dual Laterolog-Micro Laterolog and Gamma Ray. Compensated Neutron – Z Density log with Gamma Ray and Caliper.
 - ii. Total Depth to Surface: Compensated Neutron with Gamma Ray
 - iii. No coring program is planned
 - iv. Additional testing will be initiated subsequent to setting the 5 1/2" production casing. Specific intervals will be targeted based on log evaluation, geological sample shows and drill stem tests.

10. Potential Hazards:

- a. No abnormal pressures or temperatures are expected. There is no known presence of H₂S in this area. If H₂S is encountered the operator will comply with the provisions of Onshore Oil and Gas Order No. 6. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. No H₂S is anticipated to be encountered.

11. Anticipated starting date and Duration of Operations:

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

Eddy County, NM
Section 10 T26S R29E

JR's Horz Fed Com 1H
2nd Bone Spring Sand

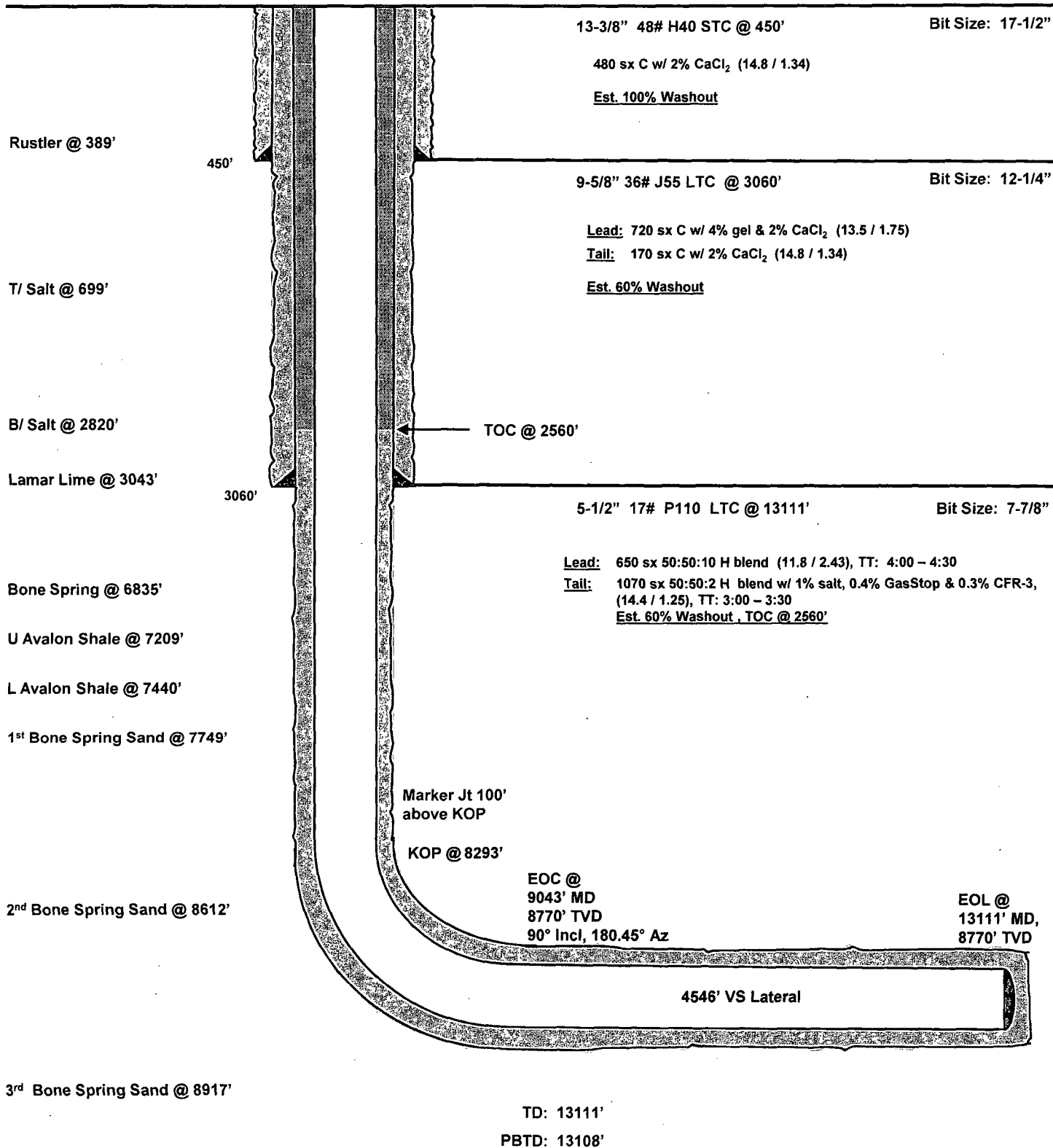
Rig:	TBD
Cmt:	Howco
Mud:	Nova
Dir Drig:	TBD
Casing:	Sooner
Wellhead:	AFS

SHL BHL
480' FNL 330' FSL
1980' FEL 1980' FEL

Proposed Wellbore

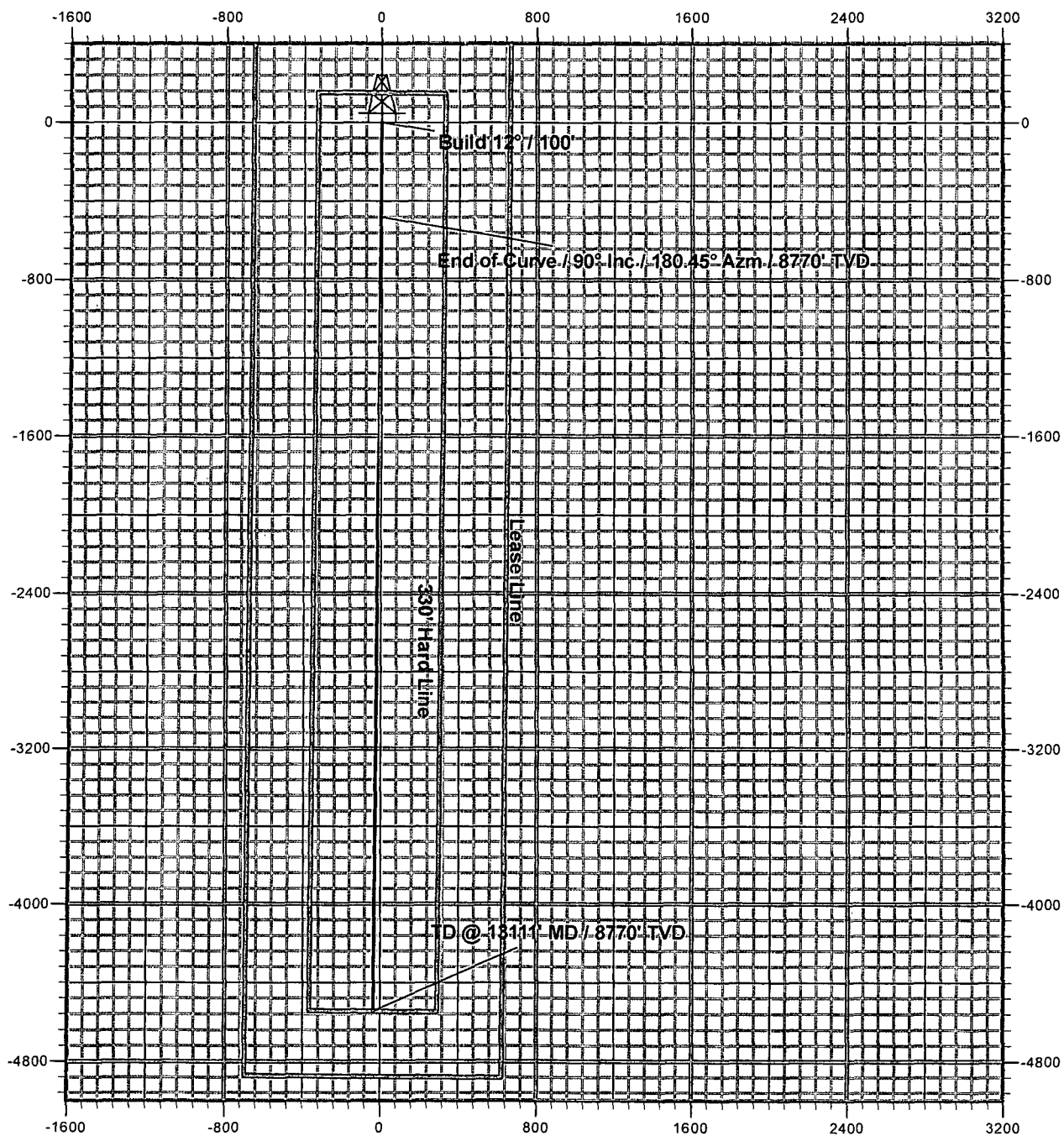
API: 30-015-37842

KB: 3007'
GL: 2990'





Eddy County, NM (NAD 27)
Jr's Horizontal Federal Com #3H
Design #1

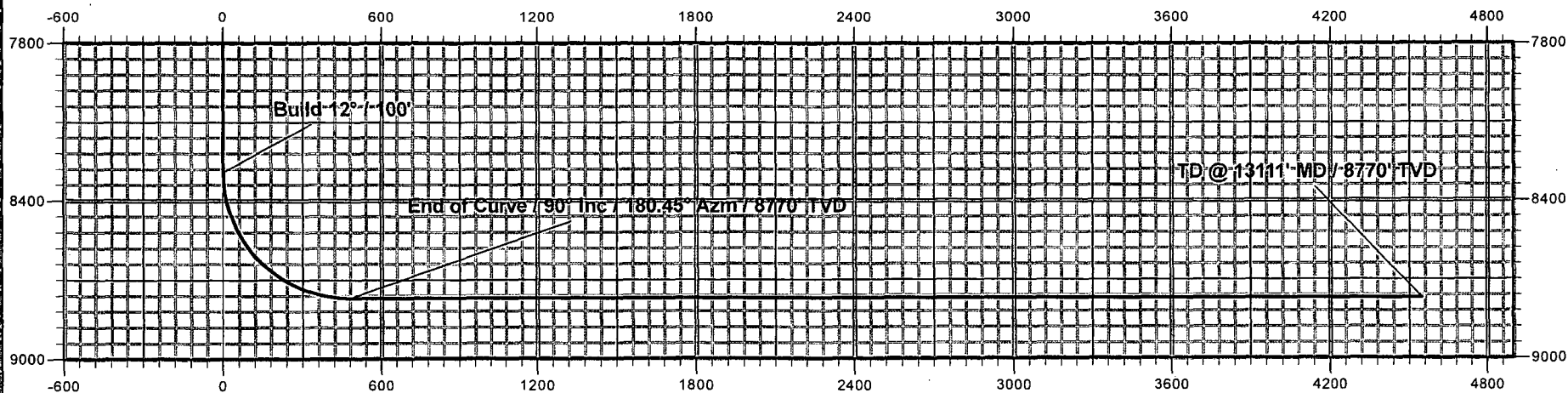
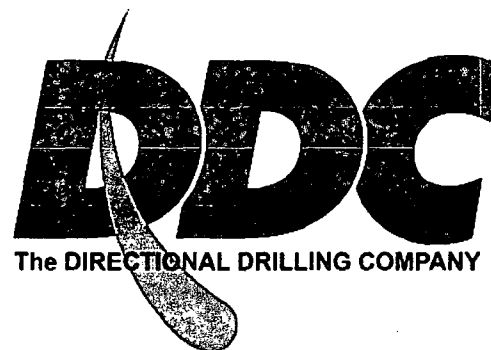




Eddy County, NM (NAD 27)

Jr's Horizontal Federal Com #3H

Design #1



Vertical Section at 180.45° (600 usft/in)



COG Operating, LLC

Eddy County, NM (NAD 27)

Sec 10, T26-S, R29-E

Jr's Horizontal Federal Com #3H

Wellbore #1

Plan: Design #1

DDC Well Planning Report

20 September, 2012





DDC
Well Planning Report



Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Eddy County, NM (NAD 27)
Site: Sec 10, T26-S, R29-E
Well: Jr's Horizontal Federal Com #3H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Jr's Horizontal Federal Com #3H
TVD Reference: WELL @ 3007.0usft (Original Well Elev)
MD Reference: WELL @ 3007.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project	Eddy County, NM (NAD 27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Sec 10, T26-S, R29-E		
Site Position:		Northing:	386,768.29 usft
From:	Map	Easting:	612,927.50 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 3' 46.141 N
		Longitude:	103° 58' 7.670 W
		Grid Convergence:	0.19 °

Well:	Jr's Horizontal Federal Com #3H		
Well Position	+N/-S	0.0 usft	Northing: 386,768.30 usft
	+E/-W	0.0 usft	Easting: 612,927.50 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	Ground Level: 2,990.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/20/2012	7.60	59.94	48,352

Design	Design #1			
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	180.45

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	
8,292.5	0.00	0.00	8,292.5	0.0	0.0	0.00	0.00	0.00	0.00	
9,042.5	90.00	180.45	8,770.0	-477.4	-3.7	12.00	12.00	-23.94	180.45	
13,111.4	90.00	180.45	8,770.0	-4,546.2	-35.5	0.00	0.00	0.00	0.00	PBHL JR's Horizon



DDC
Well Planning Report



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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
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3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
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3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
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4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00



DDC
Well Planning Report



Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Eddy County, NM (NAD 27)
Site: Sec 10, T26-S, R29-E
Well: Jr's Horizontal Federal Com #3H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Jr's Horizontal Federal Com #3H
TVD Reference: WELL @ 3007.0usft (Original Well Elev)
MD Reference: WELL @ 3007.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

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)
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00
Build 12° / 100'									
8,292.5	0.00	0.00	8,292.5	0.0	0.0	0.0	0.00	0.00	0.00
8,300.0	0.90	180.45	8,300.0	-0.1	0.0	0.1	12.00	12.00	0.00
8,400.0	12.90	180.45	8,399.1	-12.1	-0.1	12.1	12.00	12.00	0.00
8,500.0	24.90	180.45	8,493.5	-44.4	-0.3	44.4	12.00	12.00	0.00
8,600.0	36.90	180.45	8,579.2	-95.6	-0.7	95.6	12.00	12.00	0.00
8,700.0	48.90	180.45	8,652.3	-163.6	-1.3	163.6	12.00	12.00	0.00
8,800.0	60.90	180.45	8,709.7	-245.2	-1.9	245.3	12.00	12.00	0.00
8,900.0	72.90	180.45	8,748.9	-337.1	-2.6	337.1	12.00	12.00	0.00
9,000.0	84.90	180.45	8,768.1	-435.0	-3.4	435.0	12.00	12.00	0.00
End of Curve / 90° Inc / 180.45° Azm / 8770' TVD									
9,042.5	90.00	180.45	8,770.0	-477.4	-3.7	477.5	12.00	12.00	0.00
9,100.0	90.00	180.45	8,770.0	-534.9	-4.2	535.0	0.00	0.00	0.00
9,200.0	90.00	180.45	8,770.0	-634.9	-5.0	635.0	0.00	0.00	0.00
9,300.0	90.00	180.45	8,770.0	-734.9	-5.7	735.0	0.00	0.00	0.00
9,400.0	90.00	180.45	8,770.0	-834.9	-6.5	835.0	0.00	0.00	0.00
9,500.0	90.00	180.45	8,770.0	-934.9	-7.3	935.0	0.00	0.00	0.00
9,600.0	90.00	180.45	8,770.0	-1,034.9	-8.1	1,035.0	0.00	0.00	0.00
9,700.0	90.00	180.45	8,770.0	-1,134.9	-8.9	1,135.0	0.00	0.00	0.00
9,800.0	90.00	180.45	8,770.0	-1,234.9	-9.6	1,235.0	0.00	0.00	0.00
9,900.0	90.00	180.45	8,770.0	-1,334.9	-10.4	1,335.0	0.00	0.00	0.00
10,000.0	90.00	180.45	8,770.0	-1,434.9	-11.2	1,435.0	0.00	0.00	0.00
10,100.0	90.00	180.45	8,770.0	-1,534.9	-12.0	1,535.0	0.00	0.00	0.00
10,200.0	90.00	180.45	8,770.0	-1,634.9	-12.8	1,635.0	0.00	0.00	0.00



DDC
Well Planning Report



Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Eddy County, NM (NAD 27)
Site: Sec 10, T26-S, R29-E
Well: Jr's Horizontal Federal Com #3H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Jr's Horizontal Federal Com #3H
TVD Reference: WELL @ 3007.0usft (Original Well Elev)
MD Reference: WELL @ 3007.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,300.0	90.00	180.45	8,770.0	-1,734.9	-13.5	1,735.0	0.00	0.00	0.00
10,400.0	90.00	180.45	8,770.0	-1,834.9	-14.3	1,835.0	0.00	0.00	0.00
10,500.0	90.00	180.45	8,770.0	-1,934.9	-15.1	1,935.0	0.00	0.00	0.00
10,600.0	90.00	180.45	8,770.0	-2,034.9	-15.9	2,035.0	0.00	0.00	0.00
10,700.0	90.00	180.45	8,770.0	-2,134.9	-16.7	2,135.0	0.00	0.00	0.00
10,800.0	90.00	180.45	8,770.0	-2,234.9	-17.5	2,235.0	0.00	0.00	0.00
10,900.0	90.00	180.45	8,770.0	-2,334.9	-18.2	2,335.0	0.00	0.00	0.00
11,000.0	90.00	180.45	8,770.0	-2,434.9	-19.0	2,435.0	0.00	0.00	0.00
11,100.0	90.00	180.45	8,770.0	-2,534.9	-19.8	2,535.0	0.00	0.00	0.00
11,200.0	90.00	180.45	8,770.0	-2,634.9	-20.6	2,635.0	0.00	0.00	0.00
11,300.0	90.00	180.45	8,770.0	-2,734.9	-21.4	2,735.0	0.00	0.00	0.00
11,400.0	90.00	180.45	8,770.0	-2,834.9	-22.1	2,835.0	0.00	0.00	0.00
11,500.0	90.00	180.45	8,770.0	-2,934.9	-22.9	2,935.0	0.00	0.00	0.00
11,600.0	90.00	180.45	8,770.0	-3,034.9	-23.7	3,035.0	0.00	0.00	0.00
11,700.0	90.00	180.45	8,770.0	-3,134.9	-24.5	3,135.0	0.00	0.00	0.00
11,800.0	90.00	180.45	8,770.0	-3,234.9	-25.3	3,235.0	0.00	0.00	0.00
11,900.0	90.00	180.45	8,770.0	-3,334.9	-26.0	3,335.0	0.00	0.00	0.00
12,000.0	90.00	180.45	8,770.0	-3,434.9	-26.8	3,435.0	0.00	0.00	0.00
12,100.0	90.00	180.45	8,770.0	-3,534.9	-27.6	3,535.0	0.00	0.00	0.00
12,200.0	90.00	180.45	8,770.0	-3,634.9	-28.4	3,635.0	0.00	0.00	0.00
12,300.0	90.00	180.45	8,770.0	-3,734.9	-29.2	3,735.0	0.00	0.00	0.00
12,400.0	90.00	180.45	8,770.0	-3,834.8	-29.9	3,835.0	0.00	0.00	0.00
12,500.0	90.00	180.45	8,770.0	-3,934.8	-30.7	3,935.0	0.00	0.00	0.00
12,600.0	90.00	180.45	8,770.0	-4,034.8	-31.5	4,035.0	0.00	0.00	0.00
12,700.0	90.00	180.45	8,770.0	-4,134.8	-32.3	4,135.0	0.00	0.00	0.00
12,800.0	90.00	180.45	8,770.0	-4,234.8	-33.1	4,235.0	0.00	0.00	0.00
12,900.0	90.00	180.45	8,770.0	-4,334.8	-33.8	4,335.0	0.00	0.00	0.00
13,000.0	90.00	180.45	8,770.0	-4,434.8	-34.6	4,435.0	0.00	0.00	0.00
13,100.0	90.00	180.45	8,770.0	-4,534.8	-35.4	4,535.0	0.00	0.00	0.00
TD @ 13111' MD / 8770' TVD									
13,111.4	90.00	180.45	8,770.0	-4,546.2	-35.5	4,546.3	0.00	0.00	0.00

Design Targets

Target Name	Dip Angle (°)	Dip Dir (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
hit/miss target									
Shape									
PBHL JR's Horizontal	0.00	0.00	8,770.0	-4,546.2	-35.5	382,222.10	612,892.00	32° 3' 1.151 N	103° 58' 8.261 W
- plan hits target center									
- Point									

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8,292.5	8,292.5	0.0	0.0	Build 12° / 100'
9,042.5	8,770.0	-477.4	-3.7	End of Curve / 90° Inc / 180.45° Azm / 8770' TVD
13,111.4	8,770.0	-4,546.2	-35.5	TD @ 13111' MD / 8770' TVD

COG

Jr's Horz Federal Com #3H - Design #1

Eddy, NM

Sec 10, T26-S, R29-E

Your Ref:

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0	0	0	0	0	0	0	0
8292.5	0	0	8292.5	0	0	0	0
8300	0.9	180.447	8300	-0.06	0	0.06	12
8325	3.9	180.447	8324.97	-1.11	-0.01	1.11	12
8350	6.9	180.447	8349.86	-3.46	-0.03	3.46	12
8375	9.9	180.447	8374.59	-7.11	-0.06	7.11	12
8400	12.9	180.447	8399.09	-12.05	-0.09	12.05	12
8425	15.9	180.447	8423.31	-18.27	-0.14	18.27	12
8450	18.9	180.447	8447.16	-25.74	-0.2	25.74	12
8475	21.9	180.447	8470.59	-34.45	-0.27	34.46	12
8500	24.9	180.447	8493.53	-44.38	-0.35	44.38	12
8525	27.9	180.447	8515.92	-55.5	-0.43	55.5	12
8550	30.9	180.447	8537.7	-67.77	-0.53	67.77	12
8575	33.9	180.447	8558.8	-81.16	-0.63	81.16	12
8600	36.9	180.447	8579.18	-95.64	-0.75	95.64	12
8625	39.9	180.447	8598.77	-111.17	-0.87	111.17	12
8650	42.9	180.447	8617.52	-127.7	-1	127.7	12
8675	45.9	180.447	8635.38	-145.19	-1.13	145.19	12
8700	48.9	180.447	8652.3	-163.59	-1.28	163.59	12
8725	51.9	180.447	8668.23	-182.85	-1.43	182.85	12
8750	54.9	180.447	8683.14	-202.91	-1.58	202.92	12
8775	57.9	180.447	8696.97	-223.73	-1.75	223.74	12
8800	60.9	180.447	8709.7	-245.25	-1.92	245.26	12
8825	63.9	180.447	8721.28	-267.4	-2.09	267.41	12
8850	66.9	180.447	8731.68	-290.13	-2.27	290.14	12
8875	69.9	180.447	8740.88	-313.37	-2.45	313.38	12
8900	72.9	180.447	8748.86	-337.06	-2.63	337.07	12
8925	75.9	180.447	8755.58	-361.14	-2.82	361.15	12
8950	78.9	180.447	8761.03	-385.53	-3.01	385.54	12
8975	81.9	180.447	8765.2	-410.18	-3.2	410.19	12
9000	84.9	180.447	8768.07	-435.01	-3.4	435.02	12
9025	87.9	180.447	8769.64	-459.95	-3.59	459.97	12
9042.5	90	180.447	8769.96	-477.45	-3.73	477.46	12
9100	90	180.447	8769.97	-534.95	-4.18	534.96	0
9200	90	180.447	8769.97	-634.95	-4.96	634.96	0
9300	90	180.447	8769.97	-734.94	-5.74	734.96	0
9400	90	180.447	8769.97	-834.94	-6.52	834.96	0
9500	90	180.447	8769.97	-934.94	-7.3	934.96	0
9600	90	180.447	8769.97	-1034.93	-8.08	1034.96	0

Jr's Horz Federal Com #3H - Design #1

Eddy, NM

Sec 10, T26-S, R29-E

Your Ref:

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9700	90	180.447	8769.97	-1134.93	-8.86	1134.96	0
9800	90	180.447	8769.97	-1234.93	-9.64	1234.96	0
9900	90	180.447	8769.97	-1334.92	-10.42	1334.96	0
10000	90	180.447	8769.97	-1434.92	-11.2	1434.96	0
10100	90	180.447	8769.97	-1534.92	-11.99	1534.96	0
10200	90	180.447	8769.97	-1634.91	-12.77	1634.96	0
10300	90	180.447	8769.98	-1734.91	-13.55	1734.96	0
10400	90	180.447	8769.98	-1834.91	-14.33	1834.96	0
10500	90	180.447	8769.98	-1934.91	-15.11	1934.96	0
10600	90	180.447	8769.98	-2034.9	-15.89	2034.96	0
10700	90	180.447	8769.98	-2134.9	-16.67	2134.96	0
10800	90	180.447	8769.98	-2234.9	-17.45	2234.96	0
10900	90	180.447	8769.98	-2334.89	-18.23	2334.96	0
11000	90	180.447	8769.98	-2434.89	-19.01	2434.96	0
11100	90	180.447	8769.98	-2534.89	-19.79	2534.96	0
11200	90	180.447	8769.98	-2634.88	-20.58	2634.96	0
11300	90	180.447	8769.98	-2734.88	-21.36	2734.96	0
11400	90	180.447	8769.99	-2834.88	-22.14	2834.96	0
11500	90	180.447	8769.99	-2934.88	-22.92	2934.96	0
11600	90	180.447	8769.99	-3034.87	-23.7	3034.96	0
11700	90	180.447	8769.99	-3134.87	-24.48	3134.96	0
11800	90	180.447	8769.99	-3234.87	-25.26	3234.96	0
11900	90	180.447	8769.99	-3334.86	-26.04	3334.96	0
12000	90	180.447	8769.99	-3434.86	-26.82	3434.96	0
12100	90	180.447	8769.99	-3534.86	-27.6	3534.96	0
12200	90	180.447	8769.99	-3634.85	-28.38	3634.96	0
12300	90	180.447	8769.99	-3734.85	-29.16	3734.96	0
12400	90	180.447	8769.99	-3834.85	-29.95	3834.96	0
12500	90	180.447	8769.99	-3934.84	-30.73	3934.96	0
12600	90	180.447	8770	-4034.84	-31.51	4034.96	0
12700	90	180.447	8770	-4134.84	-32.29	4134.96	0
12800	90	180.447	8770	-4234.84	-33.07	4234.96	0
12900	90	180.447	8770	-4334.83	-33.85	4334.96	0
13000	90	180.447	8770	-4434.83	-34.63	4434.96	0
13100	90	180.447	8770	-4534.83	-35.41	4534.96	0
13111.37	90	180.447	8770	-4546.2	-35.5	4546.34	0

CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG OPERATING LLC
LEASE NO.:	SHL: NM054291 - BHL: NM058809
WELL NAME & NO.:	JR'S HORZ FEDERAL COM # 3H
SURFACE HOLE FOOTAGE:	480' FNL & 1980' FEL
BOTTOM HOLE FOOTAGE:	330' FSL & 1980' FEL
LOCATION:	Section 10, T. 26 S., R 29 E., NMPM
COUNTY:	Eddy County, New Mexico

A. 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. 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.

High Cave/Karst

Possible brine/water flows in the Salado group.

Possible lost circulation in the Delaware Mountain and Bone Spring groups.

1. The **13-3/8 inch** surface casing shall be set at **approximately 450 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 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.
2. The minimum required fill of cement behind the **9-5/8 inch** intermediate casing is:
Casing to be set in the Lamar Limestone.

- ☒ Cement to surface. If cement does not circulate see B.1.a, c-d above. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst.**

If 75% or greater lost circulation occurs while drilling the intermediate casing hole, the cement on the production casing must come to surface.

Centralizers required on horizontal leg, must be type for horizontal service and minimum of one every other joint.

3. The minimum required fill of cement behind the **5-1/2 inch** production casing is:
☒ Cement should tie-back at least 500 feet into previous casing string. Operator shall provide method of verification.

JAM 120312