

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

FORM APPROVED OM B No 1004-0137 Expires: March 31, 2007

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.

1. Type of Well [X] Oil Well [] Gas Well [] Other []
2. Name of Operator COG Operating LLC
3a. Address 550 W. Texas Ave., Suite 1300 Midland, TX 79701
3b. Phone No. (include area code) 432-685-4340
4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
SHL: 430' FSL & 430' FEL, Section 19, T16S, R28E, UL P
BHL: 330' FSL & 330' FWL, Section 19, T16S, R28E, UL M

5. Lease Serial No. SHL-NM-103873, BHL-NM-103872
6. If Indian, Allottee or Trust Status N/A
7. If Unit or CA/Agreement, Name and Number N/A
8. Well Name and No. Caribou 19 Federal Com #1
9. API Well No. 30-015-36540
10. Field and Pool, or Exploratory Area Abo-Dog Canyon
11. County or Parish, State Eddy, NM

RECEIVED FEB 12 2010 NMOC ARTESIA

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

Table with columns: TYPE OF SUBMISSION, TYPE OF ACTION. Includes checkboxes for Notice of Intent, Subsequent Report, Final Abandonment Notice, and various actions like Acidize, Deepen, Production, etc.

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 recomplate 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.)

COG respectfully requests permission to change the bottom hole location to: BHL: 990 FSL & 330 FWL, Section 19, T16S, R28E, UL M An amended plat and directional plan are attached.

COG respectfully requests permission to make the following changes to the drill plan:
Hole Size Interval OD of Casing Weight Thread Collar Grade
17-1/2" 0' - +/-500' 13-3/8" 54.5# New STC J/K-55 Collapse sf - 2.98, Burst sf - 2.33, Tension sf - 13.42
Lead: 200sx C w/ 2% CaCL2, 4% gel 13.5 ppg, 1.74 cf/sk. Tail: 300sx C w/ 2% CaCL2 14.8 ppg, 1.35 cf/sk.
8-3/4" 0' - +/-5800' 7" 26# New LTC P-110 Collapse sf - 2.18, Burst sf - 1.53, Tension sf - 4.37
Lead: 1100sx C w/ 4% gel 13.5 ppg, 1.72 cf/sk. Tail: 200sx C w/ 0.35% R-3 14.8 ppg, 1.33 cf/sk.
6-1/8" 6000' - +/-10892' MD 4-1/2" 11.6# New LTC P-110 Collapse sf - 2.47, Burst sf - 1.64, Tension sf - 4.48
280sx C w/ 0.3% R-3, 1.5% CD-32 16.8 ppg, 0.99cf/sk.

If wellbore integrity cannot be maintained, then the 8-3/4" hole will be reamed out to 12-1/4" and new 9-5/8" casing contingency will be run as follows:
12-1/4" 0' - +/-1800' 9-5/8" 40# New LTC J/K-55 Collapse sf - 2.86, Burst sf - 1.42, Tension sf - 7.22
COG respectfully requests permission for 100' liner overlap to set pump as deep as possible.

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

Signature [Handwritten Signature]

Title Permitting Tech

Date 01/22/2010

APPROVED FEB 10 2010 /s/ Myles Kristof BUREAU OF LAND MANAGEMENT CARLSBAD FIELD OFFICE

Approved by _____ Title _____
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)

SEE ATTACHED FOR CONDITIONS OF APPROVAL

D.S.

DISTRICT I

1625 N. French Dr., Hobbs, NM 88240

DISTRICT II

1301 W. Grand Avenue, Artesia, NM 88210

DISTRICT III

1000 Rio Brazos Rd., Aztec, NM 87410

DISTRICT IV

1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-102
Revised October 12, 2005

Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-36540	Pool Code	Pool Name ABO; DOG CANYON
Property Code 37328	Property Name CARIBOU "19" FEDERAL COM	
OGRID No. 229137	Operator Name C.O.G. OPERATING L.L.C.	
		Well Number 1
		Elevation 3558'

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	19	16 S	28 E		430	SOUTH	430	EAST	EDDY

Bottom Hole Location If Different From Surface

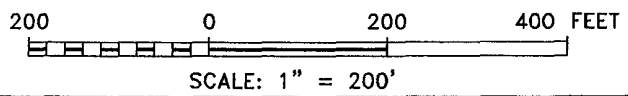
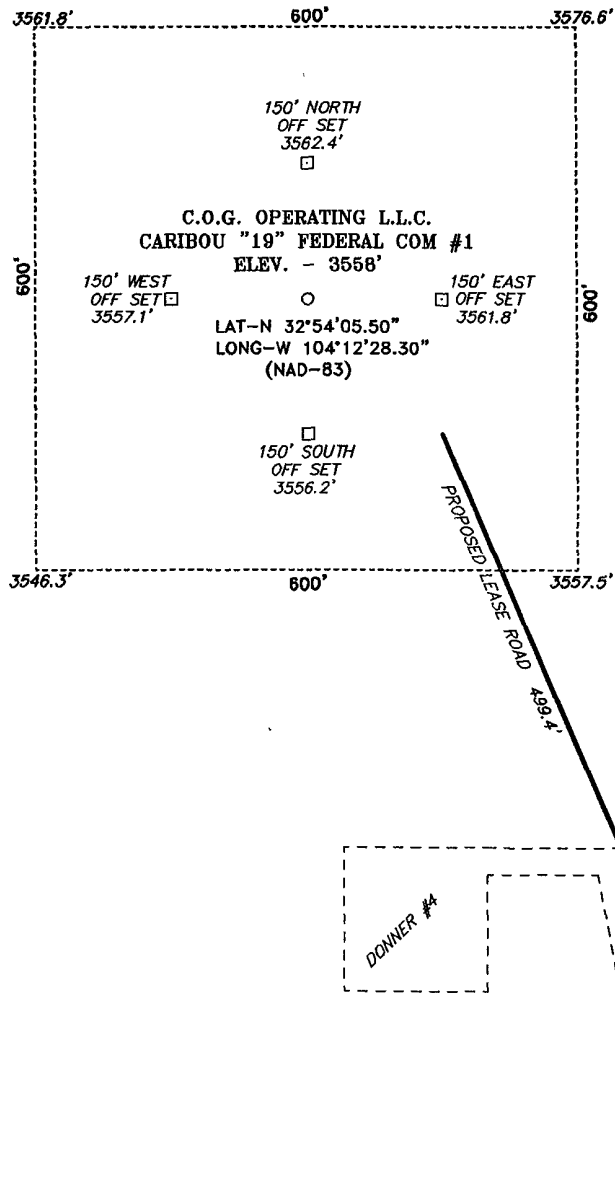
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	19	16 S	28 E		990	SOUTH	330	WEST	EDDY

Dedicated Acres 160	Joint or Infill	Consolidation Code	Order No.
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

<p>BOTTOM HOLE LOCATION LAT.: N 32°54'10.69" LONG.: W104°13'21.64" N.: 692252.327 SPC- E.: 575298.869 (NAD-83)</p>		<p>SURFACE LOCATION LAT.: N 32°54'05.50" LONG.: W104°12'28.30" N.: 691733.152 SPC- E.: 579846.595 (NAD-83)</p>	
<p>OPERATOR CERTIFICATION</p> <p>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 pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.</p> <p><i>Phyllis A. Edwards</i> 1/18/10 Signature Date</p> <p>PHYLLIS A. EDWARDS Printed Name REGULATORY ANALYST</p>			
<p>SURVEYOR CERTIFICATION</p> <p>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.</p> <p>NOVEMBER 25, 2007</p> <p>Date Surveyed</p> <p>Signature & Seal of Professional Surveyor</p> <p>GARY L. JONES Professional Surveyor 7977</p> <p>W.B. 41</p>			
<p>PROJECT AREA</p> <p>PRODUCING AREA</p> <p>330' 990' 430' 3561.8' 3576.6' 430' 3546.3' 3557.5'</p>			
<p>Certificate No. Gary L. Jones 7977</p> <p>BASIN SURVEYS</p>			

SECTION 19, TOWNSHIP 16 SOUTH, RANGE 28 EAST, N.M.P.M.,
 EDDY COUNTY, NEW MEXICO.

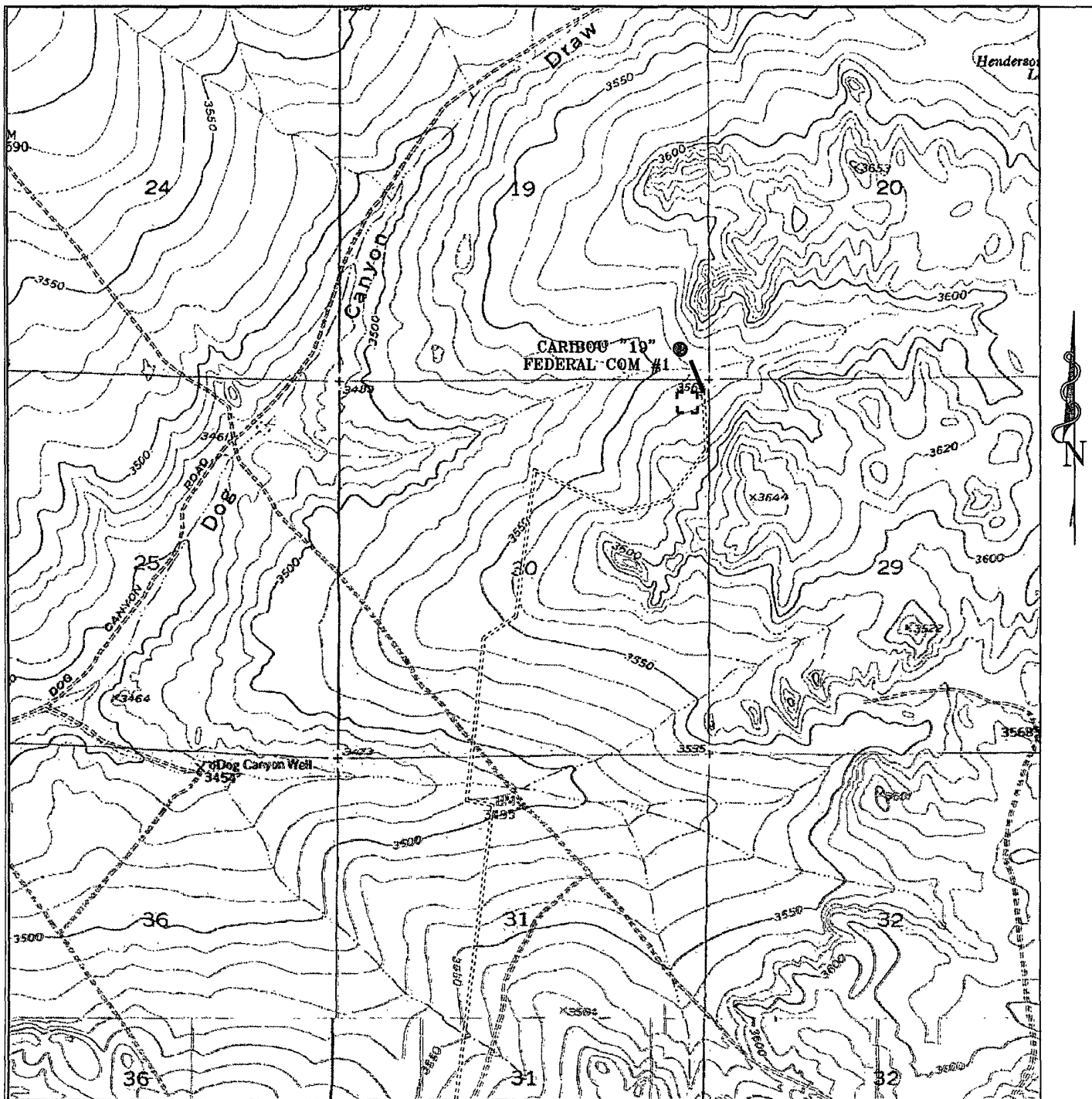


DIRECTIONS TO LOCATION:

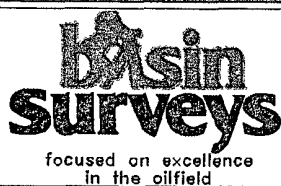
FROM THE JUNCTION OF US HWY 82 AND CO. RD. SOUTHERN UNION, GO NORTH ON SOUTHERN UNION FOR 2.5 MILES WINDING NORTHEAST FOR 1.2 MILES TO LEASE ROAD, ON LEASE ROAD GO NORTH 2.5 MILES TO DONNER #4 LOCATION AND PROPOSED LEASE ROAD.

C.O.G. OPERATING L.L.C.	
REF: CARIBOU "19" FEDERAL COM #1 / Well Pad Topo	
THE CARIBOU "19" FEDERAL COM #1 LOCATED 430' FROM THE SOUTH LINE AND 430' FROM THE EAST LINE OF SECTION 19, TOWNSHIP 16 SOUTH, RANGE 28 EAST, N.M.P.M., EDDY COUNTY, NEW MEXICO.	

BASIN SURVEYS P.O. BOX 1786—HOBBS, NEW MEXICO	
W.O. Number: 18741	Drawn By: J. M. SMALL
Date: 11-27-2007	Disk: JMS 18741W



CARIBOU "19" FEDERAL COM #1
 Located at 430' FSL and 430 FEL
 Section 19, Township 16 South, Range 28 East,
 N.M.P.M., Eddy County, New Mexico.



P.O. Box 1786
 1120 N. West County Rd.
 Hobbs, New Mexico 88241
 (505) 393-7316 - Office
 (505) 392-3074 - Fax
 basinsurveys.com

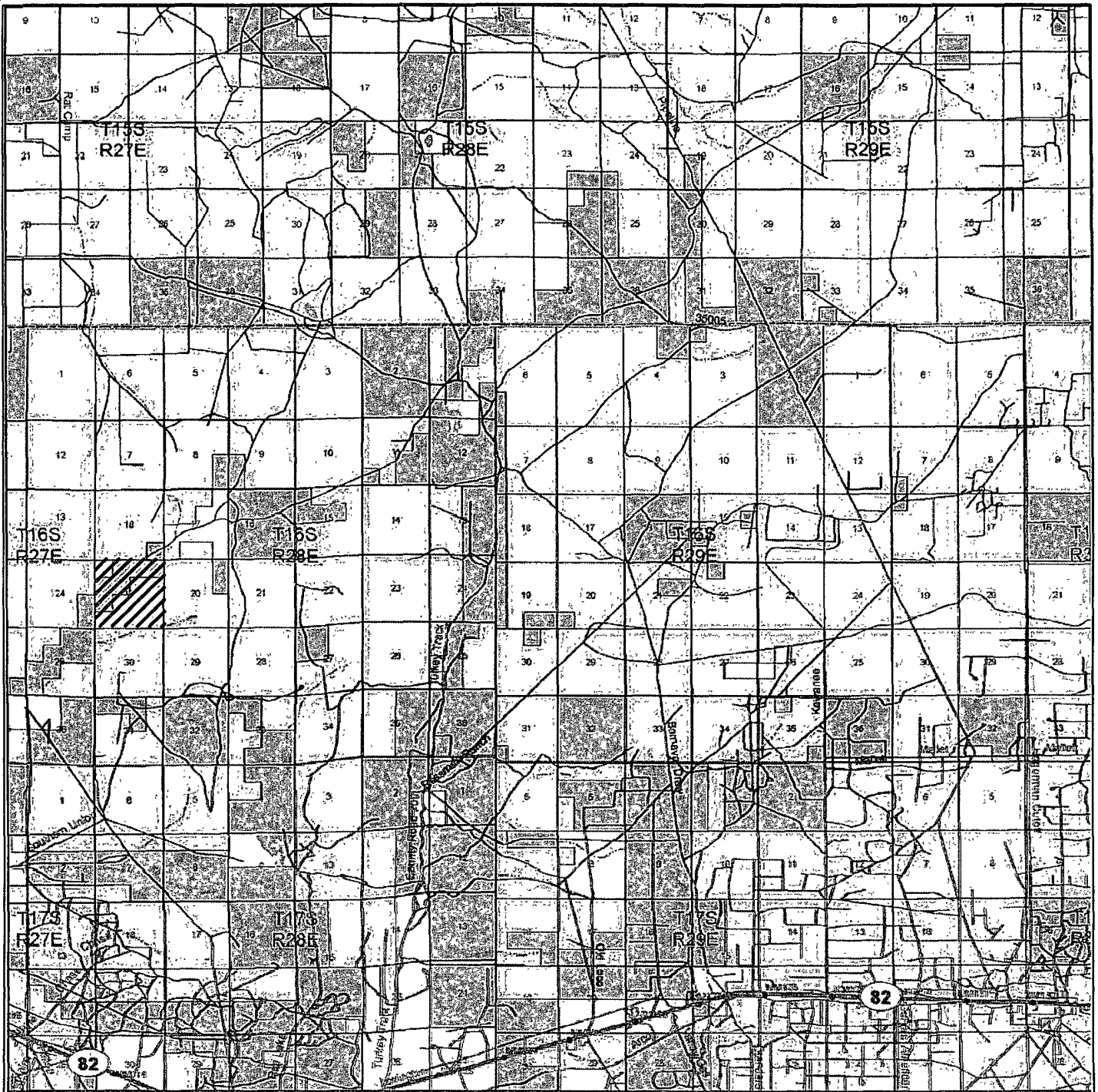
W.O. Number: JMS 18741T

Survey Date: 11-25-2007

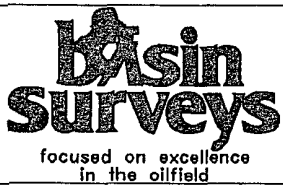
Scale: 1" = 2000'

Date: 11-27-2007

**C.O.G.
 OPERATING
 L.L.C.**



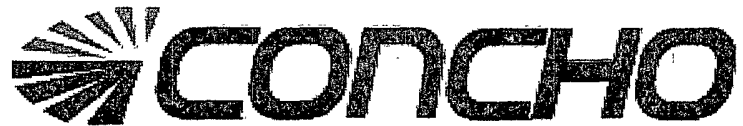
CARIBOU "19" FEDERAL COM #1
 Located at 430' FSL and 430' FEL
 Section 19, Township 16 South, Range 28 East,
 N.M.P.M., Eddy County, New Mexico.



P.O. Box 1786
 1120 N. West County Rd.
 Hobbs, New Mexico 88241
 (505) 393-7316 - Office
 (505) 392-3074 - Fax
 basinsurveys.com

W.O. Number:	JMS 18741TR
Survey Date:	11-25-2007
Scale:	1" = 2 MILES
Date:	11-27-2007

C.O.G.
 OPERATING
 L.L.C.



COG Operating LLC

Eddy County

Caribou 19 Federal

Caribou 19 Federal Com #1H

Original Hole

Plan: Plan #1

Pathfinder X & Y Planning Report

22 January, 2010

The logo for PATHFINDER, with "PATH" in a bold, sans-serif font and "FINDER" in a larger, bold, sans-serif font. A thick, black, curved underline is positioned beneath the "FINDER" portion of the text.

PATHFINDER



Pathfinder Energy Services
Pathfinder X & Y Planning Report



Company:	COG Operating, LLC	Local Coordinate Reference:	Well: Caribou 19 Federal Com #1H
Project:	Eddy County	TVD Reference:	EST-RKB @ 3558.00ft
Site:	Caribou 19 Federal	MD Reference:	EST-RKB @ 3558.00ft
Well:	Caribou 19 Federal Com #1H	North Reference:	Grid:
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	Midland Database

Project:	Eddy County
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Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site:	Caribou 19 Federal
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Site Position:		Northing:	691,733.152 ft	Latitude:	32° 54' 5.502 N
From:	Map	Easting:	579,846.595 ft	Longitude:	104° 12' 28.305 W
Position Uncertainty:	0.00 ft	Slot Radius:	"	Grid Convergence:	0.07 °

Well:	Caribou 19 Federal Com #1H
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Well Position	+N/-S	0.00 ft	Northing:	691,733.152 ft	Latitude:	32° 54' 5.502 N
	+E/-W	0.00 ft	Easting:	579,846.595 ft	Longitude:	104° 12' 28.305 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,558.00 ft

Wellbore:	Original Hole
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	02/21/2008	8.31	60.79	49,307

Design:	Plan #1
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Audit Notes:	
Version:	Phase: PROTOTYPE Tie On Depth: 0.00

Vertical Section	Depth From (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	276.51

Survey Tool Program	Date: 01/22/2010			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	10,892.57	Plan #1 (Original Hole)	MWD	MWD - Standard



Pathfinder Energy Services
Pathfinder X & Y Planning Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well: Caribou 19 Federal Com #1H
Project:	Eddy County	TVD Reference:	EST-RKB @ 3558.00ft
Site:	Caribou 19 Federal	MD Reference:	EST-RKB @ 3558.00ft
Well:	Caribou 19 Federal Com #1H	North Reference:	Grid:
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	Midland Database

Planned Survey												
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (%/100ft)	Northing (ft)	Easting (ft)		
0.00	0.00	0.00	0.00	-3,558.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
100.00	0.00	0.00	100.00	-3,458.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
200.00	0.00	0.00	200.00	-3,358.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
300.00	0.00	0.00	300.00	-3,258.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
400.00	0.00	0.00	400.00	-3,158.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
500.00	0.00	0.00	500.00	-3,058.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
600.00	0.00	0.00	600.00	-2,958.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
700.00	0.00	0.00	700.00	-2,858.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
800.00	0.00	0.00	800.00	-2,758.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
900.00	0.00	0.00	900.00	-2,658.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,000.00	0.00	0.00	1,000.00	-2,558.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,100.00	0.00	0.00	1,100.00	-2,458.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,200.00	0.00	0.00	1,200.00	-2,358.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,300.00	0.00	0.00	1,300.00	-2,258.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,400.00	0.00	0.00	1,400.00	-2,158.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,500.00	0.00	0.00	1,500.00	-2,058.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,600.00	0.00	0.00	1,600.00	-1,958.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,700.00	0.00	0.00	1,700.00	-1,858.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,800.00	0.00	0.00	1,800.00	-1,758.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
1,900.00	0.00	0.00	1,900.00	-1,658.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
2,000.00	0.00	0.00	2,000.00	-1,558.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
2,100.00	0.00	0.00	2,100.00	-1,458.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
2,200.00	0.00	0.00	2,200.00	-1,358.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
2,300.00	0.00	0.00	2,300.00	-1,258.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
2,400.00	0.00	0.00	2,400.00	-1,158.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
2,500.00	0.00	0.00	2,500.00	-1,058.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		
2,600.00	0.00	0.00	2,600.00	-958.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60		



Pathfinder Energy Services
Pathfinder X & Y Planning Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well: Carbou 19 Federal Com #1H
Project:	Eddy County	TVD Reference:	EST: RKB @ 3558.00ft
Site:	Carbou 19 Federal	MD Reference:	EST: RKB @ 3558.00ft
Well:	Carbou 19 Federal Com #1H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	Midland Database

Planned Survey											
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D Leg (%/100ft)	Northing (ft)	Easting (ft)	
2,700.00	0.00	0.00	2,700.00	-858.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
2,800.00	0.00	0.00	2,800.00	-758.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
2,900.00	0.00	0.00	2,900.00	-658.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,000.00	0.00	0.00	3,000.00	-558.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,100.00	0.00	0.00	3,100.00	-458.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,200.00	0.00	0.00	3,200.00	-358.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,300.00	0.00	0.00	3,300.00	-258.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,400.00	0.00	0.00	3,400.00	-158.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,500.00	0.00	0.00	3,500.00	-58.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,600.00	0.00	0.00	3,600.00	42.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,700.00	0.00	0.00	3,700.00	142.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,800.00	0.00	0.00	3,800.00	242.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
3,900.00	0.00	0.00	3,900.00	342.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,000.00	0.00	0.00	4,000.00	442.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,100.00	0.00	0.00	4,100.00	542.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,200.00	0.00	0.00	4,200.00	642.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,300.00	0.00	0.00	4,300.00	742.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,400.00	0.00	0.00	4,400.00	842.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,500.00	0.00	0.00	4,500.00	942.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,600.00	0.00	0.00	4,600.00	1,042.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,700.00	0.00	0.00	4,700.00	1,142.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,800.00	0.00	0.00	4,800.00	1,242.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
4,900.00	0.00	0.00	4,900.00	1,342.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,000.00	0.00	0.00	5,000.00	1,442.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,100.00	0.00	0.00	5,100.00	1,542.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,200.00	0.00	0.00	5,200.00	1,642.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,300.00	0.00	0.00	5,300.00	1,742.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	



Pathfinder Energy Services
Pathfinder X & Y Planning Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well: Caribou 19 Federal Com #1H
Project:	Eddy County	TVD Reference:	EST: RKB @ 3558.00ft
Site:	Caribou 19 Federal	MD Reference:	EST: RKB @ 3558.00ft
Well:	Caribou 19 Federal Com #1H	North Reference:	Grid:
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	Midland Database

Planned Survey											
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D Leg (#/100ft)	Northing (ft)	Easting (ft)	
5,400.00	0.00	0.00	5,400.00	1,842.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,500.00	0.00	0.00	5,500.00	1,942.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,600.00	0.00	0.00	5,600.00	2,042.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,700.00	0.00	0.00	5,700.00	2,142.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,800.00	0.00	0.00	5,800.00	2,242.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
5,900.00	0.00	0.00	5,900.00	2,342.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
6,000.00	0.00	0.00	6,000.00	2,442.00	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
6,042.57	0.00	0.00	6,042.57	2,484.57	0.00	0.00	0.00	0.00	691,733.15	579,846.60	
6,050.00	0.89	276.51	6,050.00	2,492.00	0.01	-0.06	0.06	12.00	691,733.16	579,846.54	
6,075.00	3.89	276.51	6,074.98	2,516.98	0.12	-1.09	1.10	12.00	691,733.28	579,845.50	
6,100.00	6.89	276.51	6,099.86	2,541.86	0.39	-3.43	3.45	12.00	691,733.54	579,843.17	
6,125.00	9.89	276.51	6,124.59	2,566.59	0.80	-7.05	7.10	12.00	691,733.96	579,839.54	
6,150.00	12.89	276.51	6,149.10	2,591.10	1.36	-11.96	12.04	12.00	691,734.52	579,834.64	
6,175.00	15.89	276.51	6,173.31	2,615.31	2.07	-18.13	18.25	12.00	691,735.22	579,828.46	
6,200.00	18.89	276.51	6,197.16	2,639.16	2.92	-25.55	25.72	12.00	691,736.07	579,821.04	
6,225.00	21.89	276.51	6,220.59	2,662.59	3.90	-34.21	34.43	12.00	691,737.06	579,812.39	
6,250.00	24.89	276.51	6,243.54	2,685.54	5.03	-44.07	44.35	12.00	691,738.18	579,802.53	
6,275.00	27.89	276.51	6,265.93	2,707.93	6.29	-55.11	55.47	12.00	691,739.44	579,791.49	
6,300.00	30.89	276.51	6,287.71	2,729.71	7.68	-67.30	67.73	12.00	691,740.83	579,779.30	
6,325.00	33.89	276.51	6,308.82	2,750.82	9.20	-80.60	81.12	12.00	691,742.35	579,765.99	
6,350.00	36.89	276.51	6,329.19	2,771.19	10.84	-94.99	95.60	12.00	691,743.99	579,751.61	
6,375.00	39.89	276.51	6,348.79	2,790.79	12.60	-110.41	111.13	12.00	691,745.75	579,736.19	
6,400.00	42.89	276.51	6,367.54	2,809.54	14.47	-126.83	127.65	12.00	691,747.62	579,719.76	
6,425.00	45.89	276.51	6,385.40	2,827.40	16.46	-144.20	145.14	12.00	691,749.61	579,702.39	
6,450.00	48.89	276.51	6,402.32	2,844.32	18.54	-162.48	163.54	12.00	691,751.69	579,684.11	
6,475.00	51.89	276.51	6,418.26	2,860.26	20.72	-181.62	182.80	12.00	691,753.88	579,664.98	
6,500.00	54.89	276.51	6,433.17	2,875.17	23.00	-201.55	202.86	12.00	691,756.15	579,645.04	



Pathfinder Energy Services
Pathfinder X & Y Planning Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well: Caribou-19 Federal Com #1H
Project:	Eddy County	TVD Reference:	EST: RKB @ 3558.00ft
Site:	Caribou-19 Federal	MD Reference:	EST: RKB @ 3558.00ft
Well:	Caribou-19 Federal Com #1H	North Reference:	Grid:
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	Midland Database

Planned Survey											
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D Leg (%/100ft)	Northing (ft)	Easting (ft)	
6,525.00	57.89	276.51	6,447.00	2,889.00	25.36	-222.24	223.68	12.00	691,758.51	579,624.36	
6,550.00	60.89	276.51	6,459.73	2,901.73	27.80	-243.61	245.20	12.00	691,760.95	579,602.98	
6,575.00	63.89	276.51	6,471.32	2,913.32	30.31	-265.62	267.35	12.00	691,763.46	579,580.97	
6,600.00	66.89	276.51	6,481.72	2,923.72	32.89	-288.20	290.07	12.00	691,766.04	579,558.39	
6,625.00	69.89	276.51	6,490.93	2,932.93	35.52	-311.29	313.31	12.00	691,768.67	579,535.30	
6,650.00	72.89	276.51	6,498.91	2,940.91	38.21	-334.83	337.00	12.00	691,771.36	579,511.76	
6,675.00	75.89	276.51	6,505.63	2,947.63	40.94	-358.75	361.08	12.00	691,774.09	579,487.84	
6,700.00	78.89	276.51	6,511.09	2,953.09	43.70	-382.99	385.47	12.00	691,776.86	579,463.61	
6,725.00	81.89	276.51	6,515.26	2,957.26	46.50	-407.48	410.12	12.00	691,779.65	579,439.12	
6,750.00	84.89	276.51	6,518.14	2,960.14	49.31	-432.15	434.95	12.00	691,782.47	579,414.45	
6,775.00	87.89	276.51	6,519.71	2,961.71	52.14	-456.93	459.90	12.00	691,785.29	579,389.66	
6,797.24	90.56	276.51	6,520.01	2,962.01	54.66	-479.02	482.13	12.00	691,787.81	579,367.57	
6,797.34	90.56	276.51	6,520.01	2,962.01	54.67	-479.13	482.23	0.00	691,787.83	579,367.47	
6,800.00	90.56	276.51	6,519.99	2,961.99	54.98	-481.77	484.89	0.00	691,788.13	579,364.83	
6,900.00	90.56	276.51	6,519.01	2,961.01	66.31	-581.12	584.89	0.00	691,799.46	579,265.48	
7,000.00	90.56	276.51	6,518.03	2,960.03	77.65	-680.47	684.89	0.00	691,810.80	579,166.13	
7,100.00	90.56	276.51	6,517.05	2,959.05	88.99	-779.82	784.88	0.00	691,822.14	579,066.78	
7,200.00	90.56	276.51	6,516.08	2,958.08	100.32	-879.17	884.88	0.00	691,833.48	578,967.43	
7,300.00	90.56	276.51	6,515.10	2,957.10	111.66	-978.52	984.87	0.00	691,844.81	578,868.07	
7,400.00	90.56	276.51	6,514.12	2,956.12	123.00	-1,077.87	1,084.87	0.00	691,856.15	578,768.72	
7,500.00	90.56	276.51	6,513.14	2,955.14	134.34	-1,177.22	1,184.86	0.00	691,867.49	578,669.37	
7,600.00	90.56	276.51	6,512.17	2,954.17	145.67	-1,276.57	1,284.86	0.00	691,878.82	578,570.02	
7,700.00	90.56	276.51	6,511.19	2,953.19	157.01	-1,375.92	1,384.85	0.00	691,890.16	578,470.67	
7,800.00	90.56	276.51	6,510.21	2,952.21	168.35	-1,475.27	1,484.85	0.00	691,901.50	578,371.32	
7,900.00	90.56	276.51	6,509.23	2,951.23	179.68	-1,574.62	1,584.84	0.00	691,912.84	578,271.97	
8,000.00	90.56	276.51	6,508.26	2,950.26	191.02	-1,673.97	1,684.84	0.00	691,924.17	578,172.62	
8,100.00	90.56	276.51	6,507.28	2,949.28	202.36	-1,773.32	1,784.83	0.00	691,935.51	578,073.27	



Pathfinder Energy Services
Pathfinder X & Y Planning Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well: Caribou 19 Federal Com #1H
Project:	Eddy County	TVD Reference:	EST RKB @ 3558.00ft
Site:	Caribou 19 Federal	MD Reference:	EST RKB @ 3558.00ft
Well:	Caribou 19 Federal Com #1H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	Midland Database

Planned Survey											
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)	
8,200.00	90.56	276.51	6,506.30	2,948.30	213.70	-1,872.67	1,884.83	0.00	691,946.85	577,973.92	
8,300.00	90.56	276.51	6,505.32	2,947.32	225.03	-1,972.03	1,984.82	0.00	691,958.18	577,874.57	
8,400.00	90.56	276.51	6,504.35	2,946.35	236.37	-2,071.38	2,084.82	0.00	691,969.52	577,775.22	
8,500.00	90.56	276.51	6,503.37	2,945.37	247.71	-2,170.73	2,184.81	0.00	691,980.86	577,675.87	
8,600.00	90.56	276.51	6,502.39	2,944.39	259.04	-2,270.08	2,284.81	0.00	691,992.20	577,576.52	
8,700.00	90.56	276.51	6,501.42	2,943.42	270.38	-2,369.43	2,384.80	0.00	692,003.53	577,477.17	
8,800.00	90.56	276.51	6,500.44	2,942.44	281.72	-2,468.78	2,484.80	0.00	692,014.87	577,377.82	
8,900.00	90.56	276.51	6,499.46	2,941.46	293.06	-2,568.13	2,584.79	0.00	692,026.21	577,278.47	
9,000.00	90.56	276.51	6,498.48	2,940.48	304.39	-2,667.48	2,684.79	0.00	692,037.54	577,179.12	
9,100.00	90.56	276.51	6,497.51	2,939.51	315.73	-2,766.83	2,784.78	0.00	692,048.88	577,079.77	
9,200.00	90.56	276.51	6,496.53	2,938.53	327.07	-2,866.18	2,884.78	0.00	692,060.22	576,980.42	
9,300.00	90.56	276.51	6,495.55	2,937.55	338.40	-2,965.53	2,984.78	0.00	692,071.56	576,881.07	
9,400.00	90.56	276.51	6,494.57	2,936.57	349.74	-3,064.88	3,084.77	0.00	692,082.89	576,781.71	
9,500.00	90.56	276.51	6,493.60	2,935.60	361.08	-3,164.23	3,184.77	0.00	692,094.23	576,682.36	
9,600.00	90.56	276.51	6,492.62	2,934.62	372.42	-3,263.58	3,284.76	0.00	692,105.57	576,583.01	
9,700.00	90.56	276.51	6,491.64	2,933.64	383.75	-3,362.93	3,384.76	0.00	692,116.90	576,483.66	
9,800.00	90.56	276.51	6,490.66	2,932.66	395.09	-3,462.28	3,484.75	0.00	692,128.24	576,384.31	
9,900.00	90.56	276.51	6,489.69	2,931.69	406.43	-3,561.63	3,584.75	0.00	692,139.58	576,284.96	
10,000.00	90.56	276.51	6,488.71	2,930.71	417.76	-3,660.98	3,684.74	0.00	692,150.92	576,185.61	
10,100.00	90.56	276.51	6,487.73	2,929.73	429.10	-3,760.33	3,784.74	0.00	692,162.25	576,086.26	
10,200.00	90.56	276.51	6,486.75	2,928.75	440.44	-3,859.68	3,884.73	0.00	692,173.59	575,986.91	
10,300.00	90.56	276.51	6,485.78	2,927.78	451.77	-3,959.03	3,984.73	0.00	692,184.93	575,887.56	
10,400.00	90.56	276.51	6,484.80	2,926.80	463.11	-4,058.38	4,084.72	0.00	692,196.26	575,788.21	
10,500.00	90.56	276.51	6,483.82	2,925.82	474.45	-4,157.74	4,184.72	0.00	692,207.60	575,688.86	
10,600.00	90.56	276.51	6,482.84	2,924.84	485.79	-4,257.09	4,284.71	0.00	692,218.94	575,589.51	
10,700.00	90.56	276.51	6,481.87	2,923.87	497.12	-4,356.44	4,384.71	0.00	692,230.28	575,490.16	
10,800.00	90.56	276.51	6,480.89	2,922.89	508.46	-4,455.79	4,484.70	0.00	692,241.61	575,390.81	



Pathfinder Energy Services
Pathfinder X & Y Planning Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well: Carbou 19 Federal Com #1H
Project:	Eddy County	TVD Reference:	EST RKB @ 3558.00ft
Site:	Carbou 19 Federal	MD Reference:	EST RKB @ 3558.00ft
Well:	Carbou 19 Federal Com #1H	North Reference:	Grd
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	Midland Database

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)
10,892.57	90.56	276.51	6,480.00	2,922.00	519.18	-4,547.73	4,577.26	0.00	692,252.33	575,298.87
Pbhl										

Target Name	hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/S (ft)	+E/W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Pbhl		0.00	0.00	6,480.00	519.18	-4,547.73	692,252.327	575,298.869	32° 54' 10.690 N	104° 13' 21.641 W
- plan hits target center										
- Point										

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
650.00	650.00	Yates		0.00	
5,300.00	5,300.00	Abo Shale		0.00	
1,845.00	1,845.00	San Andres D		0.00	
6,786.80	6,520.00	Wolfcamp Pay		0.00	
1,130.00	1,130.00	Queen		0.00	
6,622.31	6,490.00	Wolfcamp		0.00	
3,372.00	3,372.00	Gloneta		0.00	

Checked By: _____ Approved By: _____ Date: _____



Azimuths to Grid North
 True North: -0.07°
 Magnetic North: 8.03°
 Magnetic Field
 Strength: 49091.5nT
 Dip Angle: 60.74°
 Date: 01/22/2010
 Model: IGRF2010

Project: Eddy County
 Site: Caribou 19 Federal
 Well: Caribou 19 Federal Com #1H
 Wellbore: Original Hole
 Plan: Plan #1 (Caribou 19 Federal Com #1H/Original Hole)



WELL DETAILS: Caribou 19 Federal Com #1H

Ground Elevation: 3558.00
 RKB Elevation: EST RKB @ 3558.00ft
 Rug Name:

+N-S	+E-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	691733.152	579846.595	32° 54' 5.502 N	104° 12' 28.305 W	

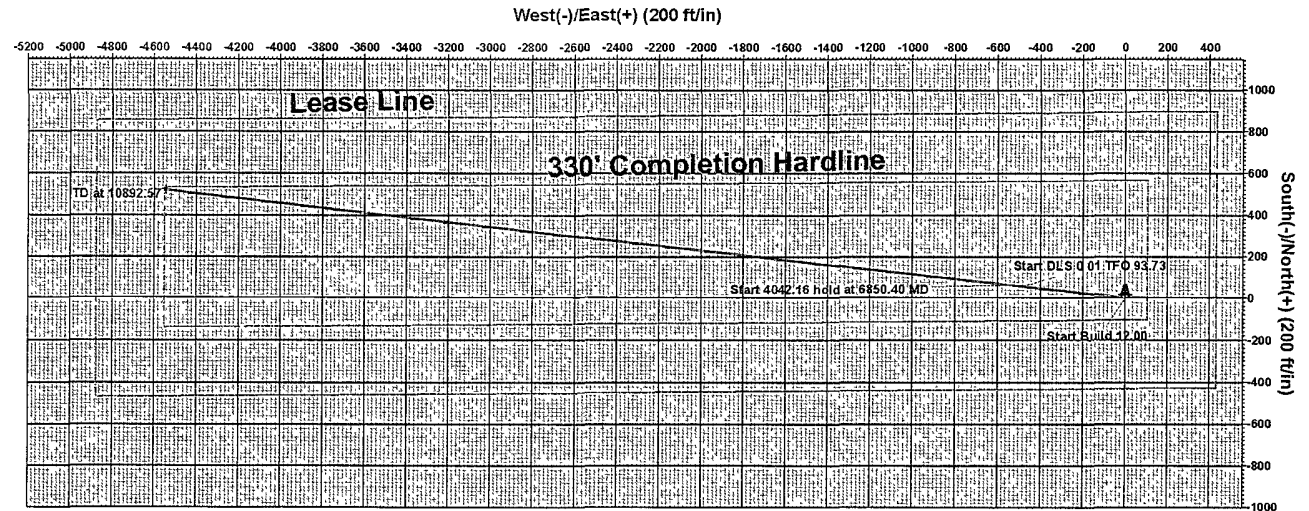
PROJECT DETAILS: Eddy County
 Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: New Mexico Eastern Zone
 System Datum: Mean Sea Level
 Local North: Grid

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N-S	+E-W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	6042.57	0.00	0.00	6042.57	0.00	0.00	0.00	0.00	0.00	
3	6797.24	90.56	276.51	6520.01	54.66	-479.02	12.00	276.51	482.13	
4	6850.40	90.56	276.51	6519.49	60.69	-531.85	0.01	93.73	535.30	
5	10892.57	90.56	276.51	6480.00	519.18	-4547.73	0.00	0.00	4577.26	Pbhi

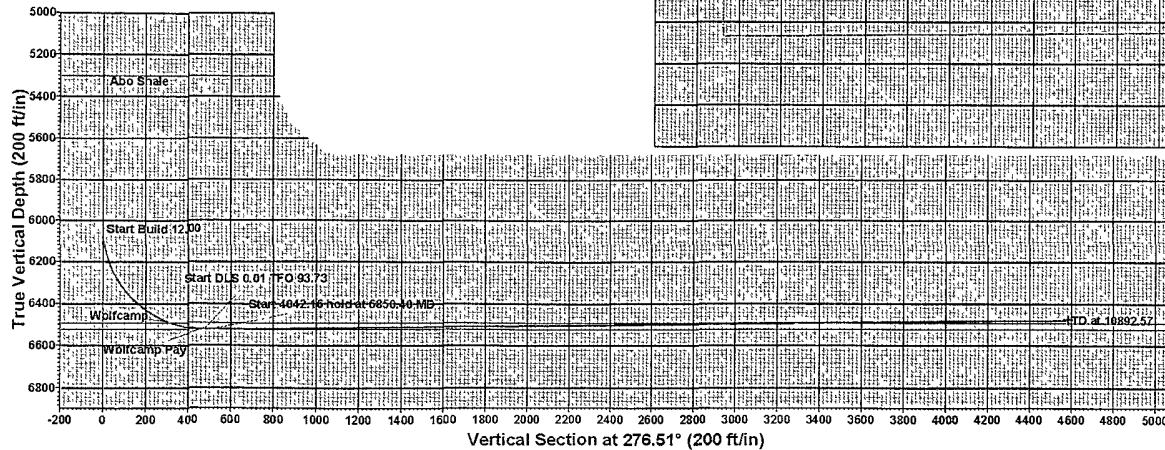
WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N-S	+E-W	Northing	Easting	Shape
Pbhi	6480.00	519.18	-4547.73	692252.327	575298.869	Point



FORMATION TOP DETAILS

TVDPath	MDPath	Formation
850.00	850.00	Yates
1130.00	1130.00	Queen
1845.00	1845.00	San Andres D
3372.00	3372.00	Glorieta
6300.00	6300.00	Abo Shale
6490.00	6622.31	Wolfcamp
6520.00	6786.80	Wolfcamp Pay



Plan: Plan #1 (Caribou 19 Federal Com #1H/Original Hole)
 Created By: Nate Bingham Date: 9/12, January 22, 2010
 Checked: _____ Date: _____

**PECOS DISTRICT
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NM-103873
WELL NAME & NO.:	Caribou 19 Federal Com #1
SURFACE HOLE FOOTAGE:	430' FSL & 430' FEL
BOTTOM HOLE FOOTAGE	330' FSL & 330' FWL
LOCATION:	Section 19, T. 16 S., R 28 E., NMPM
COUNTY:	Eddy County, New Mexico

I. DRILLING

A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified a minimum of 4 hours in advance for a representative to witness:

- a. Spudding well
- b. Setting and/or Cementing of all casing strings
- c. BOPE tests

Eddy County

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

1. **Although Hydrogen Sulfide has not been reported in this section, it is always a potential hazard. If Hydrogen Sulfide is encountered, please report measured amounts 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.
3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

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

B. CASING

Changes to the approved APD casing and cement program require submitting a sundry and receiving approval prior to work. Failure to obtain approval prior to work will result in an Incident of Non-Compliance being issued.

Centralizers required on surface casing per Onshore Order 2.III.B.1.f.

Wait on cement (WOC) time 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. 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 – IF LOST CIRCULATION OCCURS WHILE DRILLING THE 8-3/4” HOLE, THE CEMENT PROGRAM FOR THE 5-1/2” CASING WILL NEED TO BE MODIFIED AND THE BLM IS TO BE CONTACTED PRIOR TO RUNNING THE CASING. 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 WILL NOT BE PERMITTED. A DV TOOL WILL BE REQUIRED.

**Possible lost circulation in the Grayburg and San Andres formations.
Possible high pressure gas burst in the Wolfcamp.**

1. The **13-3/8** inch surface casing shall be set at **approximately 500 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 a 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 **7** inch production casing is:

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.

Pilot hole is required to have a plug at the bottom of the hole. If two plugs are set, the BLM is to be contacted (575-361-2822) prior to tag of bottom plug, which must be a minimum of 200' in length. Operator can set one plug from bottom of pilot hole to kick-off point and save the WOC time for tagging the first plug.

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

3. Cement not required on the **4-1/2"** Liner. **Packer system being used. 100' overlap approved.**

Contingency Casing

4. The minimum required fill of cement behind the **9 5/8** inch intermediate casing is:

Cement to surface. If cement does not circulate see A.2.a-c above.

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 **3000 (3M)** psi.
3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the 7" production casing shoe shall be **3000 (3M)** psi.
4. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. Casing cut-off and BOP installation will not be initiated until the cement has had 4-6 hours of setup time in a water basin and 12 hours in the potash areas. This time will start after the cement plug is bumped. Testing the BOP/BOPE against a plug can commence after meeting the above conditions plus the BOP installation time.
 - b. The tests shall be done by an independent service company utilizing a test plug.
 - c. The results of the test shall be reported to the appropriate BLM office.
 - d. 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.**
 - e. 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.
 - f. 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.

- g. **Effective November 1, 2008, no variances will be granted on reduced pressure tests on the surface casing and BOP/BOPE. Onshore Order 2 requirements will be in effect.**

D. 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.

Proposed mud weight may not be adequate for drilling through Wolfcamp.

E. DRILL STEM TEST

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

MAK 021010

13 3/8 inches O.D. of Surface Casing				<u>Design Factors</u>					
Segment	Grade	#/ft	Coupling	Joint	Collapse	Burst	Length	Weight	
"A"	j 55	54.50	ST & C	18.86	5.12	1	500	27,250	
"B"							0	0	
							Totals:	500	27,250
<u>Compare Cement Volumes, Proposed to Minimum</u>									
Hole Size	Annular Volume	Proposed Sx Cmt	CuFt Cmt Proposed	Min Cu Ft	Excess % Cmt	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	500	753	398	89	8.50	1466	2M	1.56
Comments for 13 3/8 " Csg									

Tail cmt proposed for the csg below could overlap the previous csg shoe.

7 << Casing inside the 13 3/8				<u>Design Factors</u>					
Segment	Grade	#/ft	Coupling	Joint	Collapse	Burst	Length	Weight	
"A"	P 110	26.00	LT&C	4.60	2.26	2.99	5,800	150,800	
"B"							0	0	
"C"							0	0	
"D"							0	0	
							Totals:	5,800	150,800
<u>Compare Cement Vol(s), Proposed to Min, with 500 ft overlap above 1st csg shoe.</u>									
Hole Size	Annular Volume	Proposed Sx Cmt	CuFt Cmt Proposed	Min Cu Ft	Excess % Cmt	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
8 3/4	0.1503	1300	2158	1107	95	9.10	1849	2M	0.55
Comments for 7 " Csg									

4 1/2 Liner w/top @ 5700				<u>Design Factors</u>					
Segment	Grade	#/ft	Coupling	Joint	Collapse	Burst	Length	Weight	
"A"	P 110	11.60	LT&C	2.80	1.99	3.20	5,192	60,227	
"B"							0	0	
"C"							0	0	
"D"							0	0	
6,520.01 is the Max Vertical Depth of the Horz Portion of Wellbore.							Totals:	5,192	60,227
A Segment Design Factors would be:				4.63	2.35 if it were a vertical wellbore.				
<u>Compare Cement Vol(s), Proposed to Min, with 0 ft overlap above 2nd csg shoe.</u>									
Hole Size	Annular Volume	Proposed Sx Cmt	CuFt Cmt Proposed	Min Cu Ft	Excess % Cmt	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
6 1/8	0.0942			483		9.50			0.56
Comments for 4 1/2 " Csg Ne cement - Peak system									

13 3/8 inches O.D. of Surface Casing			<u>Design Factors</u>						
Segment	Grade	#/ft	Coupling	Joint	Collapse	Burst	Length	Weight	
"A"	j 55	54.50	ST & C	18.86	5.12	3.21	500	27,250	
"B"							0	0	
							Totals:	500	27,250
<u>Compare Cement Volumes, Proposed to Minimum</u>									
Hole Size	Annular Volume	Proposed Sx Cmt	CuFt Cmt Proposed	Min Cu Ft	Excess % Cmt	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	500	753	398	89	8.50	455	2M	1.56
Comments for 13 3/8 " Csg									

Tail cmt proposed for the csg below could overlap the previous csg shoe.

9 5/8 << Casing inside the 13 3/8			<u>Design Factors</u>						
Segment	Grade	#/ft	Coupling	Joint	Collapse	Burst	Length	Weight	
"A"	j 55	40.00	LT&C	7.22	3.02	1.44	1,800	72,000	
"B"							0	0	
"C"							0	0	
"D"							0	0	
1,800.00 is the Max Vertical Depth of the Horz Portion of Wellbore.							Totals:	1,800	72,000
<u>Compare Cement Vol(s), Proposed to Min, with 500 ft overlap above 1st csg shoe.</u>									
Hole Size	Annular Volume	Proposed Sx Cmt	CuFt Cmt Proposed	Min Cu Ft	Excess % Cmt	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
12 1/4	0.3132	500	753	607	24	9.10	1466	2M	0.81
Comments for 9 5/8 " Csg Additional cement may be required.									

7 inside the 9 5/8			<u>Design Factors</u>						
Segment	Grade	#/ft	Coupling	Joint	Collapse	Burst	Length	Weight	
"A"	P 110	26.00	LT&C	4.60	2.26	2.99	5,800	150,800	
"B"							0	0	
"C"							0	0	
"D"							0	0	
5,800.00 is the Max Vertical Depth of the Horz Portion of Wellbore.							Totals:	5,800	150,800
<u>Compare Cement Vol(s), Proposed to Min, with 1800 ft overlap above 2nd csg shoe.</u>									
Hole Size	Annular Volume	Proposed Sx Cmt	CuFt Cmt Proposed	Min Cu Ft	Excess % Cmt	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
8 3/4	0.1503	1300	2158	896	141	9.10	1849	2M	0.55
Comments for 7 " Csg									

4 1/2 Liner w/top @ 5700			<u>Design Factors</u>						
Segment	Grade	#/ft	Coupling	Joint	Collapse	Burst	Length	Weight	
"A"	P 110	11.6	LT&C	2.80	1.99	3.2	5,192	60,227	
"B"							0	0	
"C"							0	0	
"D"							0	0	
6,520.01 is the Max Vertical Depth of the Horz Portion of Wellbore.							Totals:	5,192	60,227
A Segment Design Factors would be:				4.63	2.35	if it were a vertical wellbore.			
<u>Compare Cement Vol(s), Proposed to Min, with 0 ft overlap above 3rd csg shoe.</u>									
Hole Size	Annular Volume	Proposed Sx Cmt	CuFt Cmt Proposed	Min Cu Ft	Excess % Cmt	Drilling Mud Wt	Min Dist Hole-Cplg		
6 1/8	0.0942	0	0	483		9.50	0.56		
Comments for 4 1/2 " Csg No cement required - packer system.									