

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NM-0467931
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		6. If Indian, Allottee or Tribe Name N/A
2. Name of Operator COG Operating LLC		7. If Unit or CA Agreement, Name and No. N/A
3a. Address One Concho Center 600 W Illinois Ave. Midland, TX 79701	3b. Phone No. (include area code) (432) 685-4340	8. Lease Name and Well No. Electra Federal #101H
4. Location of Well (Report location clearly and in accordance with any State requirements*) At surface SHL: 660' FNL & 330' FEL, UL A At proposed prod. zone BHL: 660' FNL & 330' FWL, UL D		9. API Well No. 30-015
14. Distance in miles and direction from nearest town or post office* 2 miles North of Loco Hills, New Mexico		10. Field and Pool, or Exploratory Loco Hills; Glorieta-Yeso
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drg. unit line, if any) 330'		11. Sec., T. R. M. or Bk. and Survey or Area Sec 10, T17S, R30E
16. No. of acres in lease 320		12. County or Parish. Eddy
17. Spacing Unit dedicated to this well 160		13. State NM
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 147'		19. Proposed Depth TVD: 5700' MD: 10,115'
20. BLM/BIA Bond No. on file NMB000215; NMB000740		21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3729' GL
22. Approximate date work will start* 01/30/2013		23. Estimated duration 15 Days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, shall be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO shall be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the authorized officer.

25. Signature Kacie Connally	Name (Printed/Typed) Kacie Connally	Date 11/01/2012
Title Permitting Tech		
Approved by (Signature) /s/ Don Peterson	Name (Printed/Typed)	Date FEB 15 2013
Title FIELD MANAGER	Office CARLSBAD FIELD OFFICE	

Application approval 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.

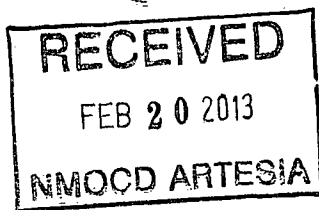
Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

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)

Roswell Controlled Water Basin

Approval Subject to General Requirements
& Special Stipulations AttachedSEE ATTACHED FOR
CONDITIONS OF APPROVAL

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

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

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

AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015- 41139	Pool Code 96718	Pool Name LOCO HILLS; GLORIETA-YESO
Property Code 302483	Property Name ELECTRA FEDERAL	Well Number 101H
OGRID No. 229137	Operator Name COG OPERATING, LLC	Elevation 3729

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	10	17-S	30-E		660	NORTH	330	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
D	10	17-S	30-E		660	NORTH	330	WEST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
160			

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

Producing Area Project Area GRID AZ = 269°52'21" HORIZ. DIST. = 4619.6' DETAILED 3720.8' 3736.3' 3737.6' 3730.8' 600' GEODETIC COORDINATES NAD 27 NME SURFACE LOCATION Y=674730.3 N X=617182.5 E LAT.=32.854336° N LONG.=103.951740° W BOTTOM HOLE LOCATION Y=674720.1 N X=612564.0 E	OPERATOR CERTIFICATION I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. <i>[Signature]</i> 12/14/2012 Signature Date Robyn M. Odom Printed Name Rodom@concho.com E-mail Address SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. AUGUST 23, 2012 Date of Survey Signature of Professional Surveyor: <i>[Signature]</i> 12/12/2012 Certification Number: 3239 Gage G. Eidson 12641 Ronald J. Eidson 3239 BKL REV. 12/11/2012 JWSC W.O.: 12.11.1233
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Surface Use Plan
COG Operating, LLC
Electra Federal #101H
SL: 660' FNL & 330' FEL UL A
BHL: 660' FNL & 330' FWL UL D
Section 10, T-17-S, R-30-E
Eddy County, New Mexico

I hereby certify that I, or persons under my direct supervision, have inspected the drill site and access road proposed herein; that I am familiar with the conditions that presently exist; that I have full knowledge of State and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or COG Operating, LLC, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements. Executed this 19th day of September 10, 2012.

Signed: Carl Bird

Printed Name: Carl Bird

Position: Drilling Engineer

Address: One Concho Center, 600 W. Illinois, Midland, Texas 79701

Telephone: (432) 683-7443

Field Representative (if not above signatory): Same

E-mail: cbird@concho.com

ATTACHMENT TO FORM 3160-3
COG Operating, LLC
Electra Federal #101H
SHL: 660' FNL & 330' FEL, UNIT A
BHL: 660' FNL & 330' FWL, UNIT D
Sec 10, T17S, R30E
Eddy County, NM

1. Proration Unit Spacing: 160 Acres
2. Ground Elevation: 3729'
3. Proposed Depths: Horizontal: **EOC (end of curve) TVD=5700' MD= 5981'**
Toe (end of lateral) TVD=5628' MD= 10115'

4. Estimated tops of geological markers:

Rustler	327'
Top of Salt	606'
Base of Salt	1191'
Yates	1343'
Seven Rivers	1637'
Queen	2249'
Grayburg	2689'
San Andres	2974'
Glorieta	4443'
Paddock	4516'
Blaine	4950'
Tubb	5919'

5. Possible mineral bearing formations:

Water Sand	50'	Fresh Water
Grayburg	2689'	
San Andres	2974'	
Glorieta	4443'	
Paddock	4516'	
Blaine	4950'	
Tubb	5919'	

No other formations are expected to give up oil, gas or fresh water in measurable quantities. Setting 13 3/8" casing to 352' (25' into Rustler) and circulating cement back to the surface will protect the surface fresh water sand. The Salt Section will be protected by setting 9 5/8" casing to 1210' and circulating cement back to surface in a single or multi-stage job and/or with an ECP. Any shallower zones above TD, which contain commercial quantities of oil and/or gas, will have cement circulated across them. This will be achieved by cementing 7" x 5 1/2" tapered production casing from the TD to surface in two stages with DV Tool and ECP set at KOP. The first stage will be from TD to KOP and second stage will be from KOP to surface. At KOP the production casing string will crossover from 7" to 5 1/2". If wellbore conditions arise that require immediate action and/or a change to this program, COG Operating LLC personnel will always react to protect the wellbore and/or environment.

6. Proposed Mud System

The well will be drilled to TD with a combination of fresh water, brine, cut brine and polymer mud systems. The applicable depths and properties of these systems are as follows:

DEPTH (MD)	TYPE	WEIGHT	VISCOSITY	WATERLOSS
0-352'	Fresh Water	8.5	28	N.C.
352'-1210'	Brine	10	30	N.C.
1210'-5223'	Cut Brine	8.7-9.2	30	N.C.
5223'-5981'	Cut Brine/polymer mud	8.7-9.2	30	N.C.
5981'-10115'	Cut Brine/polymer mud	8.7-9.2	30	N.C.

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

6. Proposed Casing Program

Hole Size	Interval MD	OD Casing	Weight	Grade	Condition	Jt.	brst/clps/ten
17 1/2"	0-352'	13 3/8"	48#	H-40/J-55 Hybrid	New	ST&C	4.73/4.75/21.1
12 1/4"	352'- 1210'	9 5/8"	40#	J/K-55	New	LT&C	3.35/4.18/12.97
8 3/4"	1210'- 5223'	7"	26#	L-80	New	LT&C	1.45/2.27/4.60
8 3/4"	5223'- 5981'	5 1/2"	17#	L-80	New	LT&C	1.55/2.64/4.65
7 7/8"	5981'- 10115'	5 1/2"	17#	L-80	New	LT&C	1.55/2.64/4.65

Production string will be a tapered string with 7" 26# L-80 LTC run from surface to kick off point (5223') and then crossed over to 5 1/2" 17# L-80 LTC.

7. Proposed Cement Program

13 3/8" SURFACE: (Circulate to Surface)

Lead: 0'-352'	600 sks	Class "C" w/2% CaCl ₂ +	1.32 cf/sk	14.8 ppg
Excess 184%		0.25 pps CF		

9 5/8" INTERMEDIATE:

Option #1: Single Stage (Circulate to Surface)

Lead:	200 sks	50:50:10 C:Poz:Gel	2.45 cf/sk	11.8 ppg
0'-800'		w/ 5% Salt+ 0.25% CF		
Excess 80%		+5 pps LCM		

Tail:	300 sks	Class C w/2% CaCl ₂	1.32 cf/sk	14.8 ppg
800'-1210'				
Excess 172%				

Option #2: Multi-stage w/ DV Tool @ +/-402' (DV Tool 50' below 13 3/8" csg. Shoe) (Circulate to Surface)

Stage #1:

Lead:				
402'-800'	100 sks	50:50:10 C:Poz:Gel w/5%	2.45 cf/sk	11.8 ppg
Excess 97%		Salt +5 pps LCM +		
		0.25 pps CF		

Tail:				
800'-1210'	300 sks	Class "C" w/2% CaCl ₂	1.32 cf/sk	14.8 ppg
Excess 172%				

Stage #2

0'-402'	100 sks	50:50:10 C:Poz:Gel w/5%	2.45 cf/sk	11.8 ppg
Excess 65%		salt+ 5 pps LCM +		
		0.25 pps CF		

Note: Multi-stage tool to be set depending on hole conditions at approximately 402' (50' below the surface casing shoe). Cement volumes will be adjusted proportionately for depth changes of multi-stage tool.

ATTACHMENT TO FORM 3160-3

COG Operating, LLC
Electra Federal #101H

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Stage #3: DV Tool @ 1260' to surface (Circulate cement)

Lead:	200 sks	35:65:6 C:Poz Gel w/5%	2.05 cf/sk	12.5 pp
0'-1260'		salt+ 5 pps LCM+ 0.2 %		
(min. tie back 200'		SMS + 0.3% FL-52A+		
Above 9 5/8" Shoe)		0.125 pps CF		
Excess 106%				

Note: 5 1/2" casing will be run from KOP at 5223' thru curve and lateral to TD of 10115' MD.
Productive intervals will be isolated by cement as described above..

Note: FL-52A is fluid loss additive, R-3 is retarder.

Note: Multi-stage tool & ECP to be set depending on hole conditions at approximately 5223'.
Cement volumes will be adjusted proportionately for depth changes of multi-stage tool.

8. Pressure Control Equipment:

The blowout preventer equipment (BOP) shown in Exhibit #9 will consist of a double ram-type (2000 psi WP) preventer, and in some cases possibly a 2000 psi Hydril type annular preventer as provided for in Onshore Order #2. This unit will be hydraulically operated and the ram type preventer will be equipped with blind rams on top and 4 1/2" drill pipe rams on the bottom. A 13-5/8" BOP will be used during the drilling of the well. A 13 5/8" permanent casing head will be installed on the 13 3/8" casing. The BOP will be nipped up on the 13 5/8" permanent casing head and tested to 2000 psig. After setting 9-5/8", permanent "B section" well head will be installed and the BOP will then be nipped up on the permanent B. BOP and well head will be tested by a third party to 2000 psig and used continuously until total depth is reached. Pipe rams will be operationally checked each 24-hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve, choke lines and a choke manifold with a 2000 psi WP rating all of which will also be tested to working pressure by independent tester also.

See
COA

9. Production Hole Drilling Summary:

Drill 8 3/4" hole to 5223'. Kick off at +/- 5223', building curve at 12°/100' over +/- 758' to horizontal at 5981' MD/5700' TVD. Reduce hole size and drill 7 7/8" lateral section at 91° in a westerly direction (Az 269.87°) for +/-4133' lateral to TD at +/-10114' MD, 5628' TVD. Run 7" x 5-1/2" production casing. 7" to be run from surface to kickoff point and then changed over to 5 1/2". 5 1/2" casing will be run from kickoff point to td and both strings will be isolated by either a single stage or multi-stage cement jobs. Minimum tie back of cement will be 200' above 9 5/8" csg shoe. Cement will be circulated to surface.

10. Auxiliary Well Control and Monitoring Equipment

- A. Kelly cock will be kept in the drill string at all times.
- B. A full opening drill pipe-stabbing valve with proper drill pipe connections will be on the rig floor at all times.

7" X 5 1/2" TAPERED PRODUCTION CASING:**Option #1: Single Stage (Cement cal to surface)**

1st Lead:	400 sks	35:65:6 C:Poz Gel w/5% salt+ 5 pps LCM+ 0.2 % SMS + 0.3% FL-52A+ 0.125 pps CF	2.05 cf/sk	12.5 pp
0'-3200'				
(min. tie back 200'				
Above 9 5/8" Shoe)				
Excess 67%				
2 nd Lead:	400 sks	50:50:2 C:Poz Gel w/5% salt+ 3 pps LCM+ 0.6 % SMS+ 0.125 pps CF+1% FL-25+ 1% BA-58	1.37 cf/sk	14.0 ppg
3200'-5223'				
Excess 80%				
Tail:	725 sks	Class "H" SOLUCEM-H w/0.7% HR-601	2.62 cf/sk	15.0 ppg
5223'-10115'				
Excess 109%				

Option #2: Multi-stage (3 Stages) w/DV Tool & ECP @ +/-5223'**Stage #1: TD to KOP**

Tail:	725 sks	Class "H" SOLUCEM-H w/0.7% HR-601	2.62 cf/sk	15.0 ppg
5223'-10115'				
Excess 109%				

Stage #2: DV Tool & ECP @ +/-5223' to 2nd DV Tool @ 1260' (50' below 9 5/8" csg shoe)

Lead:	400 sks	35:65:6 C:Poz Gel w/5% salt+ 5 pps LCM+ 0.2 % SMS+ 0.3% FL-52A+ 0.125 pps CF	2.05 cf/sk	12.5 ppg
1260'-3200'				
Excess 181%				
Tail:	400 sks	50:50:2 C:Poz Gel w/5% salt+ 3 pps LCM+ 0.6 % SMS+ 0.125 pps CF+1% FL-25+ 1% BA-58	1.37 cf/sk	14.0 ppg
3200'-5223'				
Excess 75%				

ATTACHMENT TO FORM 3160-3
COG Operating, LLC
Electra Federal #101H
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11. Logging, Testing and Coring Program:

- A. The following logs will be run in the vertical portion of the hole to KOP: SLB-PEX/HRLA, HNGS.
- B. The mud logging program will consist of lagged 10' samples from KOP to TD in Horizontal hole.
- C. Drill Stem test is not anticipated.
- D. No conventional coring is anticipated.
- E. Further testing procedures will be determined after the 7" x 5 1/2" production casing has been cemented at TD based on drill shows and log evaluation.

12. Abnormal Conditions, Pressures, Temperatures and Potential Hazards:

No abnormal pressures or temperatures are anticipated. The estimated bottom hole temperature at TD is 94° Fahrenheit and estimated maximum bottom hole pressure is 2508 psi. Wells in the Empire area will penetrate formations that are known or could reasonably be expected to contain Hydrogen Sulfide. Measurable gas volumes or Hydrogen Sulfide levels have not been encountered during drilling operations in this area. However as per Onshore order No. 6 a H2S drilling operations plan is included with this APD. No major loss circulation zones have been reported in offsetting wells.

13. Anticipated Starting Date

Drilling operations will commence approximately on approximately January 30, 2013 with drilling and completion operations lasting approximately 90 days.



COG Operating LLC

Eddy County, NM (NAN27 NME)

Electra Federal #101H

OH

Plan #1 8-3/4" Hole

Standard Planning Report

26 October, 2012





Scientific Drilling
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #101H
Company:	COG Operating LLC	TVD Reference:	GL @ 3729.00usft
Project:	Eddy County, NM (NAN27 NME)	MD Reference:	GL @ 3729.00usft
Site:	Electra Federal	North Reference:	Grid:
Well:	#101H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 8-3/4" Hole		

Project	Eddy County, NM (NAN27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		Using geodetic scale factor

Site	Electra Federal		
Site Position:		Northing:	669,772.60 usft
From:	Map	Easting:	612,581.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	0"
		Latitude:	32° 50' 26.713 N
		Longitude:	103° 58' 0.401 W
		Grid Convergence:	0.20 °

Well	#101H		
Well Position	+N-S	4,958.08 usft	Northing:
	+E-W	4,601.35 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	Ground Level:
			3,729.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	BGGM2012	10/26/2012	7.75
			Dip Angle
			60.64
			Field Strength
			48,801

Design	Plan #1 8-3/4" Hole		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.00
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			269.87

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N-S	+E-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,222.50	0.00	0.00	5,222.50	0.00	0.00	0.00	0.00	0.00	0.00	
5,980.99	91.00	269.87	5,700.00	-1.07	-485.89	12.00	12.00	0.00	269.87	
10,114.58	91.00	269.87	5,628.00	-10.20	-4,618.85	0.00	0.00	0.00	0.00 PBHL	



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #101H
Company:	COG Operating LLC	TVD Reference:	GL @ 3729.00usft
Project:	Eddy County, NM (NAN27-NME)	MD Reference:	GL @ 3729.00usft
Site:	Electra Federal	North Reference:	Grid
Well:	#101H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 "8-3/4" Hole		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,222.50	0.00	0.00	5,222.50	0.00	0.00	0.00	0.00	0.00	0.00
KOP Start Build 12.00									
5,300.00	9.30	269.87	5,299.66	-0.01	-6.27	6.27	12.00	12.00	0.00
5,400.00	21.30	269.87	5,395.94	-0.07	-32.61	32.61	12.00	12.00	0.00
5,500.00	33.29	269.87	5,484.65	-0.17	-78.38	78.38	12.00	12.00	0.00
5,600.00	45.29	269.87	5,561.90	-0.31	-141.59	141.59	12.00	12.00	0.00
5,700.00	57.29	269.87	5,624.32	-0.48	-219.48	219.48	12.00	12.00	0.00
5,800.00	69.28	269.87	5,669.20	-0.68	-308.64	308.64	12.00	12.00	0.00
5,900.00	81.28	269.87	5,694.55	-0.89	-405.18	405.18	12.00	12.00	0.00
5,980.99	91.00	269.87	5,700.00	-1.07	-485.89	485.89	12.00	12.00	0.00
EOC Start 4133.60 hold at 5980.99 MD									
6,000.00	91.00	269.87	5,699.67	-1.12	-504.90	504.90	0.00	0.00	0.00
6,100.00	91.00	269.87	5,697.93	-1.34	-604.88	604.88	0.00	0.00	0.00
6,200.00	91.00	269.87	5,696.18	-1.56	-704.87	704.87	0.00	0.00	0.00
6,300.00	91.00	269.87	5,694.44	-1.78	-804.85	804.85	0.00	0.00	0.00
6,400.00	91.00	269.87	5,692.70	-2.00	-904.84	904.84	0.00	0.00	0.00
6,500.00	91.00	269.87	5,690.96	-2.22	-1,004.82	1,004.82	0.00	0.00	0.00
6,600.00	91.00	269.87	5,689.22	-2.44	-1,104.81	1,104.81	0.00	0.00	0.00
6,700.00	91.00	269.87	5,687.48	-2.66	-1,204.79	1,204.79	0.00	0.00	0.00
6,800.00	91.00	269.87	5,685.73	-2.88	-1,304.78	1,304.78	0.00	0.00	0.00
6,900.00	91.00	269.87	5,683.99	-3.10	-1,404.76	1,404.76	0.00	0.00	0.00
7,000.00	91.00	269.87	5,682.25	-3.32	-1,504.74	1,504.75	0.00	0.00	0.00
7,100.00	91.00	269.87	5,680.51	-3.54	-1,604.73	1,604.73	0.00	0.00	0.00
7,200.00	91.00	269.87	5,678.77	-3.76	-1,704.71	1,704.72	0.00	0.00	0.00
7,300.00	91.00	269.87	5,677.02	-3.99	-1,804.70	1,804.70	0.00	0.00	0.00
7,400.00	91.00	269.87	5,675.28	-4.21	-1,904.68	1,904.69	0.00	0.00	0.00
7,500.00	91.00	269.87	5,673.54	-4.43	-2,004.67	2,004.67	0.00	0.00	0.00
7,600.00	91.00	269.87	5,671.80	-4.65	-2,104.65	2,104.66	0.00	0.00	0.00
7,700.00	91.00	269.87	5,670.06	-4.87	-2,204.64	2,204.64	0.00	0.00	0.00
7,800.00	91.00	269.87	5,668.32	-5.09	-2,304.62	2,304.63	0.00	0.00	0.00
7,900.00	91.00	269.87	5,666.57	-5.31	-2,404.61	2,404.61	0.00	0.00	0.00
8,000.00	91.00	269.87	5,664.83	-5.53	-2,504.59	2,504.60	0.00	0.00	0.00
8,100.00	91.00	269.87	5,663.09	-5.75	-2,604.58	2,604.58	0.00	0.00	0.00
8,200.00	91.00	269.87	5,661.35	-5.97	-2,704.56	2,704.57	0.00	0.00	0.00
8,300.00	91.00	269.87	5,659.61	-6.19	-2,804.54	2,804.55	0.00	0.00	0.00
8,400.00	91.00	269.87	5,657.86	-6.41	-2,904.53	2,904.54	0.00	0.00	0.00
8,500.00	91.00	269.87	5,656.12	-6.64	-3,004.51	3,004.52	0.00	0.00	0.00
8,600.00	91.00	269.87	5,654.38	-6.86	-3,104.50	3,104.51	0.00	0.00	0.00
8,700.00	91.00	269.87	5,652.64	-7.08	-3,204.48	3,204.49	0.00	0.00	0.00
8,800.00	91.00	269.87	5,650.90	-7.30	-3,304.47	3,304.48	0.00	0.00	0.00
8,900.00	91.00	269.87	5,649.16	-7.52	-3,404.45	3,404.46	0.00	0.00	0.00
9,000.00	91.00	269.87	5,647.41	-7.74	-3,504.44	3,504.45	0.00	0.00	0.00
9,100.00	91.00	269.87	5,645.67	-7.96	-3,604.42	3,604.43	0.00	0.00	0.00
9,200.00	91.00	269.87	5,643.93	-8.18	-3,704.41	3,704.41	0.00	0.00	0.00
9,300.00	91.00	269.87	5,642.19	-8.40	-3,804.39	3,804.40	0.00	0.00	0.00
9,400.00	91.00	269.87	5,640.45	-8.62	-3,904.37	3,904.38	0.00	0.00	0.00
9,500.00	91.00	269.87	5,638.70	-8.84	-4,004.36	4,004.37	0.00	0.00	0.00
9,600.00	91.00	269.87	5,636.96	-9.06	-4,104.34	4,104.35	0.00	0.00	0.00
9,700.00	91.00	269.87	5,635.22	-9.29	-4,204.33	4,204.34	0.00	0.00	0.00
9,800.00	91.00	269.87	5,633.48	-9.51	-4,304.31	4,304.32	0.00	0.00	0.00
9,900.00	91.00	269.87	5,631.74	-9.73	-4,404.30	4,404.31	0.00	0.00	0.00
10,000.00	91.00	269.87	5,630.00	-9.95	-4,504.28	4,504.29	0.00	0.00	0.00
10,100.00	91.00	269.87	5,628.25	-10.17	-4,604.27	4,604.28	0.00	0.00	0.00



Scientific Drilling
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #101H
Company:	COG Operating LLC	TVD Reference:	GL @ 3729.00usft
Project:	Eddy County, NM (NAN27-NME)	MD Reference:	GL @ 3729.00usft
Site:	Electra Federal	North Reference:	Grid
Well:	#101H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 8-3/4" Hole		

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)
10,114.58	91.00	269.87	5,628.00	-10.20	-4,618.85	4,618.86	0.00	0.00	0.00
PBHL									

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	0.00	0.00	5,628.00	-10.20	-4,618.85	674,720.10	612,564.00	32° 51' 15.670 N	103° 58' 0.405 W
- plan hits target center									
- Point									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,222.50	5,222.50	0.00	0.00	KOP Start Build 12.00
5,980.99	5,700.00	-1.07	-485.89	EOC Start 4133.60 hold at 5980.99 MD



Azimuths to Grid North
True North: -0.21°
Magnetic North: 7.54°
Magnetic Field
Strength: 48801.2nT
Dip Angle: 60.64°
Date: 10/26/2012
Model: BGGM2012

To convert a Magnetic Direction to a Grid Direction, Add 7.54°
To convert a True Direction to a Grid Direction, Subtract 0.21°

Electra Federal#101H
Eddy County, NM (NAN27 NME)
Northing: (Y) 674730.30
Easting: (X) 617182.50
Plan #1 8-3/4" Hole

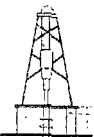
WELL DETAILS:									
Ground Level:				3729.00					
+N/S	+E/W	Northing	Easting	Latitude	Longitude				
0.00	0.00	674730.30	617182.50	32° 51' 15.609 N	103° 57' 6.262 W				

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/S	+E/W	Diag	TFace	VSecl	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5222.50	0.00	0.00	5222.50	0.00	0.00	0.00	0.00	0.00	
5980.99	81.00	269.87	5700.00	-1.07	-485.89	12.00	269.87	485.89	
10114.58	81.00	269.87	5628.00	-10.20	-4618.85	0.00	0.00	4618.86	PBHL

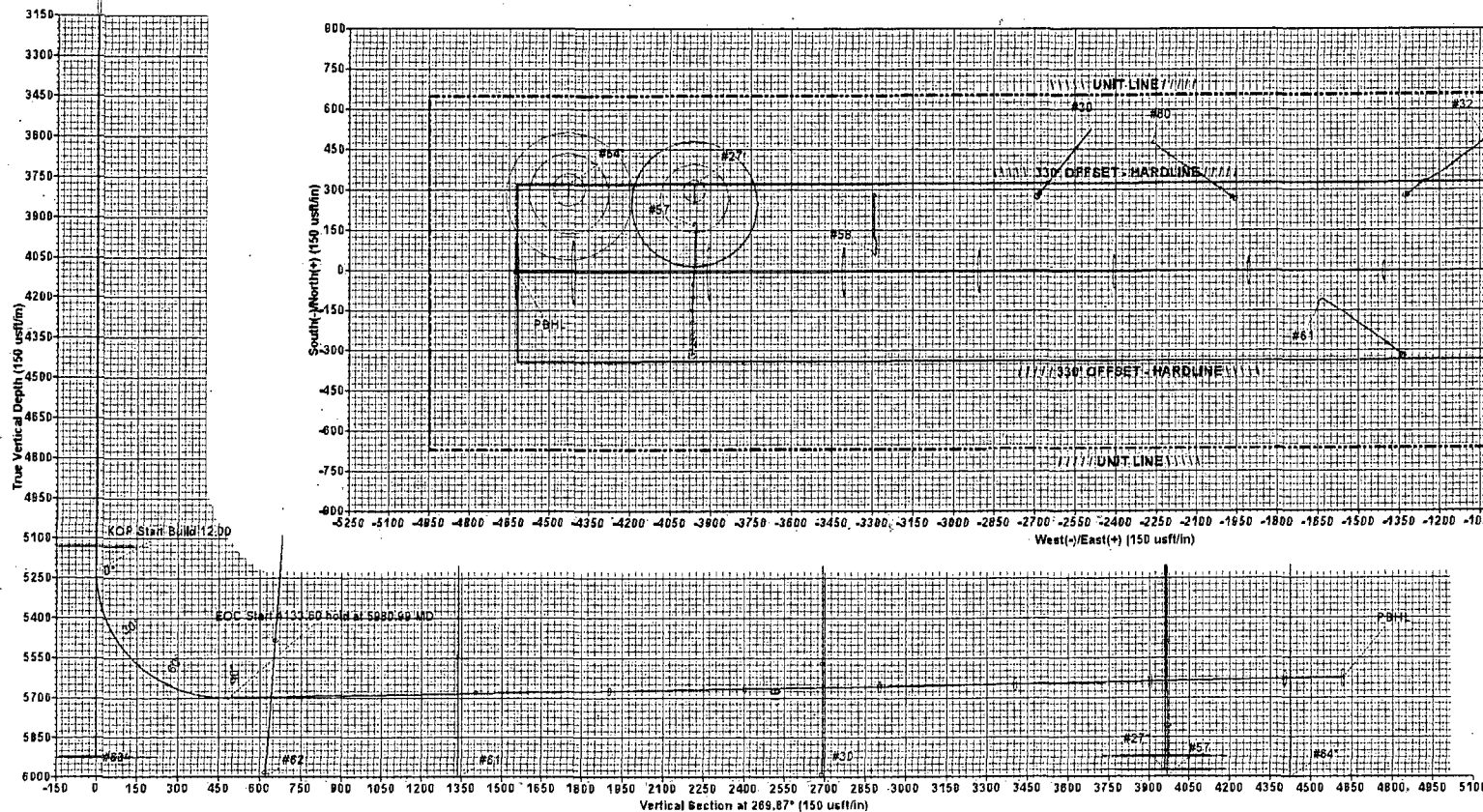
DESIGN TARGET DETAILS					
Name	TVD	+N/S	+E/W	Northing	Easting
PBHL	5628.00	-10.20	-4618.85	674720.10	612564.00

SITE DETAILS: Electra Federal	
Site Centre Northing: 669772.60	Easting: 612561.50
Positional Uncertainty: 0.00	Convergence: 0.20
Local North: Grid	
PROJECT DETAILS: Eddy County, NM (NAN27 NME)	
Geodetic System: US State Plane 1927 (Exact solution)	
Datum: NAD 1927 (NADCON CONUS)	
Ellipsoid: Clarke 1866	
Zone: New Mexico East 3001	
System Datum: Mean Sea Level	

Map System: US State Plane 1927 (Exact solution)	Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866	Zone Name: New Mexico East 3001
Local Origin: Well #101H, Grid North	
Latitude: 32° 51' 15.609 N	Longitude: 103° 57' 6.262 W
Grid East: 617182.50	Grid North: 674730.30
Scale Factor: 1.000	
Geomagnetic Model: BGGM2012	
Sample Date: 26-Oct-12	
Magnetic Declination: 7.75°	
Dip Angle from Horizontal: 60.64°	
Magnetic Field Strength: 48801	
To convert a Magnetic Direction to a Grid Direction, Add 7.54°	
To convert a Magnetic Direction to a True Direction, Add 7.75° East	
To convert a True Direction to a Grid Direction, Subtract 0.21°	



GL @ 3729.00usft
Ground Level: 3729.00





COG Operating LLC

Eddy County, NM (NAN27 NME)

Electra Federal #101H

OH

Plan #1 8-3/4" Hole

Anticollision Report

26 October, 2012



Scientific Drilling



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Reference	Plan #1 8-3/4" Hole		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 9,999.98 usft	Error Surface:	Circular Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date: 10/26/2012			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	5,222.50	Plan #1 8-3/4" Hole (OH)	Keeper	Standard Wireline Keeper ver 1.0.2
5,222.50	10,114.58	Plan #1 8-3/4" Hole (OH)	MWD	MWD - Standard

Summary							
Site Name	Reference	Offset	Distance		Separation Factor	Warning	
	Measured Depth (usft)	Measured Depth (usft)	Between Centres (usft)	Between Ellipses (usft)			
Offset Well - Wellbore - Design							
Electra Federal							
#27* - OH - OH	9,454.32	5,622.07	258.58	-70.43	0.786	Level 1, CC, ES, SF	
#30 - OH - Plan #1 - 7-7/8" Hole	8,185.11	5,690.62	279.88	196.40	3.353	CC	
#30 - OH - Plan #1 - 7-7/8" Hole	8,200.00	5,690.36	280.28	196.39	3.341	ES, SF	
#32 - OH - Job #32D0409129 - Actual	1,415.56	1,414.70	1,126.61	1,123.57	370.149	CC, ES	
#32 - OH - Job #32D0409129 - Actual	7,800.00	4,470.00	1,590.44	1,518.97	22.251	SF	
#57 - OH - Job #32D0111055 - OH	9,462.60	5,643.52	285.75	165.64	2.379	CC, ES	
#57 - OH - Job #32D0111055 - OH	9,500.00	5,643.18	288.18	167.05	2.379	SF	
#58 - OH - Actual	8,807.72	4,417.00	1,278.17	1,180.76	13.121	CC, ES	
#58 - OH - Actual	9,300.00	4,417.00	1,369.69	1,258.76	12.347	SF	
#60 - OH - Actual	7,461.25	4,924.00	842.01	779.23	13.411	CC	
#60 - OH - Actual	7,500.00	4,924.00	842.90	779.06	13.203	ES	
#60 - OH - Actual	7,800.00	4,924.00	907.60	835.56	12.599	SF	
#61 - OH - Job #32D0610466 - Actual	6,832.30	5,723.95	320.89	273.87	6.825	CC, ES	
#61 - OH - Job #32D0610466 - Actual	6,900.00	5,722.38	327.95	279.11	6.715	SF	
#62 - OH - Plan #3 8-3/4" Hole	6,135.61	5,730.83	305.58	274.89	9.956	CC, ES	
#62 - OH - Plan #3 8-3/4" Hole	6,200.00	5,725.24	312.24	279.95	9.669	SF	
#63* - OH - OH	5,281.37	5,282.38	65.00	-138.74	0.319	Level 1, CC	
#63* - OH - OH	5,300.00	5,300.84	65.07	-139.40	0.318	Level 1, SF	
#63* - OH - OH	5,325.00	5,325.41	65.52	-139.95	0.319	Level 1, ES	
#64* - OH - OH	9,919.98	5,605.51	287.83	-51.32	0.849	Level 1, CC, ES, SF	

Offset Design	Electra Federal - #27* - OH - OH										Offset Site Error:	0.00 usft
Survey Program:	178-UNKNOWN										Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Highside		Offset Wellbore Centre		Distance		Minimum Separation	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Reference (usft)	Offset (usft)	N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	-85.37	320.72	-3,959.30	3,972.32			
100.00	100.00	80.97	80.97	0.09	1.62	-85.37	320.56	-3,959.30	3,972.25	3,970.54	1.71	2,324.052
200.00	200.00	182.58	182.57	0.22	3.74	-85.38	318.91	-3,959.30	3,972.20	3,968.24	3.96	1,002.484
300.00	300.00	284.37	284.36	0.35	7.82	-85.40	318.71	-3,959.30	3,972.11	3,963.94	8.17	486.152
400.00	400.00	386.15	386.13	0.48	11.90	-85.42	316.93	-3,959.30	3,971.97	3,959.59	12.38	320.882
500.00	500.00	487.91	487.86	0.61	15.97	-85.46	314.58	-3,959.30	3,971.78	3,955.20	16.59	239.476
600.00	600.00	589.05	588.95	0.74	20.02	-85.50	311.69	-3,959.30	3,971.56	3,950.79	20.77	191.232

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #275 - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 178-UNKNOWN													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
700.00	700.00	688.08	687.95	0.88	24.00	-85.54	308.96	-3,959.30	3,971.34	3,946.47	24.87	159.676		
800.00	800.00	788.67	788.50	1.01	28.03	-85.58	306.17	-3,959.30	3,971.13	3,942.09	29.04	136.762		
900.00	900.00	889.12	888.90	1.14	32.06	-85.62	303.19	-3,959.30	3,970.90	3,937.70	33.20	119.617		
1,000.00	1,000.00	988.48	988.22	1.27	36.04	-85.66	300.27	-3,959.30	3,970.68	3,933.36	37.31	106.414		
1,100.00	1,100.00	1,087.85	1,087.55	1.40	40.03	-85.70	297.55	-3,959.30	3,970.47	3,929.04	41.43	95.835		
1,200.00	1,200.00	1,187.75	1,187.42	1.53	44.03	-85.74	294.94	-3,959.30	3,970.28	3,924.71	45.57	87.129		
1,300.00	1,300.00	1,287.72	1,287.35	1.67	48.04	-85.78	292.32	-3,959.30	3,970.08	3,920.37	49.71	79.869		
1,400.00	1,400.00	1,387.08	1,386.68	1.80	52.02	-85.81	289.80	-3,959.30	3,969.90	3,916.08	53.82	73.763		
1,500.00	1,500.00	1,486.31	1,485.88	1.93	56.00	-85.85	287.54	-3,959.30	3,969.73	3,911.80	57.93	68.531		
1,600.00	1,600.00	1,585.54	1,585.10	2.06	59.97	-85.88	285.54	-3,959.30	3,969.58	3,907.55	62.03	63.992		
1,700.00	1,700.00	1,684.79	1,684.33	2.19	63.94	-85.90	283.79	-3,959.30	3,969.46	3,903.32	66.14	60.017		
1,800.00	1,800.00	1,784.05	1,783.58	2.33	67.92	-85.92	282.29	-3,959.30	3,969.35	3,899.10	70.25	56.506		
1,900.00	1,900.00	1,883.67	1,883.20	2.46	71.91	-85.94	281.01	-3,959.30	3,969.26	3,894.89	74.36	53.376		
2,000.00	2,000.00	1,983.42	1,982.94	2.59	75.90	-85.96	279.81	-3,959.30	3,969.17	3,890.69	78.49	50.571		
2,100.00	2,100.00	2,083.18	2,082.69	2.72	79.89	-85.97	278.70	-3,959.30	3,969.10	3,886.49	82.61	48.047		
2,200.00	2,200.00	2,182.93	2,182.43	2.85	83.88	-85.99	277.67	-3,959.30	3,969.02	3,882.29	86.73	45.763		
2,300.00	2,300.00	2,282.68	2,282.19	2.99	87.87	-86.00	276.73	-3,959.30	3,968.96	3,878.10	90.85	43.685		
2,400.00	2,400.00	2,382.61	2,382.11	3.12	91.86	-86.01	275.86	-3,959.30	3,968.90	3,873.92	94.98	41.786		
2,500.00	2,500.00	2,482.61	2,482.10	3.25	95.86	-86.03	274.98	-3,959.30	3,968.84	3,869.72	99.11	40.044		
2,600.00	2,600.00	2,582.60	2,582.09	3.38	99.86	-86.04	274.11	-3,959.30	3,968.78	3,865.53	103.24	38.441		
2,700.00	2,700.00	2,682.60	2,682.08	3.51	103.86	-86.05	273.24	-3,959.30	3,968.72	3,861.34	107.38	36.961		
2,800.00	2,800.00	2,782.60	2,782.08	3.64	107.86	-86.06	272.37	-3,959.30	3,968.66	3,857.15	111.51	35.591		
2,900.00	2,900.00	2,882.59	2,882.07	3.78	111.86	-86.08	271.49	-3,959.30	3,968.60	3,852.96	115.64	34.319		
3,000.00	3,000.00	2,982.59	2,982.06	3.91	115.86	-86.09	270.62	-3,959.30	3,968.54	3,848.77	119.77	33.135		
3,100.00	3,100.00	3,082.58	3,082.05	4.04	119.86	-86.10	269.75	-3,959.30	3,968.48	3,844.57	123.90	32.029		
3,200.00	3,200.00	3,182.58	3,182.05	4.17	123.86	-86.12	268.88	-3,959.30	3,968.42	3,840.38	128.03	30.995		
3,300.00	3,300.00	3,282.58	3,282.04	4.30	127.86	-86.13	268.00	-3,959.30	3,968.36	3,836.19	132.17	30.026		
3,400.00	3,400.00	3,382.57	3,382.03	4.44	131.86	-86.14	267.13	-3,959.30	3,968.30	3,832.00	136.30	29.115		
3,500.00	3,500.00	3,482.57	3,482.02	4.57	135.86	-86.15	266.26	-3,959.30	3,968.24	3,827.81	140.43	28.258		
3,600.00	3,600.00	3,582.56	3,582.02	4.70	139.86	-86.17	265.39	-3,959.30	3,968.18	3,823.62	144.56	27.450		
3,700.00	3,700.00	3,682.56	3,682.01	4.83	143.86	-86.18	264.51	-3,959.30	3,968.12	3,819.43	148.69	26.687		
3,800.00	3,800.00	3,782.47	3,781.92	4.96	147.86	-86.19	263.65	-3,959.30	3,968.07	3,815.24	152.82	25.965		
3,900.00	3,900.00	3,882.26	3,881.70	5.09	151.85	-86.20	262.85	-3,959.30	3,968.01	3,811.07	156.95	25.283		
4,000.00	4,000.00	3,982.05	3,981.49	5.23	155.84	-86.21	262.13	-3,959.30	3,967.97	3,806.90	161.07	24.635		
4,100.00	4,100.00	4,081.85	4,081.28	5.36	159.83	-86.22	261.48	-3,959.30	3,967.92	3,802.73	165.19	24.020		
4,200.00	4,200.00	4,181.64	4,181.07	5.49	163.82	-86.23	260.92	-3,959.30	3,967.89	3,798.57	169.31	23.435		
4,300.00	4,300.00	4,281.43	4,280.87	5.62	167.82	-86.24	260.43	-3,959.30	3,967.85	3,794.42	173.44	22.878		
4,400.00	4,400.00	4,381.61	4,381.04	5.75	171.82	-86.24	259.96	-3,959.30	3,967.82	3,790.25	177.58	22.344		
4,500.00	4,500.00	4,481.85	4,481.28	5.89	175.83	-86.25	259.40	-3,959.30	3,967.79	3,786.07	181.72	21.835		
4,600.00	4,600.00	4,582.09	4,581.51	6.02	179.84	-86.26	258.74	-3,959.30	3,967.74	3,781.88	185.86	21.348		
4,700.00	4,700.00	4,682.32	4,681.75	6.15	183.85	-86.27	257.99	-3,959.30	3,967.69	3,777.69	190.00	20.883		
4,800.00	4,800.00	4,782.52	4,781.94	6.28	187.86	-86.28	257.15	-3,959.30	3,967.64	3,773.50	194.14	20.437		
4,900.00	4,900.00	4,882.52	4,881.94	6.41	191.86	-86.30	256.28	-3,959.30	3,967.58	3,769.31	198.27	20.011		
5,000.00	5,000.00	4,982.51	4,981.93	6.54	195.86	-86.31	255.41	-3,959.30	3,967.53	3,765.12	202.40	19.602		
5,100.00	5,100.00	5,082.51	5,081.92	6.68	199.86	-86.32	254.53	-3,959.30	3,967.47	3,760.93	206.54	19.209		
5,200.00	5,200.00	5,182.51	5,181.91	6.81	203.86	-86.33	253.66	-3,959.30	3,967.42	3,756.75	210.67	18.832		
5,222.50	5,222.50	5,205.01	5,204.41	6.84	204.76	-86.34	253.47	-3,959.30	3,967.40	3,755.80	211.60	18.750		
5,225.00	5,225.00	5,207.51	5,206.91	6.84	204.86	3.79	253.44	-3,959.30	3,967.40	3,755.69	211.70	18.741		
5,250.00	5,249.98	5,232.49	5,231.89	6.84	205.86	3.79	253.23	-3,959.30	3,966.60	3,753.90	212.70	18.649		
5,275.00	5,274.89	5,257.40	5,256.80	6.84	206.86	3.81	253.01	-3,959.30	3,964.50	3,750.80	213.70	18.552		
5,300.00	5,299.68	5,282.16	5,281.57	6.84	207.85	3.84	252.79	-3,959.30	3,961.10	3,746.41	214.69	18.450		
5,325.00	5,324.21	5,306.72	5,306.12	6.85	208.83	3.88	252.58	-3,959.30	3,956.41	3,740.74	215.68	18.344		

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



Scientific Drilling
Anticollision Report



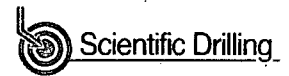
Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1, 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:
Electra Federal - #27 - OH - OH													0.00 usft
Survey Program: 178-UNKNOWN													Offset Well Error:
Reference													0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,350.00	5,348.49	5,330.99	5,330.39	6.85	209.80	3.93	252.37	-3,959.30	3,950.45	3,733.80	216.65	18.234	
5,375.00	5,372.42	5,354.92	5,354.32	6.86	210.76	4.00	252.16	-3,959.30	3,943.23	3,725.61	217.62	18.120	
5,400.00	5,395.94	5,378.44	5,377.84	6.88	211.70	4.08	251.95	-3,959.30	3,934.77	3,716.19	218.58	18.002	
5,425.00	5,418.99	5,401.49	5,400.88	6.90	212.62	4.17	251.75	-3,959.30	3,925.09	3,705.57	219.52	17.880	
5,450.00	5,441.49	5,423.99	5,423.39	6.93	213.52	4.29	251.55	-3,959.30	3,914.23	3,693.77	220.46	17.755	
5,475.00	5,463.40	5,445.90	5,445.29	6.98	214.40	4.43	251.36	-3,959.30	3,902.20	3,680.82	221.38	17.627	
5,500.00	5,484.65	5,467.14	5,466.54	7.04	215.25	4.58	251.18	-3,959.30	3,889.05	3,666.76	222.29	17.495	
5,525.00	5,505.17	5,487.67	5,487.07	7.12	216.07	4.77	251.00	-3,959.30	3,874.81	3,651.62	223.19	17.361	
5,550.00	5,524.93	5,507.42	5,506.82	7.22	216.86	4.98	250.83	-3,959.30	3,859.51	3,635.43	224.08	17.224	
5,575.00	5,543.85	5,526.35	5,525.74	7.35	217.62	5.23	250.66	-3,959.30	3,843.21	3,618.24	224.96	17.084	
5,600.00	5,561.90	5,544.39	5,543.79	7.50	218.34	5.52	250.50	-3,959.30	3,825.94	3,600.10	225.84	16.941	
5,625.00	5,579.01	5,561.51	5,560.90	7.68	219.02	5.86	250.35	-3,959.30	3,807.75	3,581.04	226.71	16.796	
5,650.00	5,595.15	5,577.65	5,577.04	7.90	219.67	6.26	250.21	-3,959.30	3,788.70	3,561.12	227.57	16.648	
5,675.00	5,610.27	5,592.76	5,592.16	8.15	220.27	6.73	250.08	-3,959.30	3,768.83	3,540.40	228.43	16.499	
5,700.00	5,624.32	5,606.82	5,606.21	8.44	220.84	7.30	249.96	-3,959.30	3,748.20	3,518.92	229.28	16.348	
5,725.00	5,637.28	5,619.77	5,619.16	8.77	221.36	8.00	249.85	-3,959.30	3,726.86	3,496.74	230.12	16.195	
5,750.00	5,649.10	5,631.59	5,630.98	9.13	221.83	8.85	249.74	-3,959.30	3,704.88	3,473.93	230.95	16.042	
5,775.00	5,659.74	5,642.24	5,641.63	9.52	222.25	9.93	249.65	-3,959.30	3,682.31	3,450.54	231.77	15.887	
5,800.00	5,669.20	5,651.69	5,651.08	9.95	222.63	11.33	249.57	-3,959.30	3,659.22	3,426.64	232.58	15.733	
5,825.00	5,677.42	5,659.92	5,659.31	10.40	222.96	13.19	249.50	-3,959.30	3,635.67	3,402.31	233.37	15.579	
5,850.00	5,684.40	5,666.90	5,666.29	10.89	223.24	15.79	249.43	-3,959.30	3,611.73	3,377.80	234.13	15.426	
5,875.00	5,690.12	5,672.61	5,672.00	11.40	223.47	19.61	249.39	-3,959.30	3,587.45	3,352.58	234.87	15.274	
5,900.00	5,694.55	5,677.05	5,676.44	11.93	223.65	25.69	249.35	-3,959.30	3,562.91	3,327.34	235.58	15.124	
5,925.00	5,697.69	5,680.19	5,679.58	12.48	223.77	36.45	249.32	-3,959.30	3,538.18	3,301.93	236.25	14.976	
5,950.00	5,699.53	5,682.03	5,681.42	13.04	223.85	57.55	249.30	-3,959.30	3,513.31	3,276.43	236.89	14.831	
5,975.00	5,700.07	5,682.56	5,681.95	13.62	223.87	94.25	249.30	-3,959.30	3,488.39	3,250.90	237.49	14.689	
5,980.99	5,700.00	5,682.50	5,681.88	13.76	223.86	103.65	249.30	-3,959.30	3,482.42	3,244.80	237.62	14.655	
6,000.00	5,699.67	5,682.16	5,681.55	14.20	223.85	103.58	249.30	-3,959.30	3,463.46	3,225.41	238.05	14.549	
6,100.00	5,697.93	5,680.43	5,679.81	16.62	223.78	103.22	249.32	-3,959.30	3,363.77	3,123.36	240.40	13.992	
6,200.00	5,696.18	5,678.69	5,678.07	19.13	223.71	102.85	249.33	-3,959.30	3,264.09	3,021.24	242.84	13.441	
6,300.00	5,694.44	5,676.95	5,676.33	21.70	223.64	102.48	249.35	-3,959.30	3,164.43	2,919.08	245.34	12.898	
6,400.00	5,692.70	5,675.21	5,674.59	24.31	223.57	102.11	249.36	-3,959.30	3,064.79	2,816.90	247.88	12.364	
6,500.00	5,690.96	5,673.47	5,672.85	28.95	223.50	101.74	249.38	-3,959.30	2,965.17	2,714.72	250.45	11.839	
6,600.00	5,689.22	5,671.73	5,671.11	29.61	223.43	101.37	249.39	-3,959.30	2,865.58	2,612.54	253.04	11.325	
6,700.00	5,687.47	5,669.99	5,669.37	32.28	223.36	101.00	249.41	-3,959.30	2,766.02	2,510.37	255.65	10.820	
6,800.00	5,685.73	5,668.25	5,667.63	34.97	223.29	100.62	249.42	-3,959.30	2,666.49	2,408.22	258.27	10.325	
6,900.00	5,683.99	5,666.51	5,665.89	37.67	223.23	100.25	249.44	-3,959.30	2,566.99	2,306.10	260.89	9.839	
7,000.00	5,682.25	5,664.77	5,664.16	40.37	223.16	99.88	249.45	-3,959.30	2,467.53	2,204.00	263.53	9.363	
7,100.00	5,680.51	5,663.03	5,662.42	43.09	223.09	99.50	249.47	-3,959.30	2,368.12	2,101.95	266.17	8.897	
7,200.00	5,678.77	5,661.29	5,660.68	45.80	223.02	99.12	249.48	-3,959.30	2,268.76	1,999.94	268.82	8.440	
7,300.00	5,677.02	5,659.55	5,658.94	48.52	222.95	98.75	249.50	-3,959.30	2,169.46	1,897.99	271.47	7.991	
7,400.00	5,675.28	5,657.81	5,657.20	51.25	222.88	98.37	249.51	-3,959.30	2,070.22	1,796.10	274.13	7.552	
7,500.00	5,673.54	5,656.07	5,655.46	53.98	222.81	97.99	249.53	-3,959.30	1,971.06	1,694.27	276.78	7.121	
7,600.00	5,671.80	5,654.33	5,653.72	56.71	222.74	97.61	249.54	-3,959.30	1,871.98	1,592.54	279.45	6.699	
7,700.00	5,670.06	5,652.59	5,651.98	59.44	222.67	97.23	249.56	-3,959.30	1,773.01	1,490.90	282.11	6.285	
7,800.00	5,668.32	5,650.85	5,650.24	62.17	222.60	96.85	249.57	-3,959.30	1,674.16	1,389.39	284.77	5.879	
7,900.00	5,666.57	5,649.11	5,648.50	64.91	222.53	96.47	249.59	-3,959.30	1,575.45	1,288.01	287.44	5.481	
8,000.00	5,664.83	5,647.37	5,646.76	67.65	222.46	96.09	249.61	-3,959.30	1,476.91	1,186.80	290.11	5.091	
8,100.00	5,663.09	5,645.63	5,645.02	70.39	222.39	95.71	249.62	-3,959.30	1,378.58	1,085.81	292.78	4.709	
8,200.00	5,661.35	5,643.89	5,643.28	73.13	222.32	95.32	249.64	-3,959.30	1,280.51	985.06	295.45	4.334	
8,300.00	5,659.61	5,642.15	5,641.54	75.87	222.25	94.94	249.65	-3,959.30	1,182.76	884.64	298.12	3.967	
8,400.00	5,657.86	5,640.41	5,639.80	78.61	222.18	94.56	249.67	-3,959.30	1,085.41	784.62	300.79	3.609	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27-NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design: Electra Federal - #27* - OH = OH														Offset Site Error:	0.00 usft
Survey Program: 178-UNKNOWN														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance									
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N/S (usft)	Offset Wellbore Centre E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
8,500.00	5,656.12	5,638.67	5,638.06	81.35	222.11	94.17	249.68	-3,959.30	988.59	685.13	303.47	3.258			
8,600.00	5,654.38	5,636.93	5,636.32	84.10	222.04	93.79	249.70	-3,959.30	892.47	586.33	306.14	2.915			
8,700.00	5,652.64	5,635.19	5,634.58	86.84	221.97	93.41	249.71	-3,959.30	797.30	488.49	308.82	2.582			
8,800.00	5,650.90	5,633.45	5,632.84	89.59	221.90	93.02	249.73	-3,959.30	703.47	391.98	311.49	2.258			
8,900.00	5,649.16	5,631.71	5,631.10	92.33	221.83	92.64	249.74	-3,959.30	611.59	297.42	314.17	1.947			
9,000.00	5,647.41	5,629.97	5,629.36	95.08	221.76	92.25	249.76	-3,959.30	522.69	205.85	316.84	1.650			
9,100.00	5,645.67	5,628.23	5,627.62	97.83	221.69	91.87	249.77	-3,959.30	438.60	119.08	319.52	1.373 Level 3			
9,200.00	5,643.93	5,626.49	5,625.88	100.57	221.62	91.48	249.79	-3,959.30	362.66	40.46	322.20	1.126 Level 2			
9,300.00	5,642.19	5,624.75	5,624.14	103.32	221.55	91.09	249.80	-3,959.30	301.12	-23.76	324.88	0.927 Level 1			
9,400.00	5,640.45	5,623.01	5,622.40	106.07	221.49	90.71	249.82	-3,959.30	264.22	-63.33	327.56	0.807 Level 1			
9,454.32	5,639.50	5,622.07	5,621.46	107.56	221.45	90.50	249.83	-3,959.30	258.58	-70.43	329.01	0.786 Level 1, CC, ES, SF			
9,500.00	5,638.70	5,621.27	5,620.66	108.82	221.42	90.32	249.83	-3,959.30	262.58	-67.65	330.23	0.795 Level 1			
9,600.00	5,636.96	5,619.53	5,618.92	111.57	221.35	89.94	249.85	-3,959.30	296.78	-36.13	332.91	0.891 Level 1			
9,700.00	5,635.22	5,617.79	5,617.18	114.32	221.28	89.55	249.86	-3,959.30	356.66	21.06	335.59	1.063 Level 2			
9,800.00	5,633.48	5,616.05	5,615.44	117.07	221.21	89.17	249.88	-3,959.30	431.65	93.38	338.27	1.276 Level 3			
9,900.00	5,631.74	5,614.31	5,613.70	119.82	221.14	88.78	249.89	-3,959.30	515.20	174.25	340.95	1.511			
10,000.00	5,630.00	5,612.57	5,611.96	122.56	221.07	88.40	249.91	-3,959.30	603.77	260.14	343.63	1.757			
10,100.00	5,628.25	5,610.83	5,610.22	125.31	221.00	88.01	249.92	-3,959.30	695.44	349.13	346.31	2.008			
10,114.58	5,628.00	5,610.58	5,609.97	125.72	220.99	87.98	249.93	-3,959.30	709.00	362.29	346.70	2.045			

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid:
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User.Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.00 usft
Electra Federal - #30 - OH - Plan #1 - 7-7/8" Hole												Offset Well Error:	0.00 usft
Survey Program: O-Keeper, 1450-MWD													
Reference		Offset		Semi Major Axis		Distance		Minimum		Separation		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.00	0.00	11.00	11.00	0.00	0.01	-78.12	524.14	-2,490.99	2,545.53				
100.00	100.00	111.00	111.00	0.09	0.10	-78.12	524.14	-2,490.99	2,545.53	2,545.34	0.19	N/A	
200.00	200.00	211.00	211.00	0.22	0.23	-78.12	524.14	-2,490.99	2,545.53	2,545.08	0.45	5,644.891	
300.00	300.00	311.00	311.00	0.35	0.36	-78.12	524.14	-2,490.99	2,545.53	2,544.82	0.71	3,569.421	
400.00	400.00	411.00	411.00	0.48	0.50	-78.12	524.14	-2,490.99	2,545.53	2,544.56	0.98	2,607.704	
500.00	500.00	511.00	511.00	0.61	0.63	-78.12	524.14	-2,490.99	2,545.53	2,544.29	1.24	2,053.752	
600.00	600.00	611.00	611.00	0.74	0.76	-78.12	524.14	-2,490.99	2,545.53	2,544.03	1.50	1,693.763	
700.00	700.00	711.00	711.00	0.88	0.89	-78.12	524.14	-2,490.99	2,545.53	2,543.77	1.77	1,441.091	
800.00	800.00	811.00	811.00	1.01	1.02	-78.12	524.14	-2,490.99	2,545.53	2,543.50	2.03	1,253.991	
900.00	900.00	911.00	911.00	1.14	1.15	-78.12	524.14	-2,490.99	2,545.53	2,543.24	2.29	1,109.877	
1,000.00	1,000.00	1,011.00	1,011.00	1.27	1.29	-78.12	524.14	-2,490.99	2,545.53	2,542.98	2.56	995.465	
1,100.00	1,100.00	1,111.00	1,111.00	1.40	1.42	-78.12	524.14	-2,490.99	2,545.53	2,542.71	2.82	902.432	
1,200.00	1,200.00	1,211.00	1,211.00	1.53	1.55	-78.12	524.14	-2,490.99	2,545.53	2,542.45	3.08	825.300	
1,300.00	1,300.00	1,311.00	1,311.00	1.67	1.68	-78.12	524.14	-2,490.99	2,545.53	2,542.19	3.35	760.312	
1,400.00	1,400.00	1,411.00	1,411.00	1.80	1.81	-78.12	524.14	-2,490.99	2,545.53	2,541.92	3.61	704.811	
1,500.00	1,500.00	1,500.00	1,500.00	1.93	1.89	-78.13	523.80	-2,491.26	2,545.75	2,541.93	3.82	666.539	
1,600.00	1,600.00	1,565.05	1,565.02	2.06	1.90	-78.16	522.33	-2,492.43	2,546.99	2,543.02	3.97	642.272	
1,700.00	1,700.00	1,636.35	1,636.21	2.19	1.93	-78.24	519.40	-2,494.76	2,549.35	2,545.23	4.12	618.067	
1,800.00	1,800.00	1,700.00	1,699.68	2.33	1.96	-78.34	515.61	-2,497.78	2,552.87	2,548.58	4.29	594.959	
1,900.00	1,900.00	1,788.17	1,785.39	2.46	2.04	-78.51	508.73	-2,503.26	2,557.52	2,553.02	4.50	568.739	
2,000.00	2,000.00	1,874.21	1,872.83	2.59	2.14	-78.72	500.67	-2,509.68	2,562.86	2,558.13	4.73	541.891	
2,100.00	2,100.00	1,973.52	1,971.46	2.72	2.27	-78.95	491.57	-2,516.93	2,568.28	2,563.28	5.00	514.059	
2,200.00	2,200.00	2,072.83	2,070.09	2.85	2.44	-79.18	482.48	-2,524.17	2,573.73	2,568.44	5.29	486.562	
2,300.00	2,300.00	2,172.14	2,168.72	2.99	2.62	-79.41	473.38	-2,531.42	2,579.23	2,573.62	5.61	459.891	
2,400.00	2,400.00	2,271.46	2,267.35	3.12	2.83	-79.64	464.29	-2,538.66	2,584.76	2,578.81	5.95	434.391	
2,500.00	2,500.00	2,370.77	2,365.98	3.25	3.06	-79.86	455.20	-2,545.91	2,590.34	2,584.03	6.31	410.321	
2,600.00	2,600.00	2,470.08	2,464.61	3.38	3.31	-80.09	446.10	-2,553.15	2,595.96	2,589.27	6.69	387.871	
2,700.00	2,700.00	2,569.39	2,563.24	3.51	3.57	-80.31	437.01	-2,560.39	2,601.62	2,594.53	7.09	367.135	
2,800.00	2,800.00	2,668.71	2,661.87	3.64	3.85	-80.54	427.91	-2,567.64	2,607.32	2,599.83	7.49	348.108	
2,900.00	2,900.00	2,768.02	2,760.50	3.78	4.13	-80.76	418.82	-2,574.88	2,613.06	2,605.16	7.90	330.712	
3,000.00	3,000.00	2,867.33	2,859.13	3.91	4.41	-80.98	409.72	-2,582.13	2,618.84	2,610.52	8.32	314.827	
3,100.00	3,100.00	2,966.64	2,957.75	4.04	4.70	-81.20	400.63	-2,589.37	2,624.86	2,615.92	8.74	300.314	
3,200.00	3,200.00	3,065.96	3,056.38	4.17	4.99	-81.43	391.54	-2,596.61	2,630.52	2,621.35	9.16	287.037	
3,300.00	3,300.00	3,165.27	3,155.01	4.30	5.29	-81.64	382.44	-2,603.86	2,636.41	2,626.82	9.59	274.866	
3,400.00	3,400.00	3,264.58	3,253.64	4.44	5.59	-81.86	373.35	-2,611.10	2,642.35	2,632.33	10.02	263.683	
3,500.00	3,500.00	3,363.89	3,352.27	4.57	5.88	-82.08	364.25	-2,618.35	2,648.32	2,637.87	10.45	253.381	
3,600.00	3,600.00	3,463.20	3,450.90	4.70	6.19	-82.30	355.16	-2,625.59	2,654.34	2,643.45	10.88	243.868	
3,700.00	3,700.00	3,562.52	3,549.53	4.83	6.49	-82.51	346.06	-2,632.84	2,660.39	2,649.07	11.32	235.062	
3,800.00	3,800.00	3,661.83	3,648.16	4.96	6.79	-82.73	336.97	-2,640.08	2,666.47	2,654.72	11.75	226.890	
3,900.00	3,900.00	3,761.14	3,746.79	5.09	7.09	-82.94	327.87	-2,647.32	2,672.60	2,660.41	12.19	219.290	
4,000.00	4,000.00	3,860.45	3,845.42	5.23	7.40	-83.15	318.78	-2,654.57	2,678.76	2,666.14	12.62	212.205	
4,100.00	4,100.00	3,959.77	3,944.05	5.36	7.70	-83.36	309.69	-2,661.81	2,684.96	2,671.90	13.06	205.586	
4,200.00	4,200.00	4,059.08	4,042.68	5.49	8.01	-83.57	300.59	-2,669.06	2,691.20	2,677.70	13.50	199.390	
4,300.00	4,300.00	4,158.39	4,141.31	5.62	8.31	-83.78	291.50	-2,676.30	2,697.47	2,683.54	13.93	193.580	
4,400.00	4,400.00	4,257.70	4,239.82	5.75	8.60	-84.00	282.41	-2,683.54	2,703.71	2,689.57	14.36	187.770	
4,500.00	4,500.00	4,357.01	4,338.62	5.88	8.90	-84.21	273.32	-2,690.78	2,709.95	2,695.59	14.79	181.960	
4,600.00	4,600.00	4,456.32	4,437.53	6.01	9.19	-84.42	264.23	-2,698.02	2,716.19	2,701.53	15.22	176.150	
4,700.00	4,700.00	4,555.63	4,536.44	6.14	9.48	-84.63	255.14	-2,705.26	2,722.43	2,707.57	15.65	170.340	
4,800.00	4,800.00	4,654.94	4,635.35	6.27	9.77	-84.84	246.05	-2,712.50	2,728.67	2,713.51	16.08	164.530	
4,900.00	4,900.00	4,754.25	4,734.26	6.40	10.06	-85.05	236.96	-2,719.74	2,734.91	2,719.55	16.51	158.720	
5,000.00	5,000.00	4,853.56	4,833.17	6.53	10.35	-85.26	227.87	-2,726.98	2,741.15	2,725.79	16.94	152.910	
5,100.00	5,100.00	4,952.87	4,931.98	6.66	10.64	-85.47	218.78	-2,734.22	2,747.39	2,731.93	17.37	147.100	

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



Scientific Drilling
Anticollision Report



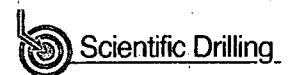
Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single-User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error	0.00 usft
Electra Federal #30 : OH - Plan #1 - 7-7/8" Hole												Offset Well Error	0.00 usft
Survey Program: 0-Keeper, 1450-MWD													
Reference		Offset		Semi Major Axis		Distance		Minimum		Separation		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside To surface (")	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
5,200.00	5,200.00	5,229.02	5,211.00	6.81	10.02	-84.19	273.94	-2,690.29	2,704.20	2,687.37	16.83	160.723	
5,222.50	5,222.50	5,251.52	5,233.50	6.84	10.05	-84.19	273.94	-2,690.29	2,704.20	2,687.31	16.89	160.109	
5,225.00	5,225.00	5,254.02	5,236.00	6.84	10.06	5.94	273.94	-2,690.29	2,704.19	2,687.30	16.89	160.061	
5,250.00	5,249.98	5,279.00	5,260.98	6.84	10.09	5.95	273.94	-2,690.29	2,703.41	2,686.48	16.93	159.646	
5,275.00	5,274.89	5,303.91	5,285.89	6.84	10.13	5.98	273.94	-2,690.29	2,701.33	2,684.36	16.97	159.151	
5,300.00	5,299.66	5,328.68	5,310.66	6.84	10.17	6.03	273.94	-2,690.29	2,697.96	2,680.94	17.01	158.571	
5,325.00	5,324.21	5,353.23	5,335.21	6.85	10.21	6.10	273.94	-2,690.29	2,693.30	2,676.24	17.06	157.905	
5,350.00	5,348.49	5,377.51	5,359.49	6.85	10.25	6.20	273.94	-2,690.29	2,687.37	2,670.27	17.10	157.147	
5,375.00	5,372.42	5,401.44	5,383.42	6.86	10.29	6.31	273.94	-2,690.29	2,680.19	2,663.04	17.15	156.289	
5,400.00	5,395.94	5,424.96	5,406.94	6.88	10.32	6.45	273.94	-2,690.29	2,671.77	2,654.57	17.20	155.316	
5,425.00	5,418.99	5,448.00	5,429.99	6.90	10.36	6.62	273.94	-2,690.29	2,662.14	2,644.87	17.26	154.218	
5,450.00	5,441.49	5,470.51	5,452.49	6.93	10.40	6.81	273.94	-2,690.29	2,651.32	2,633.99	17.33	152.981	
5,475.00	5,463.40	5,492.42	5,474.40	6.98	10.43	7.04	273.94	-2,690.29	2,639.35	2,621.94	17.41	151.588	
5,500.00	5,484.65	5,513.66	5,495.65	7.04	10.47	7.31	273.94	-2,690.29	2,626.25	2,608.75	17.51	150.018	
5,525.00	5,505.17	5,534.19	5,516.17	7.12	10.50	7.62	273.94	-2,690.29	2,612.07	2,594.45	17.62	148.256	
5,550.00	5,524.93	5,553.94	5,535.93	7.22	10.53	7.97	273.94	-2,690.29	2,596.84	2,579.09	17.75	146.288	
5,575.00	5,543.85	5,572.87	5,554.85	7.35	10.56	8.39	273.94	-2,690.29	2,580.61	2,562.70	17.91	144.103	
5,600.00	5,561.90	5,590.92	5,572.90	7.50	10.59	8.87	273.94	-2,690.29	2,563.41	2,545.32	18.09	141.693	
5,625.00	5,579.01	5,608.03	5,590.01	7.68	10.62	9.44	273.94	-2,690.29	2,545.30	2,527.00	18.30	139.057	
5,650.00	5,595.15	5,624.17	5,606.15	7.90	10.65	10.11	273.94	-2,690.29	2,526.33	2,507.78	18.55	136.203	
5,675.00	5,610.27	5,639.29	5,621.27	8.15	10.67	10.90	273.94	-2,690.29	2,506.54	2,487.72	18.83	133.145	
5,700.00	5,624.32	5,653.34	5,635.32	8.44	10.69	11.84	273.94	-2,690.29	2,486.00	2,466.87	19.14	129.906	
5,725.00	5,637.28	5,666.29	5,648.28	8.77	10.72	12.98	273.94	-2,690.29	2,464.76	2,445.28	19.48	126.512	
5,750.00	5,649.10	5,678.11	5,660.10	9.13	10.73	14.39	273.94	-2,690.29	2,442.88	2,423.02	19.86	122.996	
5,775.00	5,659.74	5,688.76	5,670.74	9.52	10.75	16.14	273.94	-2,690.29	2,420.41	2,400.14	20.27	119.391	
5,800.00	5,669.20	5,698.21	5,680.20	9.95	10.77	18.38	273.94	-2,690.29	2,397.43	2,376.71	20.72	115.733	
5,825.00	5,677.42	5,706.44	5,688.42	10.40	10.78	21.31	273.94	-2,690.29	2,373.99	2,352.80	21.19	112.055	
5,850.00	5,684.40	5,713.42	5,695.40	10.89	10.79	25.27	273.94	-2,690.29	2,350.15	2,328.47	21.68	108.391	
5,875.00	5,690.12	5,719.14	5,701.12	11.40	10.80	30.83	273.94	-2,690.29	2,325.99	2,303.79	22.20	104.769	
5,900.00	5,694.55	5,723.57	5,705.55	11.93	10.81	38.95	273.94	-2,690.29	2,301.57	2,278.83	22.74	101.214	
5,925.00	5,697.69	5,726.71	5,708.69	12.48	10.82	51.18	273.94	-2,690.29	2,276.96	2,253.66	23.29	97.747	
5,950.00	5,699.53	5,728.55	5,710.53	13.04	10.82	69.25	273.94	-2,690.29	2,252.22	2,228.36	23.86	94.387	
5,975.00	5,700.07	5,729.08	5,711.07	13.62	10.82	92.21	273.94	-2,690.29	2,227.43	2,202.99	24.44	91.146	
5,990.00	5,700.00	5,729.02	5,711.00	13.76	10.82	97.81	273.94	-2,690.29	2,221.49	2,196.91	24.58	90.389	
6,000.00	5,699.67	5,728.68	5,710.67	14.20	10.82	97.74	273.94	-2,690.29	2,202.63	2,177.61	25.02	88.028	
6,100.00	5,697.93	5,726.94	5,708.93	16.62	10.82	97.39	273.94	-2,690.29	2,103.49	2,076.06	27.44	76.666	
6,200.00	5,696.18	5,725.20	5,707.18	19.13	10.81	97.04	273.94	-2,690.29	2,004.44	1,974.50	29.94	66.941	
6,300.00	5,694.44	5,723.46	5,705.44	21.70	10.81	96.69	273.94	-2,690.29	1,905.49	1,872.98	32.51	58.613	
6,400.00	5,692.70	5,721.72	5,703.70	24.31	10.81	96.34	273.94	-2,690.29	1,806.65	1,771.53	35.12	51.447	
6,500.00	5,690.96	5,719.97	5,701.96	26.95	10.80	95.99	273.94	-2,690.29	1,707.94	1,670.19	37.75	45.241	
6,600.00	5,689.22	5,718.23	5,700.22	29.61	10.80	95.63	273.94	-2,690.29	1,609.39	1,568.98	40.41	39.827	
6,700.00	5,687.47	5,716.49	5,698.47	32.28	10.80	95.28	273.94	-2,690.29	1,511.03	1,467.95	43.08	35.073	
6,800.00	5,685.73	5,714.75	5,696.73	34.97	10.80	94.93	273.94	-2,690.29	1,412.89	1,367.13	45.77	30.871	
6,900.00	5,683.99	5,713.01	5,694.99	37.67	10.79	94.57	273.94	-2,690.29	1,315.04	1,266.58	48.46	27.136	
7,000.00	5,682.25	5,711.27	5,693.25	40.37	10.79	94.22	273.94	-2,690.29	1,217.53	1,166.37	51.16	23.796	
7,100.00	5,680.51	5,709.52	5,691.51	43.09	10.79	93.86	273.94	-2,690.29	1,120.46	1,066.59	53.87	20.798	
7,200.00	5,678.77	5,707.78	5,689.77	45.80	10.78	93.51	273.94	-2,690.29	1,023.95	967.36	56.59	18.095	
7,300.00	5,677.02	5,706.04	5,688.02	48.52	10.78	93.15	273.94	-2,690.29	928.17	868.87	59.31	15.651	
7,400.00	5,675.28	5,704.30	5,686.28	51.25	10.78	92.80	273.94	-2,690.29	833.39	771.36	62.03	13.436	
7,500.00	5,673.54	5,702.56	5,684.54	53.98	10.78	92.44	273.94	-2,690.29	739.97	675.22	64.75	11.428	
7,600.00	5,671.80	5,700.82	5,682.80	56.71	10.77	92.09	273.94	-2,690.29	648.52	581.04	67.48	9.611	
7,700.00	5,670.06	5,699.07	5,681.06	59.44	10.77	91.73	273.94	-2,690.29	559.99	489.78	70.21	7.976	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000:1 Single User Db.
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #30 - OH - Plan #1 - 7-7/8" Hole													Offset Site Error:	0.00 usft
Survey Program: O-Keeper, 1450-MWD													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
7,800.00	5,688.32	5,697.33	5,679.32	82.17	10.77	91.37	273.94	-2,690.29	476.02	403.08	72.94	6.526		
7,900.00	5,686.57	5,695.59	5,677.57	64.91	10.76	91.02	273.94	-2,690.29	399.49	323.82	75.67	5.279		
8,000.00	5,684.83	5,693.85	5,675.83	67.65	10.76	90.66	273.94	-2,690.29	335.54	257.13	78.41	4.279		
8,100.00	5,683.09	5,692.11	5,674.09	70.39	10.76	90.30	273.94	-2,690.29	292.53	211.38	81.15	3.605		
8,185.11	5,661.61	5,690.62	5,672.61	72.72	10.76	90.00	273.94	-2,690.29	279.88	196.40	83.48	3.353 CC		
8,200.00	5,661.35	5,690.36	5,672.35	73.13	10.75	89.95	273.94	-2,690.29	280.28	196.39	83.88	3.341 ES, SF		
8,300.00	5,659.61	5,688.62	5,670.61	75.87	10.75	89.59	273.94	-2,690.29	302.54	215.92	86.62	3.493		
8,400.00	5,657.86	5,686.88	5,668.86	78.61	10.75	89.23	273.94	-2,690.29	352.84	263.48	89.36	3.949		
8,500.00	5,656.12	5,685.14	5,667.12	81.35	10.75	88.88	273.94	-2,690.29	421.26	329.16	92.10	4.574		
8,600.00	5,654.38	5,683.40	5,665.38	84.10	10.74	88.52	273.94	-2,690.29	500.42	405.57	94.84	5.276		
8,700.00	5,652.64	5,681.66	5,663.64	86.84	10.74	88.16	273.94	-2,690.29	585.98	488.39	97.58	6.005		
8,800.00	5,650.90	5,679.91	5,661.90	89.59	10.74	87.81	273.94	-2,690.29	675.51	575.18	100.33	6.733		
8,900.00	5,649.16	5,678.17	5,660.16	92.33	10.73	87.45	273.94	-2,690.29	767.63	664.56	103.07	7.448		
9,000.00	5,647.41	5,676.43	5,658.41	95.08	10.73	87.10	273.94	-2,690.29	861.50	755.69	105.81	8.142		
9,100.00	5,645.67	5,674.69	5,656.67	97.83	10.73	86.74	273.94	-2,690.29	956.61	848.06	108.56	8.812		
9,200.00	5,643.93	5,672.95	5,654.93	100.57	10.73	86.39	273.94	-2,690.29	1,052.63	941.33	111.30	9.457		
9,300.00	5,642.19	5,671.21	5,653.19	103.32	10.72	86.03	273.94	-2,690.29	1,149.32	1,035.28	114.05	10.078		
9,400.00	5,640.45	5,669.46	5,651.45	106.07	10.72	85.68	273.94	-2,690.29	1,246.54	1,129.74	116.79	10.673		
9,500.00	5,638.70	5,667.72	5,649.70	108.82	10.72	85.32	273.94	-2,690.29	1,344.16	1,224.62	119.54	11.245		
9,600.00	5,636.96	5,665.98	5,647.96	111.57	10.71	84.97	273.94	-2,690.29	1,442.10	1,319.82	122.28	11.793		
9,700.00	5,635.22	5,664.24	5,646.22	114.32	10.71	84.62	273.94	-2,690.29	1,540.30	1,415.28	125.03	12.320		
9,800.00	5,633.48	5,662.50	5,644.48	117.07	10.71	84.26	273.94	-2,690.29	1,638.73	1,510.95	127.77	12.825		
9,900.00	5,631.74	5,660.75	5,642.74	119.82	10.71	83.91	273.94	-2,690.29	1,737.33	1,606.80	130.52	13.311		
10,000.00	5,630.00	5,659.01	5,641.00	122.56	10.70	83.56	273.94	-2,690.29	1,836.08	1,702.81	133.27	13.777		
10,100.00	5,628.25	5,657.27	5,639.25	125.31	10.70	83.21	273.94	-2,690.29	1,934.95	1,798.94	136.02	14.226		
10,114.58	5,628.00	5,657.02	5,639.00	125.72	10.70	83.15	273.94	-2,690.29	1,949.38	1,812.96	136.42	14.290		

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



Scientific Drilling Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729'00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729'00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1-8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #32 - OH - Job #32D0409129 - Actual													Offset Site Error:
Survey Program: 100-Keeper, 1402-MWD													0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	-64.94	477.54	-1,021.38	1,127.50				
100.00	100.00	98.61	98.61	0.09	0.09	-64.91	478.17	-1,021.10	1,127.51	1,127.34	0.18	6,439.052	
200.00	200.00	193.28	193.27	0.22	0.16	-64.88	478.76	-1,021.10	1,127.78	1,127.41	0.38	2,988.055	
300.00	300.00	299.76	299.75	0.35	0.22	-64.90	478.46	-1,021.54	1,128.04	1,127.47	0.57	1,967.732	
309.29	309.29	308.30	308.29	0.36	0.23	-64.90	478.43	-1,021.55	1,128.04	1,127.45	0.59	1,903.239	
400.00	400.00	391.36	391.35	0.48	0.31	-64.91	478.42	-1,021.87	1,128.35	1,127.56	0.79	1,435.616	
500.00	500.00	494.04	494.03	0.61	0.40	-64.90	478.94	-1,022.31	1,128.95	1,127.94	1.02	1,112.256	
600.00	600.00	593.65	593.64	0.74	0.51	-64.87	479.56	-1,022.51	1,129.40	1,128.15	1.25	903.366	
700.00	700.00	695.22	695.20	0.88	0.62	-64.85	480.20	-1,022.68	1,129.81	1,128.32	1.49	756.415	
800.00	800.00	802.28	802.26	1.01	0.72	-64.80	481.09	-1,022.29	1,129.84	1,128.11	1.72	655.347	
900.00	900.00	902.43	902.40	1.14	0.80	-64.72	482.38	-1,021.35	1,129.54	1,127.60	1.94	581.111	
1,000.00	1,000.00	1,001.93	1,001.88	1.27	0.90	-64.63	483.82	-1,020.37	1,129.27	1,127.10	2.18	519.144	
1,100.00	1,100.00	1,109.79	1,109.71	1.40	1.01	-64.52	485.58	-1,018.79	1,128.64	1,126.23	2.42	467.011	
1,200.00	1,200.00	1,209.96	1,209.86	1.53	1.11	-64.40	487.13	-1,016.92	1,127.63	1,124.98	2.65	425.613	
1,300.00	1,300.00	1,304.13	1,304.01	1.67	1.18	-64.31	488.53	-1,015.65	1,127.04	1,124.20	2.85	396.078	
1,400.00	1,400.00	1,402.00	1,401.86	1.80	1.22	-64.23	489.79	-1,014.60	1,126.64	1,123.62	3.02	373.428	
1,415.56	1,415.56	1,414.70	1,414.56	1.82	1.22	-64.22	489.94	-1,014.50	1,126.61	1,123.57	3.04	370.149	CC, ES
1,500.00	1,500.00	1,478.75	1,478.60	1.93	1.26	-64.19	490.68	-1,014.79	1,127.38	1,124.19	3.19	353.846	
1,600.00	1,600.00	1,554.94	1,554.76	2.06	1.31	-64.22	491.23	-1,016.95	1,130.24	1,126.87	3.38	334.812	
1,700.00	1,700.00	1,644.71	1,644.38	2.19	1.41	-64.36	490.46	-1,021.96	1,134.88	1,131.27	3.60	314.991	
1,800.00	1,800.00	1,742.44	1,741.84	2.33	1.55	-64.64	487.62	-1,028.57	1,139.74	1,135.87	3.87	294.365	
1,900.00	1,900.00	1,838.66	1,837.50	2.46	1.71	-65.09	481.46	-1,036.96	1,144.94	1,140.77	4.17	274.427	
2,000.00	2,000.00	1,928.25	1,926.30	2.59	1.90	-65.63	473.92	-1,046.04	1,150.69	1,146.20	4.49	256.316	
2,100.00	2,100.00	2,027.77	2,024.74	2.72	2.12	-66.28	484.57	-1,057.36	1,157.30	1,152.46	4.84	239.107	
2,200.00	2,200.00	2,137.78	2,133.76	2.85	2.37	-66.93	455.12	-1,068.61	1,163.32	1,158.09	5.23	222.624	
2,300.00	2,300.00	2,223.97	2,219.25	2.99	2.59	-67.40	448.31	-1,077.12	1,169.42	1,163.84	5.57	209.798	
2,400.00	2,400.00	2,306.95	2,301.46	3.12	2.80	-67.86	441.98	-1,086.46	1,176.97	1,171.05	5.92	198.833	
2,500.00	2,500.00	2,411.61	2,405.08	3.25	3.09	-68.44	434.20	-1,099.01	1,185.40	1,179.06	6.34	187.077	
2,600.00	2,600.00	2,525.00	2,517.50	3.38	3.40	-69.03	425.76	-1,111.07	1,192.64	1,185.86	6.78	175.781	
2,700.00	2,700.00	2,620.16	2,611.86	3.51	3.68	-69.54	418.28	-1,120.90	1,199.57	1,192.38	7.20	166.712	
2,800.00	2,800.00	2,712.00	2,702.76	3.64	3.95	-70.07	410.27	-1,131.23	1,207.18	1,199.58	7.60	158.891	
2,900.00	2,900.00	2,807.89	2,797.51	3.78	4.28	-70.66	401.08	-1,142.73	1,215.32	1,207.27	8.05	150.879	
3,000.00	3,000.00	2,900.00	2,888.38	3.91	4.59	-71.27	391.42	-1,154.32	1,223.89	1,215.39	8.50	143.972	
3,100.00	3,100.00	2,990.08	2,977.19	4.04	4.90	-71.86	382.11	-1,166.20	1,233.23	1,224.29	8.94	137.968	
3,200.00	3,200.00	3,087.00	3,072.76	4.17	5.23	-72.44	373.26	-1,179.61	1,243.68	1,234.28	9.40	132.306	
3,300.00	3,300.00	3,183.03	3,167.52	4.30	5.53	-72.98	365.09	-1,192.88	1,254.41	1,244.58	9.84	127.502	
3,400.00	3,400.00	3,290.08	3,273.26	4.44	5.88	-73.57	355.98	-1,206.92	1,264.59	1,254.27	10.31	122.618	
3,500.00	3,500.00	3,383.21	3,365.27	4.57	6.19	-74.06	348.09	-1,218.90	1,274.66	1,263.91	10.75	118.530	
3,600.00	3,600.00	3,467.12	3,448.14	4.70	6.47	-74.48	341.66	-1,230.39	1,285.82	1,274.65	11.17	115.130	
3,700.00	3,700.00	3,577.14	3,556.91	4.83	6.81	-74.97	334.38	-1,245.25	1,297.17	1,285.53	11.64	111.410	
3,800.00	3,800.00	3,690.98	3,669.69	4.96	7.16	-75.41	327.81	-1,259.30	1,307.67	1,295.55	12.13	107.844	
3,900.00	3,900.00	3,810.63	3,788.22	5.09	7.52	-75.94	318.77	-1,272.84	1,316.82	1,304.20	12.62	104.356	
4,000.00	4,000.00	3,915.01	3,891.56	5.23	7.84	-76.47	309.06	-1,283.91	1,324.95	1,311.88	13.07	101.368	
4,100.00	4,100.00	4,014.92	3,990.47	5.36	8.15	-76.96	299.72	-1,294.40	1,333.07	1,319.56	13.51	98.665	
4,200.00	4,200.00	4,119.88	4,094.45	5.49	8.47	-77.46	290.23	-1,305.13	1,341.09	1,327.13	13.96	96.088	
4,300.00	4,300.00	4,229.03	4,202.88	5.62	8.77	-77.87	282.71	-1,315.09	1,348.56	1,334.17	14.39	93.704	
4,400.00	4,400.00	4,355.82	4,329.21	5.75	9.08	-78.17	277.35	-1,324.43	1,354.96	1,340.13	14.83	91.344	
4,500.00	4,500.00	4,470.00	4,443.27	5.89	9.30	-78.28	275.69	-1,328.72	1,358.16	1,342.98	15.19	89.430	
4,600.00	4,600.00	4,470.00	4,443.27	6.02	9.30	-78.28	275.69	-1,328.72	1,365.93	1,350.61	15.32	89.167	
4,700.00	4,700.00	4,470.00	4,443.27	6.15	9.30	-78.28	275.69	-1,328.72	1,380.90	1,365.45	15.45	89.378	
4,800.00	4,800.00	4,470.00	4,443.27	6.28	9.30	-78.28	275.69	-1,328.72	1,402.87	1,387.29	15.58	90.029	
4,900.00	4,900.00	4,470.00	4,443.27	6.41	9.30	-78.28	275.69	-1,328.72	1,431.50	1,415.78	15.71	91.096	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal #32 - OH Job #32D0409129 Actual														Offset Site Error:	0.00 usft
Survey Program: 100-Keeper, 1402-MWD														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)					
5,000.00	5,000.00	4,470.00	4,443.27	6.54	9.30	-78.28	275.69	-1,328.72	1,466.40	1,450.56	15.85	92.541			
5,100.00	5,100.00	4,470.00	4,443.27	6.68	9.30	-78.28	275.69	-1,328.72	1,507.14	1,491.16	15.98	94.327			
5,200.00	5,200.00	4,470.00	4,443.27	6.81	9.30	-78.28	275.69	-1,328.72	1,553.26	1,537.15	16.11	96.418			
5,222.50	5,222.50	4,470.00	4,443.27	6.84	9.30	-78.28	275.69	-1,328.72	1,564.33	1,548.19	16.14	96.927			
5,225.00	5,225.00	4,470.00	4,443.27	6.84	9.30	11.81	275.69	-1,328.72	1,565.57	1,549.43	16.14	96.996			
5,250.00	5,249.98	4,470.00	4,443.27	6.84	9.30	11.48	275.69	-1,328.72	1,577.52	1,561.38	16.14	97.735			
5,275.00	5,274.89	4,470.00	4,443.27	6.84	9.30	11.19	275.69	-1,328.72	1,588.64	1,572.50	16.14	98.418			
5,300.00	5,299.66	4,470.00	4,443.27	6.84	9.30	10.93	275.69	-1,328.72	1,598.92	1,582.78	16.14	99.044			
5,325.00	5,324.21	4,470.00	4,443.27	6.85	9.30	10.70	275.69	-1,328.72	1,608.36	1,592.21	16.15	99.605			
5,350.00	5,348.49	4,470.00	4,443.27	6.85	9.30	10.50	275.69	-1,328.72	1,616.93	1,600.77	16.15	100.097			
5,375.00	5,372.42	4,470.00	4,443.27	6.86	9.30	10.32	275.69	-1,328.72	1,624.63	1,608.46	16.16	100.511			
5,400.00	5,395.94	4,470.00	4,443.27	6.88	9.30	10.17	275.69	-1,328.72	1,631.45	1,615.27	16.18	100.835			
5,425.00	5,418.99	4,470.00	4,443.27	6.90	9.30	10.04	275.69	-1,328.72	1,637.38	1,621.18	16.20	101.057			
5,450.00	5,441.49	4,470.00	4,443.27	6.93	9.30	9.94	275.69	-1,328.72	1,642.42	1,626.18	16.24	101.163			
5,475.00	5,463.40	4,470.00	4,443.27	6.98	9.30	9.85	275.69	-1,328.72	1,646.56	1,630.28	16.28	101.136			
5,500.00	5,484.65	4,470.00	4,443.27	7.04	9.30	9.78	275.69	-1,328.72	1,649.80	1,633.45	16.34	100.958			
5,525.00	5,505.17	4,470.00	4,443.27	7.12	9.30	9.74	275.69	-1,328.72	1,652.12	1,635.70	16.42	100.614			
5,550.00	5,524.93	4,470.00	4,443.27	7.22	9.30	9.71	275.69	-1,328.72	1,653.54	1,637.02	16.52	100.086			
5,575.00	5,543.85	4,470.00	4,443.27	7.35	9.30	9.70	275.69	-1,328.72	1,654.05	1,637.40	16.65	99.359			
5,600.00	5,561.90	4,470.00	4,443.27	7.50	9.30	9.71	275.69	-1,328.72	1,653.64	1,636.84	16.80	98.425			
5,625.00	5,579.01	4,470.00	4,443.27	7.68	9.30	9.73	275.69	-1,328.72	1,652.33	1,635.34	16.99	97.277			
5,650.00	5,595.15	4,470.00	4,443.27	7.90	9.30	9.78	275.69	-1,328.72	1,650.10	1,632.90	17.20	95.916			
5,675.00	5,610.27	4,470.00	4,443.27	8.15	9.30	9.84	275.69	-1,328.72	1,646.97	1,629.51	17.46	94.349			
5,700.00	5,624.32	4,470.00	4,443.27	8.44	9.30	9.93	275.69	-1,328.72	1,642.93	1,625.18	17.74	92.589			
5,725.00	5,637.28	4,470.00	4,443.27	8.77	9.30	10.03	275.69	-1,328.72	1,637.99	1,619.92	18.07	90.655			
5,750.00	5,649.10	4,470.00	4,443.27	9.13	9.30	10.16	275.69	-1,328.72	1,632.15	1,613.73	18.43	88.569			
5,775.00	5,659.74	4,470.00	4,443.27	9.52	9.30	10.31	275.69	-1,328.72	1,625.43	1,606.61	18.82	86.358			
5,800.00	5,669.20	4,470.00	4,443.27	9.95	9.30	10.48	275.69	-1,328.72	1,617.83	1,598.58	19.25	84.049			
5,825.00	5,677.42	4,470.00	4,443.27	10.40	9.30	10.68	275.69	-1,328.72	1,609.36	1,589.65	19.71	81.670			
5,850.00	5,684.40	4,470.00	4,443.27	10.89	9.30	10.90	275.69	-1,328.72	1,600.02	1,579.83	20.19	79.247			
5,875.00	5,690.12	4,470.00	4,443.27	11.40	9.30	11.16	275.69	-1,328.72	1,589.83	1,569.13	20.70	76.804			
5,900.00	5,694.55	4,470.00	4,443.27	11.93	9.30	11.45	275.69	-1,328.72	1,578.80	1,557.57	21.23	74.363			
5,925.00	5,697.69	4,470.00	4,443.27	12.48	9.30	11.77	275.69	-1,328.72	1,566.95	1,545.17	21.78	71.943			
5,950.00	5,699.53	4,470.00	4,443.27	13.04	9.30	12.14	275.69	-1,328.72	1,554.28	1,531.93	22.34	69.559			
5,975.00	5,700.07	4,470.00	4,443.27	13.62	9.30	12.55	275.69	-1,328.72	1,540.81	1,517.89	22.92	67.225			
5,980.99	5,700.00	4,470.00	4,443.27	13.76	9.30	12.66	275.69	-1,328.72	1,537.47	1,514.41	23.06	66.675			
6,000.00	5,699.67	4,470.00	4,443.27	14.20	9.30	12.66	275.69	-1,328.72	1,526.86	1,503.36	23.50	64.960			
6,100.00	5,697.93	4,470.00	4,443.27	16.62	9.30	12.66	275.69	-1,328.72	1,473.88	1,447.96	25.92	56.857			
6,200.00	5,696.18	4,470.00	4,443.27	19.13	9.30	12.66	275.69	-1,328.72	1,425.95	1,397.52	28.43	50.153			
6,300.00	5,694.44	4,470.00	4,443.27	21.70	9.30	12.66	275.69	-1,328.72	1,383.60	1,352.60	31.00	44.631			
6,400.00	5,692.70	4,470.00	4,443.27	24.31	9.30	12.66	275.69	-1,328.72	1,347.35	1,313.74	33.61	40.087			
6,500.00	5,690.96	4,470.00	4,443.27	26.95	9.30	12.66	275.69	-1,328.72	1,317.71	1,281.46	36.25	36.351			
6,600.00	5,689.22	4,470.00	4,443.27	29.61	9.30	12.66	275.69	-1,328.72	1,295.14	1,256.23	38.91	33.286			
6,700.00	5,687.47	4,470.00	4,443.27	32.28	9.30	12.66	275.69	-1,328.72	1,280.00	1,238.41	41.59	30.780			
6,800.00	5,685.73	4,470.00	4,443.27	34.97	9.30	12.66	275.69	-1,328.72	1,272.56	1,228.28	44.27	28.743			
6,844.95	5,684.95	4,470.00	4,443.27	36.18	9.30	12.66	275.69	-1,328.72	1,271.76	1,226.28	45.49	27.960			
6,900.00	5,683.99	4,470.00	4,443.27	37.67	9.30	12.66	275.69	-1,328.72	1,272.95	1,225.98	46.97	27.101			
7,000.00	5,682.25	4,470.00	4,443.27	40.37	9.30	12.66	275.69	-1,328.72	1,281.18	1,231.50	49.68	25.791			
7,100.00	5,680.51	4,470.00	4,443.27	43.09	9.30	12.66	275.69	-1,328.72	1,297.09	1,244.70	52.39	24.759			
7,200.00	5,678.77	4,470.00	4,443.27	45.80	9.30	12.66	275.69	-1,328.72	1,320.39	1,265.29	55.10	23.962			
7,300.00	5,677.02	4,470.00	4,443.27	48.52	9.30	12.66	275.69	-1,328.72	1,350.72	1,292.90	57.83	23.358			
7,400.00	5,675.28	4,470.00	4,443.27	51.25	9.30	12.66	275.69	-1,328.72	1,387.61	1,327.06	60.55	22.917			

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User.Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #32 - OH - Job #32D0409129 - Actual													Offset Site Error	0.00 usft
Survey Program: 100-Keeper, 1402-MWD													Offset Well Error	0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
7,500.00	5,673.54	4,470.00	4,443.27	53.98	9.30	12.66	275.69	-1,328.72	1,430.55	1,367.27	63.28	22.607		
7,600.00	5,671.80	4,470.00	4,443.27	56.71	9.30	12.66	275.69	-1,328.72	1,479.01	1,413.01	66.01	22.406		
7,700.00	5,670.06	4,470.00	4,443.27	59.44	9.30	12.66	275.69	-1,328.72	1,532.48	1,463.74	68.74	22.293		
7,800.00	5,668.32	4,470.00	4,443.27	62.17	9.30	12.66	275.69	-1,328.72	1,590.44	1,518.97	71.48	22.251 SF		
7,900.00	5,666.57	4,470.00	4,443.27	64.91	9.30	12.66	275.69	-1,328.72	1,652.43	1,578.21	74.21	22.266		
8,000.00	5,664.83	4,470.00	4,443.27	67.65	9.30	12.66	275.69	-1,328.72	1,718.00	1,641.05	76.95	22.326		
8,100.00	5,663.09	4,470.00	4,443.27	70.39	9.30	12.66	275.69	-1,328.72	1,786.77	1,707.08	79.69	22.422		
8,200.00	5,661.35	4,470.00	4,443.27	73.13	9.30	12.66	275.69	-1,328.72	1,858.37	1,775.94	82.43	22.545		
8,300.00	5,659.61	4,470.00	4,443.27	75.87	9.30	12.66	275.69	-1,328.72	1,932.50	1,847.33	85.17	22.690		
8,400.00	5,657.86	4,470.00	4,443.27	78.61	9.30	12.66	275.69	-1,328.72	2,008.87	1,920.96	87.91	22.851		
8,500.00	5,656.12	4,470.00	4,443.27	81.35	9.30	12.66	275.69	-1,328.72	2,087.24	1,996.59	90.66	23.024		
8,600.00	5,654.38	4,470.00	4,443.27	84.10	9.30	12.66	275.69	-1,328.72	2,167.39	2,073.99	93.40	23.205		
8,700.00	5,652.64	4,470.00	4,443.27	86.84	9.30	12.66	275.69	-1,328.72	2,249.13	2,152.99	96.14	23.393		
8,800.00	5,650.90	4,470.00	4,443.27	89.59	9.30	12.66	275.69	-1,328.72	2,332.30	2,233.41	98.89	23.585		
8,900.00	5,649.16	4,470.00	4,443.27	92.33	9.30	12.66	275.69	-1,328.72	2,416.74	2,315.10	101.64	23.778		
9,000.00	5,647.41	4,470.00	4,443.27	95.08	9.30	12.66	275.69	-1,328.72	2,502.33	2,397.94	104.38	23.973		
9,100.00	5,645.67	4,470.00	4,443.27	97.83	9.30	12.66	275.69	-1,328.72	2,588.95	2,481.82	107.13	24.167		
9,200.00	5,643.93	4,470.00	4,443.27	100.57	9.30	12.66	275.69	-1,328.72	2,676.50	2,566.62	109.88	24.359		
9,300.00	5,642.19	4,470.00	4,443.27	103.32	9.30	12.66	275.69	-1,328.72	2,764.90	2,652.27	112.62	24.550		
9,400.00	5,640.45	4,470.00	4,443.27	106.07	9.30	12.66	275.69	-1,328.72	2,854.06	2,738.69	115.37	24.738		
9,500.00	5,638.70	4,470.00	4,443.27	108.82	9.30	12.66	275.69	-1,328.72	2,943.92	2,825.80	118.12	24.923		
9,600.00	5,636.96	4,470.00	4,443.27	111.57	9.30	12.66	275.69	-1,328.72	3,034.42	2,913.55	120.87	25.105		
9,700.00	5,635.22	4,470.00	4,443.27	114.32	9.30	12.66	275.69	-1,328.72	3,125.49	3,001.87	123.62	25.283		
9,800.00	5,633.48	4,470.00	4,443.27	117.07	9.30	12.66	275.69	-1,328.72	3,217.10	3,090.73	126.37	25.458		
9,900.00	5,631.74	4,470.00	4,443.27	119.82	9.30	12.66	275.69	-1,328.72	3,309.19	3,180.07	129.12	25.629		
10,000.00	5,630.00	4,470.00	4,443.27	122.56	9.30	12.66	275.69	-1,328.72	3,401.73	3,269.86	131.87	25.797		
10,100.00	5,628.25	4,470.00	4,443.27	125.31	9.30	12.66	275.69	-1,328.72	3,494.67	3,360.06	134.62	25.960		
10,114.58	5,628.00	4,470.00	4,443.27	125.72	9.30	12.66	275.69	-1,328.72	3,508.26	3,373.24	135.02	25.984		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:
Electra Federal - #57 - OH - Job #32D0111055 - OH													0.00 usft
Survey Program: 100-Keeper, 1240-MWD													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	-87.80	166.21	-3,959.50	3,963.00	3,963.00	0.00	N/A	
100.00	100.00	70.47	70.47	0.09	0.05	-87.59	166.32	-3,959.68	3,963.22	3,963.08	0.14	N/A	
200.00	200.00	170.73	170.73	0.22	0.17	-87.59	166.63	-3,960.29	3,963.85	3,963.46	0.39	N/A	
300.00	300.00	260.22	260.22	0.35	0.28	-87.59	166.82	-3,960.78	3,964.41	3,963.78	0.63	6,298.575	
400.00	400.00	357.32	357.31	0.48	0.39	-87.57	167.80	-3,961.63	3,965.32	3,964.45	0.88	4,527.544	
500.00	500.00	470.88	470.84	0.61	0.52	-87.54	170.20	-3,962.30	3,966.01	3,964.87	1.13	3,498.106	
600.00	600.00	589.40	589.34	0.74	0.65	-87.51	172.38	-3,962.55	3,966.29	3,964.90	1.40	2,841.358	
700.00	700.00	690.22	690.15	0.88	0.76	-87.49	173.81	-3,962.49	3,966.30	3,964.66	1.64	2,417.853	
800.00	800.00	804.54	804.46	1.01	0.89	-87.47	174.90	-3,962.28	3,966.16	3,964.27	1.89	2,095.381	
900.00	900.00	916.15	916.07	1.14	0.99	-87.46	175.78	-3,961.74	3,965.72	3,963.59	2.13	1,861.956	
1,000.00	1,000.00	1,047.46	1,047.36	1.27	1.10	-87.44	176.89	-3,960.25	3,964.60	3,962.23	2.37	1,672.866	
1,100.00	1,100.00	1,151.61	1,151.50	1.40	1.18	-87.43	177.92	-3,958.82	3,963.08	3,960.49	2.58	1,534.366	
1,200.00	1,200.00	1,257.83	1,257.70	1.53	1.21	-87.41	178.67	-3,956.92	3,961.51	3,958.76	2.75	1,442.807	
1,300.00	1,300.00	1,354.16	1,354.01	1.67	1.25	-87.41	178.88	-3,955.18	3,959.73	3,956.81	2.92	1,355.584	
1,400.00	1,400.00	1,453.82	1,453.67	1.80	1.33	-87.41	178.89	-3,953.63	3,958.17	3,955.04	3.13	1,265.371	
1,500.00	1,500.00	1,541.67	1,541.50	1.93	1.42	-87.43	177.56	-3,952.38	3,956.69	3,953.34	3.35	1,179.862	
1,600.00	1,600.00	1,623.00	1,622.77	2.06	1.53	-87.47	174.86	-3,951.65	3,955.65	3,952.06	3.59	1,101.727	
1,700.00	1,700.00	1,705.22	1,704.87	2.19	1.65	-87.53	170.33	-3,951.33	3,955.02	3,951.17	3.85	1,028.217	
1,800.00	1,800.00	1,800.88	1,800.15	2.33	1.81	-87.65	162.01	-3,951.61	3,954.94	3,950.80	4.14	955.212	
1,900.00	1,900.00	1,895.15	1,893.67	2.46	1.99	-87.82	150.14	-3,951.81	3,954.66	3,950.22	4.45	888.865	
1,907.62	1,907.62	1,900.15	1,898.62	2.47	2.00	-87.83	149.43	-3,951.84	3,954.66	3,950.19	4.47	884.952	
2,000.00	2,000.00	1,973.26	1,970.92	2.59	2.14	-87.99	138.65	-3,952.51	3,955.00	3,950.27	4.73	836.758	
2,100.00	2,100.00	2,081.45	2,077.94	2.72	2.32	-88.22	122.76	-3,953.47	3,955.40	3,950.35	5.05	783.995	
2,200.00	2,200.00	2,175.07	2,170.64	2.85	2.54	-88.41	109.65	-3,954.23	3,955.80	3,950.41	5.39	733.927	
2,300.00	2,300.00	2,279.91	2,274.47	2.99	2.83	-88.62	95.16	-3,955.03	3,956.21	3,950.39	5.81	680.424	
2,400.00	2,400.00	2,360.53	2,354.26	3.12	3.07	-88.79	83.71	-3,955.91	3,956.97	3,950.78	6.19	639.617	
2,500.00	2,500.00	2,528.04	2,519.76	3.25	3.59	-89.16	57.91	-3,956.38	3,956.91	3,950.07	6.84	578.891	
2,600.00	2,600.00	2,613.82	2,604.65	3.38	3.84	-89.34	45.54	-3,956.05	3,956.34	3,949.12	7.22	548.233	
2,656.55	2,656.55	2,657.15	2,647.56	3.46	3.96	-89.43	39.57	-3,956.03	3,956.23	3,948.81	7.42	533.300	
2,700.00	2,700.00	2,688.02	2,678.13	3.51	4.06	-89.49	35.21	-3,956.13	3,956.30	3,948.73	7.57	522.662	
2,800.00	2,800.00	2,772.65	2,761.84	3.64	4.32	-89.67	22.77	-3,956.71	3,956.88	3,948.91	7.97	496.552	
2,900.00	2,900.00	2,864.46	2,852.66	3.78	4.61	-89.86	9.38	-3,957.41	3,957.61	3,949.22	8.39	471.899	
3,000.00	3,000.00	2,941.76	2,929.07	3.91	4.86	-90.03	-2.30	-3,958.44	3,958.92	3,950.15	8.77	451.440	
3,100.00	3,100.00	3,037.28	3,023.39	4.04	5.18	-90.25	-17.27	-3,960.00	3,960.61	3,951.39	9.22	429.456	
3,200.00	3,200.00	3,152.00	3,136.74	4.17	5.55	-90.50	-34.86	-3,961.51	3,962.04	3,952.32	9.72	407.557	
3,300.00	3,300.00	3,249.71	3,233.27	4.30	5.87	-90.72	-50.02	-3,962.86	3,963.60	3,953.42	10.18	389.460	
3,400.00	3,400.00	3,429.89	3,411.32	4.44	6.46	-91.12	-77.53	-3,962.48	3,963.29	3,952.39	10.89	363.817	
3,479.53	3,479.53	3,489.73	3,470.53	4.54	6.65	-91.25	-86.19	-3,962.06	3,963.00	3,951.82	11.19	354.289	
3,500.00	3,500.00	3,500.44	3,481.13	4.57	6.68	-91.27	-87.73	-3,962.04	3,963.03	3,951.78	11.25	352.399	
3,600.00	3,600.00	3,561.39	3,541.45	4.70	6.87	-91.39	-96.45	-3,962.36	3,963.85	3,952.28	11.57	342.587	
3,700.00	3,700.00	3,642.71	3,621.80	4.83	7.14	-91.57	-108.89	-3,963.27	3,965.37	3,953.40	11.97	331.177	
3,800.00	3,800.00	3,747.84	3,725.64	4.96	7.49	-91.81	-125.31	-3,964.58	3,967.10	3,954.65	12.45	318.521	
3,900.00	3,900.00	3,880.00	3,856.25	5.09	7.92	-92.10	-145.45	-3,965.75	3,968.57	3,955.55	13.01	304.959	
4,000.00	4,000.00	4,018.53	3,993.26	5.23	8.37	-92.40	-165.89	-3,965.28	3,968.75	3,955.16	13.59	292.005	
4,070.14	4,070.14	4,087.11	4,061.14	5.32	8.58	-92.54	-175.70	-3,964.83	3,968.72	3,954.82	13.90	285.554	
4,100.00	4,100.00	4,108.00	4,081.82	5.36	8.64	-92.58	-178.59	-3,964.70	3,968.74	3,954.73	14.00	283.434	
4,200.00	4,200.00	4,172.00	4,145.22	5.49	8.84	-92.71	-187.36	-3,964.82	3,969.50	3,955.17	14.33	276.995	
4,300.00	4,300.00	4,245.15	4,217.69	5.62	9.06	-92.85	-197.28	-3,965.58	3,971.16	3,956.47	14.69	270.399	
4,400.00	4,400.00	4,368.77	4,340.26	5.75	9.44	-93.08	-213.32	-3,966.98	3,973.03	3,957.84	15.19	261.573	
4,500.00	4,500.00	4,526.28	4,497.05	5.89	9.84	-93.29	-228.11	-3,967.15	3,973.71	3,957.98	15.73	252.641	
4,600.00	4,600.00	4,641.04	4,611.61	6.02	10.10	-93.39	-234.91	-3,966.30	3,973.31	3,957.19	16.11	246.582	
4,700.00	4,700.00	4,731.87	4,702.28	6.15	10.29	-93.47	-240.13	-3,965.52	3,972.80	3,956.36	16.44	241.604	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8 3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error	0.00 usft
Survey Program: 100-Keeper, 1240-MWD												Offset Well Error	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre NW-S (usft)	Offset Wellbore Centre NE-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
4,739.49	4,739.49	4,760.94	4,731.30	6.20	10.36	-93.49	-241.89	-3,965.37	3,972.74	3,956.18	16.56	239.903	
4,800.00	4,800.00	4,809.00	4,779.26	6.28	10.47	-93.53	-244.92	-3,965.30	3,972.87	3,956.12	16.75	237.233	
4,900.00	4,900.00	4,904.32	4,874.40	6.41	10.68	-93.62	-250.87	-3,965.37	3,973.34	3,956.24	17.09	232.462	
5,000.00	5,000.00	5,009.32	4,979.20	6.54	10.91	-93.71	-257.36	-3,965.31	3,973.67	3,956.21	17.46	227.603	
5,100.00	5,100.00	5,100.11	5,069.83	6.68	11.11	-93.79	-262.73	-3,965.34	3,974.10	3,956.30	17.79	223.372	
5,200.00	5,200.00	5,200.50	5,170.04	6.81	11.34	-93.88	-268.61	-3,965.50	3,974.65	3,956.50	18.14	219.054	
5,222.50	5,222.50	5,221.01	5,190.52	6.84	11.38	-93.89	-269.81	-3,965.54	3,974.77	3,956.55	18.22	218.161	
5,225.00	5,225.00	5,223.29	5,192.80	6.84	11.39	-3.77	-269.95	-3,965.54	3,974.78	3,956.55	18.23	218.087	
5,250.00	5,249.98	5,246.08	5,215.54	6.84	11.44	-3.79	-271.26	-3,965.59	3,974.15	3,955.87	18.28	217.451	
5,275.00	5,274.89	5,271.67	5,241.09	6.84	11.49	-3.83	-272.72	-3,965.65	3,972.22	3,953.89	18.33	216.667	
5,300.00	5,299.66	5,299.32	5,268.70	6.84	11.55	-3.88	-274.32	-3,965.71	3,968.98	3,950.59	18.40	215.751	
5,325.00	5,324.21	5,327.63	5,296.96	6.85	11.62	-3.95	-275.96	-3,965.74	3,964.44	3,945.98	18.46	214.735	
5,350.00	5,348.49	5,357.85	5,327.13	6.85	11.68	-4.03	-277.68	-3,965.74	3,968.58	3,940.05	18.53	213.578	
5,375.00	5,372.42	5,386.61	5,355.85	6.86	11.75	-4.13	-279.27	-3,965.69	3,961.44	3,932.83	18.61	212.353	
5,400.00	5,395.94	5,409.47	5,378.67	6.88	11.80	-4.24	-280.51	-3,965.65	3,943.04	3,924.36	18.67	211.159	
5,425.00	5,418.89	5,431.86	5,401.03	6.90	11.84	-4.36	-281.74	-3,965.61	3,933.43	3,914.68	18.75	209.835	
5,450.00	5,441.49	5,453.98	5,423.12	6.93	11.89	-4.50	-282.95	-3,965.58	3,922.63	3,903.80	18.83	208.359	
5,475.00	5,463.40	5,476.06	5,445.16	6.98	11.94	-4.67	-284.14	-3,965.54	3,910.67	3,891.75	18.92	206.702	
5,500.00	5,484.65	5,497.47	5,466.54	7.04	11.99	-4.86	-285.27	-3,965.51	3,897.58	3,878.56	19.03	204.852	
5,525.00	5,505.17	5,510.00	5,479.06	7.12	12.01	-5.06	-285.92	-3,965.49	3,883.41	3,864.28	19.13	202.974	
5,550.00	5,524.93	5,530.05	5,499.08	7.22	12.06	-5.30	-286.99	-3,965.48	3,868.20	3,848.92	19.28	200.657	
5,575.00	5,543.85	5,543.71	5,512.71	7.35	12.09	-5.58	-287.75	-3,965.49	3,852.01	3,832.57	19.43	198.213	
5,600.00	5,561.90	5,556.75	5,525.74	7.50	12.12	-5.89	-288.52	-3,965.52	3,834.87	3,815.25	19.62	195.493	
5,625.00	5,579.01	5,574.00	5,542.95	7.68	12.15	-6.28	-289.57	-3,965.58	3,818.84	3,797.00	19.84	192.388	
5,650.00	5,595.15	5,581.58	5,550.51	7.90	12.17	-6.69	-290.04	-3,965.61	3,797.94	3,777.87	20.07	189.194	
5,675.00	5,610.27	5,593.70	5,562.61	8.15	12.20	-7.21	-290.80	-3,965.67	3,778.24	3,757.88	20.35	185.623	
5,700.00	5,624.32	5,605.01	5,573.90	8.44	12.23	-7.82	-291.51	-3,965.74	3,757.77	3,737.10	20.67	181.814	
5,725.00	5,637.28	5,615.46	5,584.33	8.77	12.25	-8.55	-292.17	-3,965.80	3,736.60	3,715.59	21.02	177.797	
5,750.00	5,649.10	5,625.03	5,593.88	9.13	12.27	-9.45	-292.77	-3,965.87	3,714.79	3,693.39	21.40	173.608	
5,775.00	5,659.74	5,638.00	5,606.82	9.52	12.30	-10.61	-293.58	-3,965.97	3,692.38	3,670.56	21.82	169.212	
5,800.00	5,669.20	5,642.65	5,611.46	9.95	12.31	-12.02	-293.88	-3,966.01	3,669.43	3,647.17	22.26	164.857	
5,825.00	5,677.42	5,651.80	5,620.59	10.40	12.33	-13.93	-294.46	-3,966.09	3,646.01	3,623.27	22.74	160.362	
5,850.00	5,684.40	5,659.59	5,628.37	10.89	12.35	-16.56	-294.95	-3,966.15	3,622.17	3,598.93	23.24	155.869	
5,875.00	5,690.12	5,666.00	5,634.77	11.40	12.36	-20.33	-295.35	-3,966.20	3,597.99	3,574.23	23.76	151.413	
5,900.00	5,694.55	5,671.02	5,639.78	11.93	12.38	-26.12	-295.67	-3,966.24	3,573.53	3,549.22	24.31	147.026	
5,925.00	5,697.69	5,674.63	5,643.38	12.48	12.38	-35.84	-295.90	-3,966.27	3,548.85	3,523.99	24.86	142.736	
5,950.00	5,699.53	5,676.83	5,645.58	13.04	12.39	-53.63	-296.04	-3,966.28	3,524.03	3,498.60	25.43	138.566	
5,975.00	5,700.07	5,677.62	5,646.36	13.62	12.39	-84.50	-296.09	-3,966.29	3,499.13	3,473.12	26.01	134.533	
5,980.99	5,700.00	5,677.59	5,646.34	13.76	12.39	-93.18	-296.08	-3,966.29	3,493.17	3,467.02	26.15	133.590	
6,000.00	5,699.67	5,677.39	5,646.14	14.20	12.39	-93.14	-296.07	-3,966.29	3,474.22	3,447.62	26.59	130.642	
6,100.00	5,697.93	5,676.33	5,645.08	16.62	12.39	-92.93	-296.01	-3,966.28	3,374.57	3,345.56	29.01	116.328	
6,200.00	5,696.18	5,675.28	5,644.03	19.13	12.39	-92.73	-295.94	-3,966.27	3,274.94	3,243.43	31.52	103.913	
6,300.00	5,694.44	5,674.24	5,642.99	21.70	12.38	-92.52	-295.87	-3,966.26	3,175.34	3,141.26	34.08	93.166	
6,400.00	5,692.70	5,673.19	5,641.95	24.31	12.38	-92.31	-295.81	-3,966.25	3,075.77	3,039.08	36.69	83.831	
6,500.00	5,690.96	5,672.16	5,640.91	26.95	12.38	-92.11	-295.74	-3,966.25	2,976.22	2,936.89	39.33	75.680	
6,600.00	5,689.22	5,671.12	5,639.88	29.61	12.38	-91.90	-295.68	-3,966.24	2,876.70	2,834.72	41.98	68.519	
6,700.00	5,687.47	5,670.10	5,638.86	32.28	12.37	-91.70	-295.61	-3,966.23	2,777.22	2,732.56	44.66	62.190	
6,800.00	5,685.73	5,669.08	5,637.84	34.97	12.37	-91.49	-295.55	-3,966.22	2,677.77	2,630.43	47.34	56.561	
6,900.00	5,683.99	5,668.06	5,636.82	37.67	12.37	-91.29	-295.48	-3,966.22	2,578.37	2,528.33	50.04	51.528	
7,000.00	5,682.25	5,667.04	5,635.81	40.37	12.37	-91.09	-295.42	-3,966.21	2,479.02	2,426.27	52.74	47.003	
7,100.00	5,680.51	5,666.04	5,634.80	43.09	12.36	-90.89	-295.36	-3,966.20	2,379.71	2,324.26	55.45	42.916	
7,200.00	5,678.77	5,665.03	5,633.80	45.80	12.36	-90.69	-295.29	-3,966.19	2,280.47	2,222.31	58.17	39.207	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error: 0.00 usft	
Electra Federal - #57 - OH - Job #32D0111055 - OH													Offset Well Error: 0.00 usft	
Survey Program: 100-Keeper, 1240-MWD														
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre +N/S (usft)	+E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
7,300.00	5,877.02	5,864.03	5,832.81	48.52	12.36	-90.49	-295.23	-3,966.18	2,181.30	2,120.42	60.88	35.827		
7,400.00	5,875.28	5,863.04	5,831.81	51.25	12.36	-90.29	-295.17	-3,966.18	2,082.21	2,018.60	63.61	32.736		
7,500.00	5,873.54	5,862.05	5,830.83	53.98	12.36	-90.09	-295.10	-3,966.17	1,983.21	1,918.88	66.33	29.898		
7,600.00	5,871.80	5,861.07	5,829.84	56.71	12.35	-89.90	-295.04	-3,966.16	1,884.31	1,815.25	69.06	27.285		
7,700.00	5,870.06	5,860.09	5,828.87	59.44	12.35	-89.70	-294.98	-3,966.15	1,785.54	1,713.75	71.79	24.871		
7,800.00	5,868.32	5,859.11	5,827.89	62.17	12.35	-89.51	-294.92	-3,966.15	1,686.91	1,612.38	74.52	22.636		
7,900.00	5,866.57	5,858.14	5,826.92	64.91	12.35	-89.31	-294.86	-3,966.14	1,588.45	1,511.19	77.26	20.561		
8,000.00	5,864.83	5,857.17	5,825.96	67.65	12.34	-89.12	-294.80	-3,966.13	1,490.19	1,410.20	79.99	18.629		
8,100.00	5,863.09	5,856.21	5,825.00	70.39	12.34	-88.93	-294.74	-3,966.12	1,392.18	1,309.45	82.73	16.828		
8,200.00	5,861.35	5,855.25	5,824.04	73.13	12.34	-88.73	-294.68	-3,966.12	1,294.48	1,209.01	85.47	15.146		
8,300.00	5,859.61	5,854.30	5,823.09	75.87	12.34	-88.54	-294.62	-3,966.11	1,197.15	1,108.94	88.21	13.572		
8,400.00	5,857.86	5,853.35	5,822.14	78.61	12.34	-88.35	-294.56	-3,966.10	1,100.31	1,009.36	90.95	12.098		
8,500.00	5,856.12	5,852.40	5,821.20	81.35	12.33	-88.16	-294.50	-3,966.09	1,004.08	910.39	93.69	10.717		
8,600.00	5,854.38	5,851.46	5,820.26	84.10	12.33	-87.98	-294.44	-3,966.09	908.66	812.23	96.43	9.423		
8,700.00	5,852.64	5,850.53	5,819.33	86.84	12.33	-87.79	-294.38	-3,966.08	814.35	715.17	99.17	8.211		
8,800.00	5,850.90	5,849.59	5,818.39	89.59	12.33	-87.60	-294.32	-3,966.07	721.56	619.65	101.92	7.080		
8,900.00	5,849.16	5,848.67	5,817.47	92.33	12.32	-87.41	-294.26	-3,966.06	630.98	526.33	104.66	6.029		
9,000.00	5,847.41	5,847.74	5,816.56	95.08	12.32	-87.23	-294.20	-3,966.06	543.72	436.32	107.40	5.062		
9,100.00	5,845.67	5,846.82	5,815.63	97.83	12.32	-87.05	-294.14	-3,966.05	461.65	351.50	110.15	4.191		
9,200.00	5,843.93	5,845.91	5,814.71	100.57	12.32	-86.86	-294.09	-3,966.04	388.08	275.18	112.89	3.438		
9,300.00	5,842.19	5,844.99	5,813.80	103.32	12.32	-86.68	-294.03	-3,966.03	328.77	213.13	115.64	2.843		
9,400.00	5,840.45	5,844.09	5,812.90	106.07	12.31	-86.50	-293.97	-3,966.03	292.52	174.14	118.38	2.471		
9,462.60	5,839.36	5,843.52	5,812.33	107.79	12.31	-86.38	-293.94	-3,966.02	285.75	165.64	120.10	2.379 CC, ES		
9,500.00	5,838.70	5,843.18	5,812.00	108.82	12.31	-86.32	-293.91	-3,966.02	288.18	167.05	121.13	2.379 SF		
9,600.00	5,836.96	5,842.28	5,811.10	111.57	12.31	-86.14	-293.86	-3,966.01	317.06	193.18	123.88	2.559		
9,700.00	5,835.22	5,841.39	5,810.21	114.32	12.31	-85.96	-293.80	-3,966.00	371.49	244.87	126.62	2.934		
9,800.00	5,833.48	5,840.50	5,809.32	117.07	12.31	-85.78	-293.75	-3,966.00	442.13	312.76	129.37	3.418		
9,900.00	5,831.74	5,839.61	5,808.43	119.82	12.30	-85.60	-293.69	-3,965.99	522.45	390.33	132.12	3.954		
10,000.00	5,830.00	5,838.72	5,807.55	122.56	12.30	-85.42	-293.63	-3,965.98	608.63	473.76	134.87	4.513		
10,100.00	5,828.25	5,837.84	5,806.66	125.31	12.30	-85.24	-293.58	-3,965.97	698.50	560.88	137.62	5.076		
10,114.58	5,828.00	5,837.70	5,806.53	125.72	12.30	-85.22	-293.57	-3,965.97	711.83	573.81	138.02	5.158		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27-NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #58 - OH - Actual													Offset Site Error
Survey Program: 100-Keeper, 1367-MWD													Offset Well Error
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
							N-S (usft)	E-W (usft)					
0.00	0.00	2.20	2.20	0.00	0.00	-88.74	72.51	-3,299.25	3,300.04				
100.00	100.00	110.29	110.29	0.09	0.09	-88.74	72.41	-3,299.08	3,299.89	3,299.71	0.18	N/A	
200.00	200.00	202.66	202.66	0.22	0.20	-88.74	72.30	-3,298.97	3,299.76	3,299.34	0.42	7,948.234	
300.00	300.00	309.46	309.46	0.35	0.33	-88.75	71.98	-3,298.85	3,299.64	3,298.96	0.68	4,857.954	
400.00	400.00	417.95	417.94	0.48	0.47	-88.77	70.73	-3,298.45	3,299.24	3,298.29	0.95	3,470.119	
500.00	500.00	511.82	511.80	0.61	0.59	-88.80	69.06	-3,298.12	3,298.86	3,297.66	1.20	2,743.377	
600.00	600.00	608.70	608.66	0.74	0.71	-88.83	67.43	-3,297.92	3,298.62	3,297.16	1.46	2,262.747	
700.00	700.00	714.67	714.61	0.88	0.85	-88.86	65.58	-3,297.64	3,298.32	3,296.59	1.73	1,910.766	
800.00	800.00	816.87	816.80	1.01	0.98	-88.88	64.22	-3,297.25	3,297.91	3,296.92	1.99	1,656.315	
900.00	900.00	926.02	925.94	1.14	1.12	-88.91	62.98	-3,296.89	3,297.38	3,296.11	2.26	1,456.547	
1,000.00	1,000.00	1,049.17	1,049.09	1.27	1.27	-88.93	61.67	-3,296.35	3,296.27	3,293.72	2.55	1,294.663	
1,100.00	1,100.00	1,153.44	1,153.33	1.40	1.40	-88.95	60.38	-3,293.73	3,294.68	3,291.88	2.80	1,175.178	
1,200.00	1,200.00	1,277.25	1,277.11	1.53	1.54	-88.98	58.81	-3,291.54	3,292.92	3,289.84	3.07	1,071.406	
1,300.00	1,300.00	1,367.00	1,366.83	1.67	1.58	-89.00	57.49	-3,289.61	3,290.76	3,287.51	3.24	1,014.347	
1,400.00	1,400.00	1,449.45	1,449.26	1.80	1.60	-89.01	56.72	-3,288.19	3,289.02	3,285.62	3.40	967.543	
1,500.00	1,500.00	1,528.04	1,527.85	1.93	1.64	-89.00	57.41	-3,287.30	3,287.90	3,284.33	3.57	920.714	
1,600.00	1,600.00	1,618.57	1,618.31	2.06	1.71	-88.94	60.79	-3,286.73	3,287.33	3,283.56	3.77	871.677	
1,700.00	1,700.00	1,740.71	1,740.11	2.19	1.84	-88.79	69.66	-3,285.67	3,286.63	3,282.60	4.03	815.430	
1,800.00	1,800.00	1,827.15	1,826.21	2.33	1.95	-88.65	77.19	-3,284.65	3,285.65	3,281.38	4.27	769.274	
1,900.00	1,900.00	1,922.93	1,921.66	2.46	2.07	-88.51	85.20	-3,283.85	3,285.01	3,280.48	4.53	724.917	
2,000.00	2,000.00	2,009.18	2,007.64	2.59	2.20	-88.40	91.96	-3,283.31	3,284.60	3,279.81	4.79	685.603	
2,100.00	2,100.00	2,106.92	2,105.14	2.72	2.36	-88.27	98.93	-3,283.03	3,284.52	3,279.44	5.08	646.798	
2,123.17	2,123.17	2,127.00	2,125.17	2.75	2.39	-88.25	100.21	-3,282.97	3,284.50	3,279.36	5.14	638.838	
2,200.00	2,200.00	2,173.21	2,171.29	2.85	2.47	-88.20	103.14	-3,283.07	3,284.83	3,279.51	5.32	617.277	
2,300.00	2,300.00	2,233.34	2,231.28	2.99	2.57	-88.13	107.05	-3,283.91	3,286.41	3,280.86	5.56	591.328	
2,400.00	2,400.00	2,317.00	2,314.72	3.12	2.73	-88.03	112.85	-3,285.81	3,288.91	3,283.07	5.84	562.959	
2,500.00	2,500.00	2,423.25	2,420.71	3.25	2.92	-87.91	119.72	-3,288.37	3,291.55	3,285.38	6.17	533.802	
2,600.00	2,600.00	2,514.11	2,511.37	3.38	3.09	-87.82	125.49	-3,290.55	3,294.19	3,287.72	6.47	509.406	
2,700.00	2,700.00	2,664.86	2,661.63	3.51	3.39	-87.61	137.38	-3,292.52	3,295.63	3,288.73	6.90	477.401	
2,800.00	2,800.00	2,766.88	2,763.28	3.64	3.65	-87.45	146.84	-3,293.41	3,296.73	3,289.44	7.30	451.914	
2,900.00	2,900.00	2,895.00	2,891.05	3.78	3.89	-87.30	155.47	-3,293.43	3,297.12	3,289.45	7.67	430.127	
3,000.00	3,000.00	2,982.03	2,977.83	3.91	4.09	-87.18	162.09	-3,293.56	3,297.64	3,289.64	7.99	412.493	
3,100.00	3,100.00	3,105.88	3,101.24	4.04	4.38	-87.00	172.39	-3,293.41	3,297.92	3,289.50	8.42	391.739	
3,200.00	3,200.00	3,192.22	3,187.24	4.17	4.59	-86.87	180.06	-3,293.23	3,298.18	3,289.42	8.76	376.452	
3,300.00	3,300.00	3,289.52	3,284.18	4.30	4.83	-86.72	188.45	-3,293.23	3,298.68	3,289.53	9.13	361.203	
3,400.00	3,400.00	3,384.27	3,378.58	4.44	5.06	-86.58	196.62	-3,293.35	3,299.29	3,289.80	9.50	347.338	
3,500.00	3,500.00	3,491.09	3,485.02	4.57	5.33	-86.43	205.59	-3,293.57	3,300.03	3,290.13	9.89	333.509	
3,600.00	3,600.00	3,606.40	3,599.84	4.70	5.62	-86.24	216.20	-3,292.95	3,300.04	3,289.72	10.32	319.913	
3,700.00	3,700.00	3,698.38	3,691.42	4.83	5.85	-86.09	224.79	-3,292.64	3,300.32	3,289.64	10.68	308.970	
3,800.00	3,800.00	3,798.11	3,790.70	4.96	6.11	-85.93	234.19	-3,292.26	3,300.60	3,289.53	11.07	298.213	
3,900.00	3,900.00	3,892.22	3,884.41	5.09	6.35	-85.78	242.88	-3,292.05	3,301.05	3,289.61	11.44	288.524	
4,000.00	4,000.00	3,985.63	3,977.42	5.23	6.59	-85.63	251.54	-3,291.98	3,301.67	3,289.85	11.81	279.453	
4,100.00	4,100.00	4,082.64	4,074.02	5.36	6.84	-85.48	260.48	-3,292.11	3,302.52	3,290.32	12.20	270.765	
4,200.00	4,200.00	4,197.99	4,188.93	5.49	7.13	-85.30	270.55	-3,292.09	3,303.21	3,290.59	12.62	261.781	
4,300.00	4,300.00	4,322.00	4,312.69	5.62	7.42	-85.17	278.19	-3,291.49	3,303.24	3,290.21	13.04	253.360	
4,397.92	4,397.92	4,409.26	4,399.92	5.75	7.59	-85.13	280.62	-3,291.14	3,303.08	3,289.74	13.34	247.516	
4,400.00	4,400.00	4,411.12	4,401.77	5.75	7.60	-85.13	280.65	-3,291.14	3,303.08	3,289.73	13.35	247.395	
4,500.00	4,500.00	4,417.00	4,407.65	5.89	7.61	-85.12	280.74	-3,291.13	3,304.43	3,290.93	13.50	244.858	
4,600.00	4,600.00	4,417.00	4,407.65	6.02	7.61	-85.12	280.74	-3,291.13	3,308.79	3,295.17	13.63	242.809	
4,700.00	4,700.00	4,417.00	4,407.65	6.15	7.61	-85.12	280.74	-3,291.13	3,316.17	3,302.41	13.76	241.019	
4,800.00	4,800.00	4,417.00	4,407.65	6.28	7.61	-85.12	280.74	-3,291.13	3,326.54	3,312.65	13.89	239.477	
4,900.00	4,900.00	4,417.00	4,407.65	6.41	7.61	-85.12	280.74	-3,291.13	3,339.87	3,325.85	14.02	238.177	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27-NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM-5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #58 - OH - Actual														Offset Site Error:	0.00 usft
Survey Program: 100-Keeper, 1367-MWD														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)					
5,000.00	5,000.00	4,417.00	4,407.65	6.54	7.61	-85.12	280.74	-3,291.13	3,356.13	3,341.97	14.15	237.107			
5,100.00	5,100.00	4,417.00	4,407.65	6.68	7.61	-85.12	280.74	-3,291.13	3,375.27	3,360.99	14.29	236.259			
5,200.00	5,200.00	4,417.00	4,407.65	6.81	7.61	-85.12	280.74	-3,291.13	3,397.25	3,382.84	14.42	235.623			
5,222.50	5,222.50	4,417.00	4,407.65	6.84	7.61	-85.12	280.74	-3,291.13	3,402.59	3,388.14	14.45	235.508			
5,225.00	5,225.00	4,417.00	4,407.65	6.84	7.61	5.00	280.74	-3,291.13	3,403.18	3,388.73	14.45	235.529			
5,250.00	5,249.98	4,417.00	4,407.65	6.84	7.61	4.94	280.74	-3,291.13	3,408.52	3,394.08	14.45	235.895			
5,275.00	5,274.89	4,417.00	4,407.65	6.84	7.61	4.89	280.74	-3,291.13	3,412.77	3,398.32	14.45	236.174			
5,300.00	5,299.66	4,417.00	4,407.65	6.84	7.61	4.86	280.74	-3,291.13	3,415.90	3,401.44	14.45	236.359			
5,325.00	5,324.21	4,417.00	4,407.65	6.85	7.61	4.84	280.74	-3,291.13	3,417.91	3,403.46	14.46	236.439			
5,350.00	5,348.49	4,417.00	4,407.65	6.85	7.61	4.83	280.74	-3,291.13	3,418.81	3,404.34	14.46	236.399			
5,375.00	5,372.42	4,417.00	4,407.65	6.86	7.61	4.84	280.74	-3,291.13	3,418.58	3,404.11	14.47	236.217			
5,400.00	5,395.94	4,417.00	4,407.65	6.88	7.61	4.85	280.74	-3,291.13	3,417.23	3,402.75	14.49	235.868			
5,425.00	5,418.99	4,417.00	4,407.65	6.90	7.61	4.87	280.74	-3,291.13	3,414.77	3,400.26	14.51	235.323			
5,450.00	5,441.49	4,417.00	4,407.65	6.93	7.61	4.91	280.74	-3,291.13	3,411.19	3,396.65	14.54	234.544			
5,475.00	5,463.40	4,417.00	4,407.65	6.98	7.61	4.96	280.74	-3,291.13	3,406.51	3,391.92	14.59	233.495			
5,500.00	5,484.65	4,417.00	4,407.65	7.04	7.61	5.02	280.74	-3,291.13	3,400.72	3,386.07	14.65	232.134			
5,525.00	5,505.17	4,417.00	4,407.65	7.12	7.61	5.10	280.74	-3,291.13	3,393.85	3,379.12	14.73	230.421			
5,550.00	5,524.93	4,417.00	4,407.65	7.22	7.61	5.19	280.74	-3,291.13	3,385.90	3,371.07	14.83	228.317			
5,575.00	5,543.85	4,417.00	4,407.65	7.35	7.61	5.29	280.74	-3,291.13	3,376.88	3,361.93	14.96	225.793			
5,600.00	5,561.90	4,417.00	4,407.65	7.50	7.61	5.42	280.74	-3,291.13	3,366.82	3,351.71	15.11	222.828			
5,625.00	5,579.01	4,417.00	4,407.65	7.68	7.61	5.56	280.74	-3,291.13	3,355.74	3,340.44	15.29	219.411			
5,650.00	5,595.15	4,417.00	4,407.65	7.90	7.61	5.72	280.74	-3,291.13	3,343.64	3,328.13	15.51	215.551			
5,675.00	5,610.27	4,417.00	4,407.65	8.15	7.61	5.91	280.74	-3,291.13	3,330.56	3,314.79	15.76	211.269			
5,700.00	5,624.32	4,417.00	4,407.65	8.44	7.61	6.12	280.74	-3,291.13	3,316.52	3,300.47	16.05	206.601			
5,725.00	5,637.28	4,417.00	4,407.65	8.77	7.61	6.37	280.74	-3,291.13	3,301.54	3,285.17	16.38	201.597			
5,750.00	5,649.10	4,417.00	4,407.65	9.13	7.61	6.65	280.74	-3,291.13	3,285.66	3,268.92	16.74	196.316			
5,775.00	5,659.74	4,417.00	4,407.65	9.52	7.61	6.97	280.74	-3,291.13	3,268.90	3,251.77	17.13	190.823			
5,800.00	5,669.20	4,417.00	4,407.65	9.95	7.61	7.34	280.74	-3,291.13	3,251.30	3,233.75	17.56	185.184			
5,825.00	5,677.42	4,417.00	4,407.65	10.40	7.61	7.77	280.74	-3,291.13	3,232.90	3,214.88	18.01	179.464			
5,850.00	5,684.40	4,417.00	4,407.65	10.89	7.61	8.27	280.74	-3,291.13	3,213.72	3,195.22	18.50	173.725			
5,875.00	5,690.12	4,417.00	4,407.65	11.40	7.61	8.85	280.74	-3,291.13	3,193.81	3,174.80	19.01	168.021			
5,900.00	5,694.55	4,417.00	4,407.65	11.93	7.61	9.55	280.74	-3,291.13	3,173.21	3,153.67	19.54	162.400			
5,925.00	5,697.69	4,417.00	4,407.65	12.48	7.61	10.39	280.74	-3,291.13	3,151.97	3,131.88	20.09	156.901			
5,950.00	5,699.53	4,417.00	4,407.65	13.04	7.61	11.41	280.74	-3,291.13	3,130.12	3,109.47	20.65	151.557			
5,975.00	5,700.07	4,417.00	4,407.65	13.62	7.61	12.67	280.74	-3,291.13	3,107.72	3,086.49	21.23	146.393			
5,980.99	5,700.00	4,417.00	4,407.65	13.76	7.61	13.02	280.74	-3,291.13	3,102.28	3,080.91	21.37	145.186			
6,000.00	5,699.67	4,417.00	4,407.65	14.20	7.61	13.02	280.74	-3,291.13	3,084.96	3,063.15	21.81	141.427			
6,100.00	5,697.93	4,417.00	4,407.65	16.62	7.61	13.02	280.74	-3,291.13	2,994.24	2,970.01	24.23	123.569			
6,200.00	5,696.18	4,417.00	4,407.65	19.13	7.61	13.02	280.74	-3,291.13	2,904.12	2,877.38	26.74	108.603			
6,300.00	5,694.44	4,417.00	4,407.65	21.70	7.61	13.02	280.74	-3,291.13	2,814.67	2,785.36	29.31	96.032			
6,400.00	5,692.70	4,417.00	4,407.65	24.31	7.61	13.02	280.74	-3,291.13	2,725.95	2,694.03	31.92	85.401			
6,500.00	5,690.96	4,417.00	4,407.65	26.95	7.61	13.02	280.74	-3,291.13	2,638.04	2,603.49	34.56	76.337			
6,600.00	5,689.22	4,417.00	4,407.65	29.61	7.61	13.02	280.74	-3,291.13	2,551.03	2,513.81	37.22	68.543			
6,700.00	5,687.47	4,417.00	4,407.65	32.28	7.61	13.02	280.74	-3,291.13	2,464.99	2,425.10	39.89	61.789			
6,800.00	5,685.73	4,417.00	4,407.65	34.97	7.61	13.02	280.74	-3,291.13	2,380.05	2,337.47	42.58	55.894			
6,900.00	5,683.99	4,417.00	4,407.65	37.67	7.61	13.02	280.74	-3,291.13	2,296.32	2,251.04	45.28	50.715			
7,000.00	5,682.25	4,417.00	4,407.65	40.37	7.61	13.02	280.74	-3,291.13	2,213.95	2,165.96	47.98	46.139			
7,100.00	5,680.51	4,417.00	4,407.65	43.09	7.61	13.02	280.74	-3,291.13	2,133.08	2,082.38	50.70	42.076			
7,200.00	5,678.77	4,417.00	4,407.65	45.80	7.61	13.02	280.74	-3,291.13	2,053.89	2,000.48	53.41	38.453			
7,300.00	5,677.02	4,417.00	4,407.65	48.52	7.61	13.02	280.74	-3,291.13	1,976.60	1,920.46	56.13	35.212			
7,400.00	5,675.28	4,417.00	4,407.65	51.25	7.61	13.02	280.74	-3,291.13	1,901.42	1,842.56	58.86	32.305			
7,500.00	5,673.54	4,417.00	4,407.65	53.98	7.61	13.02	280.74	-3,291.13	1,828.62	1,767.03	61.59	29.892			

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User.Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #58 - OH - Actual													Offset Site Error:	0.00 usft
Survey Program: 100 Keeper, 1367-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
7,600.00	5,871.80	4,417.00	4,407.65	56.71	7.61	13.02	280.74	-3,291.13	1,758.49	1,694.18	64.32	27.341		
7,700.00	5,670.06	4,417.00	4,407.65	59.44	7.61	13.02	280.74	-3,291.13	1,691.38	1,624.33	67.05	25.226		
7,800.00	5,668.32	4,417.00	4,407.65	62.17	7.61	13.02	280.74	-3,291.13	1,627.64	1,557.86	69.78	23.324		
7,900.00	5,666.57	4,417.00	4,407.65	64.91	7.61	13.02	280.74	-3,291.13	1,567.70	1,495.17	72.52	21.617		
8,000.00	5,664.83	4,417.00	4,407.65	67.65	7.61	13.02	280.74	-3,291.13	1,511.99	1,436.74	75.26	20.091		
8,100.00	5,663.09	4,417.00	4,407.65	70.39	7.61	13.02	280.74	-3,291.13	1,461.02	1,383.02	78.00	18.732		
8,200.00	5,661.35	4,417.00	4,407.65	73.13	7.61	13.02	280.74	-3,291.13	1,415.29	1,334.55	80.74	17.529		
8,300.00	5,659.61	4,417.00	4,407.65	75.87	7.61	13.02	280.74	-3,291.13	1,375.32	1,291.84	83.48	16.475		
8,400.00	5,657.86	4,417.00	4,407.65	78.61	7.61	13.02	280.74	-3,291.13	1,341.62	1,255.40	86.22	15.560		
8,500.00	5,656.12	4,417.00	4,407.65	81.35	7.61	13.02	280.74	-3,291.13	1,314.69	1,225.72	88.96	14.778		
8,600.00	5,654.38	4,417.00	4,407.65	84.10	7.61	13.02	280.74	-3,291.13	1,294.94	1,203.23	91.71	14.120		
8,700.00	5,652.64	4,417.00	4,407.65	86.84	7.61	13.02	280.74	-3,291.13	1,282.70	1,188.25	94.45	13.580		
8,800.00	5,650.90	4,417.00	4,407.65	89.59	7.61	13.02	280.74	-3,291.13	1,278.19	1,180.99	97.20	13.150		
8,807.72	5,650.76	4,417.00	4,407.65	89.80	7.61	13.02	280.74	-3,291.13	1,278.17	1,180.76	97.41	13.121 CC, ES		
8,900.00	5,649.16	4,417.00	4,407.65	92.33	7.61	13.02	280.74	-3,291.13	1,281.50	1,181.55	99.94	12.822		
9,000.00	5,647.41	4,417.00	4,407.65	95.08	7.61	13.02	280.74	-3,291.13	1,292.55	1,189.86	102.69	12.587		
9,100.00	5,645.67	4,417.00	4,407.65	97.83	7.61	13.02	280.74	-3,291.13	1,311.16	1,205.72	105.44	12.435		
9,200.00	5,643.93	4,417.00	4,407.65	100.57	7.61	13.02	280.74	-3,291.13	1,337.01	1,228.83	108.18	12.359		
9,300.00	5,642.19	4,417.00	4,407.65	103.32	7.61	13.02	280.74	-3,291.13	1,369.69	1,258.76	110.93	12.347 SF		
9,400.00	5,640.45	4,417.00	4,407.65	106.07	7.61	13.02	280.74	-3,291.13	1,408.73	1,295.05	113.68	12.392		
9,500.00	5,638.70	4,417.00	4,407.65	108.82	7.61	13.02	280.74	-3,291.13	1,453.61	1,337.18	116.43	12.485		
9,600.00	5,636.96	4,417.00	4,407.65	111.57	7.61	13.02	280.74	-3,291.13	1,503.80	1,384.63	119.18	12.618		
9,700.00	5,635.22	4,417.00	4,407.65	114.32	7.61	13.02	280.74	-3,291.13	1,558.81	1,436.88	121.93	12.785		
9,800.00	5,633.48	4,417.00	4,407.65	117.07	7.61	13.02	280.74	-3,291.13	1,618.13	1,493.45	124.68	12.979		
9,900.00	5,631.74	4,417.00	4,407.65	119.82	7.61	13.02	280.74	-3,291.13	1,681.31	1,553.88	127.43	13.194		
10,000.00	5,630.00	4,417.00	4,407.65	122.56	7.61	13.02	280.74	-3,291.13	1,747.93	1,617.75	130.17	13.428		
10,100.00	5,628.25	4,417.00	4,407.65	125.31	7.61	13.02	280.74	-3,291.13	1,817.61	1,684.69	132.92	13.674		
10,114.58	5,628.00	4,417.00	4,407.65	125.72	7.61	13.02	280.74	-3,291.13	1,828.01	1,694.68	133.33	13.711		

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



Scientific Drilling
Anticollision Report



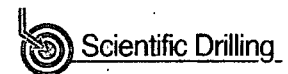
Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal #60 OH Actual													Offset Site Error:	0.00 usft
Survey Program: 100-Keeper, 1981-MWD													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
0.00	0.00	23.85	23.85	0.00	0.02	-78.03	479.54	-2,261.27	2,311.56					
100.00	100.00	121.02	121.02	0.09	0.10	-78.03	479.51	-2,261.31	2,311.59	2,311.40	0.19	N/A		
200.00	200.00	212.18	212.18	0.22	0.22	-78.04	479.16	-2,261.70	2,311.93	2,311.49	0.44	5,247.522		
300.00	300.00	311.36	311.36	0.35	0.35	-78.06	478.70	-2,262.32	2,312.45	2,311.75	0.70	3,299.802		
400.00	400.00	405.90	405.89	0.48	0.47	-78.07	477.98	-2,263.14	2,313.13	2,312.18	0.95	2,422.160		
500.00	500.00	517.26	517.24	0.61	0.61	-78.11	476.54	-2,264.01	2,313.62	2,312.40	1.22	1,889.354		
600.00	600.00	615.89	615.85	0.74	0.73	-78.15	474.98	-2,264.65	2,313.94	2,312.46	1.48	1,565.898		
700.00	700.00	716.65	716.60	0.88	0.86	-78.19	473.61	-2,265.35	2,314.34	2,312.61	1.73	1,334.093		
800.00	800.00	842.92	842.86	1.01	0.98	-78.22	472.37	-2,265.34	2,314.14	2,312.15	1.99	1,164.490		
900.00	900.00	964.98	964.91	1.14	1.03	-78.23	471.67	-2,263.77	2,312.75	2,310.57	2.17	1,063.758		
1,000.00	1,000.00	1,082.91	1,082.81	1.27	1.07	-78.23	471.25	-2,261.29	2,310.62	2,308.28	2.34	986.139		
1,100.00	1,100.00	1,181.18	1,181.05	1.40	1.11	-78.22	471.24	-2,258.70	2,308.04	2,305.53	2.51	919.785		
1,200.00	1,200.00	1,296.01	1,295.84	1.53	1.16	-78.21	470.83	-2,255.54	2,305.28	2,302.58	2.69	855.552		
1,300.00	1,300.00	1,393.55	1,393.33	1.67	1.18	-78.22	469.95	-2,252.62	2,302.16	2,299.31	2.85	808.675		
1,400.00	1,400.00	1,487.41	1,487.14	1.80	1.22	-78.22	469.29	-2,250.04	2,299.33	2,296.31	3.02	761.140		
1,500.00	1,500.00	1,690.63	1,690.06	1.93	1.43	-78.34	462.42	-2,241.80	2,295.01	2,291.64	3.36	682.518		
1,600.00	1,600.00	1,888.55	1,888.63	2.06	1.79	-78.63	447.27	-2,224.76	2,284.42	2,280.57	3.85	593.356		
1,700.00	1,700.00	2,005.00	2,002.08	2.19	2.04	-78.79	438.32	-2,212.48	2,272.56	2,268.33	4.23	536.915		
1,800.00	1,800.00	2,087.85	2,084.06	2.33	2.24	-78.89	432.87	-2,203.48	2,260.61	2,256.04	4.56	495.372		
1,900.00	1,900.00	2,197.38	2,192.93	2.46	2.52	-79.01	425.48	-2,191.92	2,248.98	2,244.00	4.98	451.754		
2,000.00	2,000.00	2,296.20	2,290.92	2.59	2.80	-79.14	418.41	-2,181.28	2,237.03	2,231.64	5.39	415.347		
2,100.00	2,100.00	2,391.05	2,384.95	2.72	3.07	-79.28	411.06	-2,171.30	2,225.22	2,219.43	5.79	384.337		
2,200.00	2,200.00	2,512.88	2,505.63	2.85	3.43	-79.48	400.89	-2,158.01	2,212.93	2,206.64	6.29	352.093		
2,300.00	2,300.00	2,626.43	2,618.00	2.99	3.78	-79.66	391.42	-2,144.75	2,199.91	2,193.14	6.77	325.179		
2,400.00	2,400.00	2,723.52	2,714.06	3.12	4.07	-79.79	384.00	-2,132.80	2,186.42	2,179.23	7.19	304.058		
2,500.00	2,500.00	2,810.03	2,799.75	3.25	4.33	-79.91	377.73	-2,122.56	2,173.47	2,165.89	7.58	286.858		
2,600.00	2,600.00	2,901.22	2,890.11	3.38	4.59	-80.03	371.40	-2,112.14	2,160.99	2,153.02	7.97	271.038		
2,700.00	2,700.00	2,997.25	2,985.33	3.51	4.87	-80.14	365.17	-2,101.34	2,148.79	2,140.40	8.39	256.240		
2,800.00	2,800.00	3,097.25	3,084.50	3.64	5.17	-80.26	358.78	-2,090.10	2,136.61	2,127.80	8.81	242.394		
2,900.00	2,900.00	3,204.68	3,191.01	3.78	5.49	-80.38	352.09	-2,077.86	2,124.32	2,115.05	9.27	229.169		
3,000.00	3,000.00	3,312.85	3,298.12	3.91	5.84	-80.55	343.92	-2,065.17	2,111.48	2,101.74	9.74	216.709		
3,100.00	3,100.00	3,416.33	3,400.48	4.04	6.17	-80.73	334.96	-2,052.96	2,098.40	2,088.19	10.21	205.517		
3,200.00	3,200.00	3,522.04	3,504.98	4.17	6.52	-80.94	325.18	-2,040.32	2,085.09	2,074.40	10.69	195.086		
3,300.00	3,300.00	3,622.79	3,604.57	4.30	6.84	-81.14	316.30	-2,027.96	2,071.56	2,060.42	11.15	185.860		
3,400.00	3,400.00	3,720.86	3,701.54	4.44	7.16	-81.31	308.03	-2,015.83	2,058.03	2,046.44	11.59	177.529		
3,500.00	3,500.00	3,806.81	3,786.55	4.57	7.43	-81.47	300.88	-2,005.37	2,044.74	2,032.74	12.00	170.449		
3,600.00	3,600.00	3,888.37	3,867.34	4.70	7.68	-81.61	294.46	-1,996.19	2,032.42	2,020.04	12.38	164.173		
3,700.00	3,700.00	3,974.76	3,952.96	4.83	7.94	-81.76	287.62	-1,986.97	2,020.70	2,007.92	12.77	158.213		
3,800.00	3,800.00	4,044.00	4,021.69	4.96	8.14	-81.87	282.85	-1,980.07	2,009.92	1,996.81	13.11	153.346		
3,900.00	3,900.00	4,118.98	4,096.25	5.09	8.35	-81.97	278.32	-1,973.53	2,000.49	1,987.04	13.44	148.832		
4,000.00	4,000.00	4,187.93	4,164.92	5.23	8.52	-82.06	274.67	-1,968.60	1,992.66	1,978.91	13.74	144.974		
4,100.00	4,100.00	4,255.75	4,232.58	5.36	8.68	-82.11	272.41	-1,964.59	1,986.35	1,972.32	14.03	141.545		
4,200.00	4,200.00	4,331.00	4,307.74	5.49	8.83	-82.15	270.30	-1,961.54	1,981.84	1,967.52	14.32	138.369		
4,300.00	4,300.00	4,421.56	4,398.22	5.62	9.01	-82.22	267.77	-1,958.65	1,978.26	1,963.63	14.63	135.177		
4,400.00	4,400.00	4,489.31	4,465.92	5.75	9.14	-82.25	266.18	-1,956.83	1,975.29	1,960.40	14.89	132.635		
4,500.00	4,500.00	4,569.78	4,546.38	5.89	9.28	-82.28	265.22	-1,955.81	1,973.84	1,958.67	15.16	130.158		
4,600.00	4,600.00	4,666.99	4,643.59	6.02	9.44	-82.28	265.16	-1,954.82	1,972.82	1,957.36	15.46	127.627		
4,700.00	4,700.00	4,767.11	4,743.71	6.15	9.61	-82.28	264.98	-1,953.83	1,971.81	1,956.06	15.76	125.155		
4,800.00	4,800.00	4,859.88	4,836.47	6.28	9.76	-82.27	264.94	-1,953.00	1,970.92	1,954.88	16.04	122.870		
4,875.69	4,875.69	4,924.00	4,900.59	6.38	9.86	-82.27	265.10	-1,952.62	1,970.54	1,954.29	16.25	121.299		
4,900.00	4,900.00	4,924.00	4,900.59	6.41	9.86	-82.27	265.10	-1,952.62	1,970.67	1,954.40	16.28	121.069		
5,000.00	5,000.00	4,924.00	4,900.59	6.54	9.86	-82.27	265.10	-1,952.62	1,974.40	1,957.99	16.41	120.323		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27-NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User.Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design - Electra Federal - #60 - OH - Actual													Offset Site Error:	0.00 usft
Survey Program: 100-Keeper, 1361-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
5,100.00	5,100.00	4,924.00	4,900.59	6.68	9.86	-82.27	265.10	-1,952.62	1,983.16	1,966.62	16.54	119.894		
5,200.00	5,200.00	4,924.00	4,900.59	6.81	9.86	-82.27	265.10	-1,952.62	1,996.90	1,980.23	16.67	119.770		
5,222.50	5,222.50	4,924.00	4,900.59	6.84	9.86	-82.27	265.10	-1,952.62	2,000.67	1,983.96	16.70	119.783		
5,225.00	5,225.00	4,924.00	4,900.59	6.84	9.86	7.85	265.10	-1,952.62	2,001.09	1,984.39	16.70	119.800		
5,250.00	5,249.98	4,924.00	4,900.59	6.84	9.86	7.79	265.10	-1,952.62	2,004.83	1,988.13	16.70	120.022		
5,275.00	5,274.89	4,924.00	4,900.59	6.84	9.86	7.74	265.10	-1,952.62	2,007.59	1,990.88	16.70	120.180		
5,300.00	5,299.66	4,924.00	4,900.59	6.84	9.86	7.72	265.10	-1,952.62	2,009.36	1,992.66	16.71	120.273		
5,325.00	5,324.21	4,924.00	4,900.59	6.85	9.86	7.70	265.10	-1,952.62	2,010.16	1,993.44	16.71	120.294		
5,350.00	5,348.49	4,924.00	4,900.59	6.85	9.86	7.71	265.10	-1,952.62	2,009.96	1,993.24	16.72	120.237		
5,375.00	5,372.42	4,924.00	4,900.59	6.86	9.86	7.73	265.10	-1,952.62	2,008.78	1,992.05	16.73	120.093		
5,400.00	5,395.94	4,924.00	4,900.59	6.88	9.86	7.76	265.10	-1,952.62	2,006.61	1,989.87	16.74	119.852		
5,425.00	5,418.99	4,924.00	4,900.59	6.90	9.86	7.81	265.10	-1,952.62	2,003.47	1,986.70	16.77	119.498		
5,450.00	5,441.49	4,924.00	4,900.59	6.93	9.86	7.88	265.10	-1,952.62	1,999.34	1,982.55	16.80	119.019		
5,475.00	5,463.40	4,924.00	4,900.59	6.98	9.86	7.97	265.10	-1,952.62	1,994.25	1,977.41	16.84	118.397		
5,500.00	5,484.65	4,924.00	4,900.59	7.04	9.86	8.07	265.10	-1,952.62	1,988.19	1,971.28	16.90	117.614		
5,525.00	5,505.17	4,924.00	4,900.59	7.12	9.86	8.19	265.10	-1,952.62	1,981.17	1,964.19	16.98	116.652		
5,550.00	5,524.93	4,924.00	4,900.59	7.22	9.86	8.34	265.10	-1,952.62	1,973.20	1,956.12	17.08	115.497		
5,575.00	5,543.85	4,924.00	4,900.59	7.35	9.86	8.51	265.10	-1,952.62	1,964.30	1,947.09	17.21	114.135		
5,600.00	5,561.90	4,924.00	4,900.59	7.50	9.86	8.70	265.10	-1,952.62	1,954.46	1,937.10	17.36	112.558		
5,625.00	5,579.01	4,924.00	4,900.59	7.68	9.86	8.92	265.10	-1,952.62	1,943.72	1,926.17	17.55	110.760		
5,650.00	5,595.15	4,924.00	4,900.59	7.90	9.86	9.17	265.10	-1,952.62	1,932.08	1,914.31	17.77	108.747		
5,675.00	5,610.27	4,924.00	4,900.59	8.15	9.86	9.45	265.10	-1,952.62	1,919.55	1,901.53	18.02	106.528		
5,700.00	5,624.32	4,924.00	4,900.59	8.44	9.86	9.76	265.10	-1,952.62	1,906.16	1,887.85	18.31	104.120		
5,725.00	5,637.28	4,924.00	4,900.59	8.77	9.86	10.12	265.10	-1,952.62	1,891.92	1,873.29	18.63	101.544		
5,750.00	5,649.10	4,924.00	4,900.59	9.13	9.86	10.53	265.10	-1,952.62	1,876.85	1,857.86	18.99	98.828		
5,775.00	5,659.74	4,924.00	4,900.59	9.52	9.86	10.99	265.10	-1,952.62	1,860.98	1,841.59	19.39	96.000		
5,800.00	5,669.20	4,924.00	4,900.59	9.95	9.86	11.51	265.10	-1,952.62	1,844.33	1,824.52	19.81	93.093		
5,825.00	5,677.42	4,924.00	4,900.59	10.40	9.86	12.11	265.10	-1,952.62	1,826.92	1,806.65	20.27	90.135		
5,850.00	5,684.40	4,924.00	4,900.59	10.89	9.86	12.79	265.10	-1,952.62	1,808.78	1,788.02	20.75	87.155		
5,875.00	5,690.12	4,924.00	4,900.59	11.40	9.86	13.58	265.10	-1,952.62	1,789.93	1,768.67	21.26	84.181		
5,900.00	5,694.55	4,924.00	4,900.59	11.93	9.86	14.48	265.10	-1,952.62	1,770.42	1,748.63	21.79	81.234		
5,925.00	5,697.69	4,924.00	4,900.59	12.48	9.86	15.54	265.10	-1,952.62	1,750.27	1,727.92	22.34	78.334		
5,950.00	5,699.53	4,924.00	4,900.59	13.04	9.86	16.79	265.10	-1,952.62	1,729.51	1,706.60	22.91	75.499		
5,975.00	5,700.07	4,924.00	4,900.59	13.62	9.86	18.27	265.10	-1,952.62	1,708.17	1,684.69	23.48	72.740		
5,980.99	5,700.00	4,924.00	4,900.59	13.76	9.86	18.66	265.10	-1,952.62	1,702.99	1,679.36	23.62	72.092		
6,000.00	5,699.67	4,924.00	4,900.59	14.20	9.86	18.66	265.10	-1,952.62	1,686.49	1,662.42	24.07	70.072		
6,100.00	5,697.93	4,924.00	4,900.59	16.62	9.86	18.66	265.10	-1,952.62	1,600.62	1,574.13	26.49	60.433		
6,200.00	5,696.18	4,924.00	4,900.59	19.13	9.86	18.66	265.10	-1,952.62	1,516.49	1,487.49	29.00	52.301		
6,300.00	5,694.44	4,924.00	4,900.59	21.70	9.86	18.66	265.10	-1,952.62	1,434.39	1,402.83	31.56	45.444		
6,400.00	5,692.70	4,924.00	4,900.59	24.31	9.86	18.66	265.10	-1,952.62	1,354.71	1,320.53	34.17	39.642		
6,500.00	5,690.96	4,924.00	4,900.59	26.95	9.86	18.66	265.10	-1,952.62	1,277.88	1,241.07	36.81	34.713		
6,600.00	5,689.22	4,924.00	4,900.59	29.61	9.86	18.66	265.10	-1,952.62	1,204.46	1,164.99	39.47	30.514		
6,700.00	5,687.47	4,924.00	4,900.59	32.28	9.86	18.66	265.10	-1,952.62	1,135.11	1,092.97	42.15	26.932		
6,800.00	5,685.73	4,924.00	4,900.59	34.97	9.86	18.66	265.10	-1,952.62	1,070.62	1,025.79	44.84	23.879		
6,900.00	5,683.99	4,924.00	4,900.59	37.67	9.86	18.66	265.10	-1,952.62	1,011.92	964.39	47.53	21.288		
7,000.00	5,682.25	4,924.00	4,900.59	40.37	9.86	18.66	265.10	-1,952.62	960.07	909.83	50.24	19.110		
7,100.00	5,680.51	4,924.00	4,900.59	43.09	9.86	18.66	265.10	-1,952.62	916.24	863.28	52.95	17.303		
7,200.00	5,678.77	4,924.00	4,900.59	45.80	9.86	18.66	265.10	-1,952.62	881.61	825.94	55.67	15.837		
7,300.00	5,677.02	4,924.00	4,900.59	48.52	9.86	18.66	265.10	-1,952.62	857.31	798.93	58.39	14.683		
7,400.00	5,675.28	4,924.00	4,900.59	51.25	9.86	18.66	265.10	-1,952.62	844.24	783.12	61.11	13.814		
7,461.25	5,674.22	4,924.00	4,900.59	52.92	9.86	18.66	265.10	-1,952.62	842.01	779.23	62.78	13.411 CC		
7,500.00	5,673.54	4,924.00	4,900.59	53.98	9.86	18.66	265.10	-1,952.62	842.90	779.06	63.84	13.203 ES		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #60 - OH - Actual													Offset Site Error: 0.00 usft	
Survey Program: 100-Keeper, 1361-MWD													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance					Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)			
7,600.00	5,671.80	4,924.00	4,900.59	56.71	9.86	18.66	265.10	-1,952.62	853.37	786.80	66.57	12.819		
7,700.00	5,670.06	4,924.00	4,900.59	59.44	9.86	18.66	265.10	-1,952.62	875.21	805.90	69.30	12.628		
7,800.00	5,668.32	4,924.00	4,900.59	62.17	9.86	18.66	265.10	-1,952.62	907.60	835.56	72.04	12.599 SF		
7,900.00	5,666.57	4,924.00	4,900.59	64.91	9.86	18.66	265.10	-1,952.62	949.47	874.69	74.78	12.698		
8,000.00	5,664.83	4,924.00	4,900.59	67.65	9.86	18.66	265.10	-1,952.62	999.62	922.11	77.51	12.896		
8,100.00	5,663.09	4,924.00	4,900.59	70.39	9.86	18.66	265.10	-1,952.62	1,056.88	976.63	80.25	13.169		
8,200.00	5,661.35	4,924.00	4,900.59	73.13	9.86	18.66	265.10	-1,952.62	1,120.15	1,037.16	82.99	13.497		
8,300.00	5,659.61	4,924.00	4,900.59	75.87	9.86	18.66	265.10	-1,952.62	1,188.48	1,102.75	85.73	13.862		
8,400.00	5,657.86	4,924.00	4,900.59	78.61	9.86	18.66	265.10	-1,952.62	1,261.05	1,172.57	88.48	14.253		
8,500.00	5,656.12	4,924.00	4,900.59	81.35	9.86	18.66	265.10	-1,952.62	1,337.16	1,245.94	91.22	14.659		
8,600.00	5,654.38	4,924.00	4,900.59	84.10	9.86	18.66	265.10	-1,952.62	1,416.24	1,322.28	93.96	15.072		
8,700.00	5,652.64	4,924.00	4,900.59	86.84	9.86	18.66	265.10	-1,952.62	1,497.83	1,401.12	96.71	15.488		
8,800.00	5,650.90	4,924.00	4,900.59	89.59	9.86	18.66	265.10	-1,952.62	1,581.53	1,482.08	99.45	15.902		
8,900.00	5,649.16	4,924.00	4,900.59	92.33	9.86	18.66	265.10	-1,952.62	1,667.03	1,564.83	102.20	16.312		
9,000.00	5,647.41	4,924.00	4,900.59	95.08	9.86	18.66	265.10	-1,952.62	1,754.07	1,649.12	104.95	16.714		
9,100.00	5,645.67	4,924.00	4,900.59	97.83	9.86	18.66	265.10	-1,952.62	1,842.42	1,734.72	107.69	17.108		
9,200.00	5,643.93	4,924.00	4,900.59	100.57	9.86	18.66	265.10	-1,952.62	1,931.90	1,821.46	110.44	17.493		
9,300.00	5,642.19	4,924.00	4,900.59	103.32	9.86	18.66	265.10	-1,952.62	2,022.37	1,909.19	113.19	17.868		
9,400.00	5,640.45	4,924.00	4,900.59	106.07	9.86	18.66	265.10	-1,952.62	2,113.70	1,997.77	115.93	18.232		
9,500.00	5,638.70	4,924.00	4,900.59	108.82	9.86	18.66	265.10	-1,952.62	2,205.79	2,087.10	118.68	18.585		
9,600.00	5,636.96	4,924.00	4,900.59	111.57	9.86	18.66	265.10	-1,952.62	2,298.53	2,177.10	121.43	18.929		
9,700.00	5,635.22	4,924.00	4,900.59	114.32	9.86	18.66	265.10	-1,952.62	2,391.86	2,267.68	124.18	19.261		
9,800.00	5,633.48	4,924.00	4,900.59	117.07	9.86	18.66	265.10	-1,952.62	2,485.71	2,358.78	126.93	19.583		
9,900.00	5,631.74	4,924.00	4,900.59	119.82	9.86	18.66	265.10	-1,952.62	2,580.02	2,450.34	129.68	19.895		
10,000.00	5,630.00	4,924.00	4,900.59	122.56	9.86	18.66	265.10	-1,952.62	2,674.74	2,542.31	132.43	20.197		
10,100.00	5,628.25	4,924.00	4,900.59	125.31	9.86	18.66	265.10	-1,952.62	2,769.84	2,634.66	135.18	20.490		
10,114.58	5,628.00	4,924.00	4,900.59	125.72	9.86	18.66	265.10	-1,952.62	2,783.73	2,648.15	135.58	20.532		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27-NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset-TVD Reference:	Offset Datum

Offset Design													Offset Site Error: 0.00 usft	
Electra Federal - #61 - OH - Job #32D0610466 - Actual													Offset Well Error: 0.00 usft	
Survey Program: 100-Keiper, 1399-MWD														
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
0.00	0.00	11.80	11.80	0.00	0.01	-94.51	-129.81	-1,646.33	1,651.44					
100.00	100.00	103.28	103.28	0.09	0.08	-94.51	-129.77	-1,646.66	1,651.79	1,651.63	0.16	N/A		
200.00	200.00	219.31	219.31	0.22	0.18	-94.49	-129.36	-1,646.78	1,651.86	1,651.46	0.40	4,138.649		
300.00	300.00	325.66	325.64	0.35	0.29	-94.44	-127.83	-1,646.21	1,651.21	1,650.57	0.64	2,573.264		
400.00	400.00	423.29	423.25	0.48	0.41	-94.38	-125.99	-1,645.69	1,650.53	1,649.64	0.89	1,849.416		
500.00	500.00	522.80	522.74	0.61	0.54	-94.31	-124.01	-1,645.22	1,649.92	1,648.77	1.15	1,434.452		
600.00	600.00	621.29	621.22	0.74	0.66	-94.25	-122.31	-1,644.82	1,649.38	1,647.97	1.41	1,171.112		
700.00	700.00	720.43	720.34	0.88	0.79	-94.20	-120.75	-1,644.47	1,648.91	1,647.24	1.67	988.337		
800.00	800.00	821.42	821.33	1.01	0.92	-94.15	-119.25	-1,644.12	1,648.46	1,646.53	1.93	853.701		
900.00	900.00	930.42	930.31	1.14	1.06	-94.09	-117.64	-1,643.47	1,647.76	1,645.56	2.20	748.956		
1,000.00	1,000.00	1,050.08	1,049.94	1.27	1.20	-94.04	-115.92	-1,641.62	1,646.13	1,643.66	2.47	666.898		
1,100.00	1,100.00	1,162.73	1,162.54	1.40	1.31	-93.99	-114.43	-1,638.66	1,643.40	1,640.68	2.72	604.634		
1,200.00	1,200.00	1,263.12	1,262.88	1.53	1.42	-93.95	-113.05	-1,635.64	1,640.30	1,637.35	2.96	555.060		
1,300.00	1,300.00	1,359.01	1,358.73	1.67	1.50	-93.92	-111.85	-1,632.88	1,637.34	1,634.18	3.16	517.743		
1,400.00	1,400.00	1,471.99	1,471.65	1.80	1.53	-93.89	-110.88	-1,629.66	1,634.48	1,631.15	3.33	491.343		
1,500.00	1,500.00	1,644.07	1,643.31	1.93	1.65	-94.11	-116.33	-1,619.45	1,628.84	1,625.26	3.58	455.331		
1,600.00	1,600.00	1,789.43	1,787.60	2.06	1.87	-94.50	-126.20	-1,604.97	1,619.36	1,615.43	3.93	411.812		
1,700.00	1,700.00	1,900.33	1,897.36	2.19	2.09	-94.83	-134.59	-1,591.50	1,607.78	1,603.50	4.28	375.607		
1,800.00	1,800.00	1,985.83	1,982.08	2.33	2.27	-95.07	-140.39	-1,581.57	1,596.77	1,592.18	4.59	347.770		
1,900.00	1,900.00	2,079.21	2,074.73	2.46	2.47	-95.31	-146.09	-1,571.34	1,586.38	1,581.45	4.92	322.186		
2,000.00	2,000.00	2,169.02	2,163.88	2.59	2.67	-95.54	-151.47	-1,561.90	1,576.46	1,571.20	5.26	299.567		
2,100.00	2,100.00	2,263.47	2,257.63	2.72	2.90	-95.81	-158.01	-1,552.50	1,567.21	1,561.58	5.62	278.636		
2,200.00	2,200.00	2,373.95	2,367.22	2.85	3.19	-96.15	-165.97	-1,541.01	1,557.58	1,551.54	6.04	257.687		
2,300.00	2,300.00	2,469.05	2,461.51	2.99	3.45	-96.46	-173.25	-1,530.92	1,547.83	1,541.39	6.44	240.402		
2,400.00	2,400.00	2,567.76	2,559.34	3.12	3.73	-96.80	-181.21	-1,520.57	1,538.30	1,531.46	6.84	224.790		
2,500.00	2,500.00	2,671.26	2,661.93	3.25	4.02	-97.15	-189.50	-1,509.62	1,528.73	1,521.47	7.27	210.310		
2,600.00	2,600.00	2,774.78	2,764.43	3.38	4.32	-97.54	-198.39	-1,498.15	1,518.80	1,511.10	7.70	197.170		
2,700.00	2,700.00	2,872.00	2,860.74	3.51	4.61	-97.90	-206.28	-1,487.47	1,508.96	1,500.83	8.12	185.784		
2,800.00	2,800.00	2,974.59	2,962.40	3.64	4.91	-98.26	-214.18	-1,476.20	1,499.11	1,490.56	8.56	175.201		
2,900.00	2,900.00	3,071.89	3,058.80	3.78	5.20	-98.60	-221.62	-1,465.30	1,489.12	1,480.15	8.97	165.935		
3,000.00	3,000.00	3,161.72	3,147.87	3.91	5.46	-98.91	-228.18	-1,455.73	1,479.67	1,470.30	9.37	157.945		
3,100.00	3,100.00	3,271.04	3,256.31	4.04	5.78	-99.28	-236.03	-1,444.29	1,470.45	1,460.63	9.82	149.693		
3,200.00	3,200.00	3,375.32	3,359.59	4.17	6.10	-99.67	-244.06	-1,432.35	1,460.37	1,450.10	10.27	142.203		
3,300.00	3,300.00	3,471.03	3,454.41	4.30	6.39	-100.03	-251.35	-1,421.53	1,450.49	1,439.80	10.69	135.628		
3,400.00	3,400.00	3,568.47	3,550.87	4.44	6.69	-100.43	-259.85	-1,410.52	1,440.83	1,429.70	11.13	129.492		
3,500.00	3,500.00	3,664.71	3,646.10	4.57	6.99	-100.85	-268.39	-1,399.69	1,431.40	1,419.84	11.56	123.828		
3,600.00	3,600.00	3,761.81	3,742.24	4.70	7.30	-101.27	-276.88	-1,389.01	1,422.22	1,410.23	11.99	118.578		
3,700.00	3,700.00	3,860.90	3,840.36	4.83	7.60	-101.70	-285.42	-1,378.18	1,413.17	1,400.74	12.43	113.675		
3,800.00	3,800.00	3,959.55	3,938.05	4.96	7.91	-102.13	-293.85	-1,367.41	1,404.21	1,391.34	12.87	109.112		
3,900.00	3,900.00	4,051.00	4,028.64	5.09	8.19	-102.52	-301.52	-1,357.50	1,395.38	1,382.10	13.29	105.030		
4,000.00	4,000.00	4,126.44	4,103.52	5.23	8.41	-102.82	-307.22	-1,350.33	1,387.80	1,374.16	13.64	101.776		
4,100.00	4,100.00	4,200.76	4,177.56	5.36	8.60	-103.03	-311.22	-1,345.21	1,382.25	1,368.29	13.95	99.060		
4,200.00	4,200.00	4,281.81	4,258.44	5.49	8.78	-103.20	-314.50	-1,341.20	1,378.33	1,364.06	14.27	96.596		
4,300.00	4,300.00	4,368.49	4,344.94	5.62	9.01	-103.40	-318.45	-1,336.40	1,374.79	1,360.16	14.63	93.968		
4,400.00	4,400.00	4,465.00	4,441.33	5.75	9.17	-103.54	-320.99	-1,333.14	1,371.53	1,356.60	14.92	91.905		
4,500.00	4,500.00	4,541.98	4,518.28	5.89	9.31	-103.61	-322.31	-1,331.63	1,370.10	1,354.90	15.19	90.176		
4,525.16	4,525.16	4,561.85	4,538.16	5.92	9.34	-103.61	-322.44	-1,331.56	1,370.05	1,354.79	15.26	89.792		
4,600.00	4,600.00	4,625.78	4,602.08	6.02	9.44	-103.61	-322.56	-1,331.87	1,370.41	1,354.96	15.45	88.680		
4,700.00	4,700.00	4,722.51	4,698.80	6.15	9.58	-103.61	-322.75	-1,332.79	1,371.38	1,355.65	15.73	87.201		
4,800.00	4,800.00	4,821.27	4,797.56	6.28	9.72	-103.62	-323.10	-1,333.80	1,372.46	1,356.46	16.00	85.762		
4,900.00	4,900.00	4,922.86	4,899.14	6.41	9.87	-103.63	-323.60	-1,334.82	1,373.55	1,357.27	16.29	84.332		
5,000.00	5,000.00	5,025.45	5,001.73	6.54	10.03	-103.64	-324.16	-1,335.65	1,374.47	1,357.89	16.57	82.926		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #61 - OH - Job #32D0610466 - Actual													Offset Site Error
Survey Program: 100-Keeper, 1399-MWD													0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum		Separation		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Factor	
5,100.00	5,100.00	5,126.72	5,103.00	6.68	10.19	-103.65	-324.65	-1,336.33	1,375.24	1,358.37	16.87	81.544	
5,200.00	5,200.00	5,227.82	5,204.09	6.81	10.35	-103.66	-324.91	-1,336.98	1,375.92	1,358.77	17.16	80.200	
5,222.50	5,222.50	5,251.81	5,228.08	6.84	10.39	-103.66	-324.94	-1,337.12	1,376.06	1,358.83	17.22	79.889	
5,225.00	5,225.00	5,254.49	5,230.76	6.84	10.39	-13.53	-324.94	-1,337.14	1,376.07	1,358.83	17.23	79.864	
5,250.00	5,249.98	5,281.27	5,257.55	6.84	10.43	-13.56	-324.95	-1,337.26	1,375.42	1,358.14	17.27	79.624	
5,275.00	5,274.89	5,307.98	5,284.25	6.84	10.48	-13.63	-324.93	-1,337.36	1,373.47	1,356.15	17.32	79.308	
5,300.00	5,299.66	5,334.53	5,310.81	6.84	10.52	-13.76	-324.89	-1,337.42	1,370.22	1,352.86	17.36	78.915	
5,325.00	5,324.21	5,360.85	5,337.13	6.85	10.56	-13.94	-324.83	-1,337.46	1,365.68	1,348.28	17.41	78.444	
5,350.00	5,348.49	5,386.86	5,363.13	6.85	10.61	-14.18	-324.75	-1,337.46	1,359.88	1,342.42	17.46	77.893	
5,375.00	5,372.42	5,411.32	5,387.60	6.86	10.65	-14.47	-324.66	-1,337.45	1,352.83	1,335.32	17.51	77.264	
5,400.00	5,395.94	5,435.26	5,411.53	6.88	10.69	-14.82	-324.59	-1,337.42	1,344.56	1,327.00	17.56	76.549	
5,425.00	5,418.99	5,458.69	5,434.97	6.90	10.73	-15.25	-324.52	-1,337.39	1,335.11	1,317.49	17.63	75.743	
5,450.00	5,441.49	5,481.58	5,457.85	6.93	10.76	-15.75	-324.47	-1,337.34	1,324.51	1,306.81	17.70	74.839	
5,475.00	5,463.40	5,503.83	5,480.11	6.98	10.80	-16.33	-324.43	-1,337.29	1,312.77	1,294.99	17.78	73.832	
5,500.00	5,484.65	5,525.41	5,501.68	7.04	10.84	-17.01	-324.39	-1,337.24	1,299.94	1,282.07	17.88	72.715	
5,525.00	5,505.17	5,546.24	5,522.51	7.12	10.87	-17.80	-324.36	-1,337.17	1,286.06	1,268.07	17.99	71.463	
5,550.00	5,524.93	5,566.27	5,542.54	7.22	10.91	-18.71	-324.34	-1,337.11	1,271.17	1,253.04	18.13	70.131	
5,575.00	5,543.85	5,585.49	5,561.76	7.35	10.94	-19.77	-324.33	-1,337.03	1,255.30	1,237.02	18.28	68.657	
5,600.00	5,561.90	5,603.96	5,580.23	7.50	10.97	-20.99	-324.31	-1,336.96	1,238.51	1,220.04	18.47	67.058	
5,625.00	5,579.01	5,621.46	5,597.73	7.68	11.00	-22.40	-324.28	-1,336.89	1,220.85	1,202.17	18.68	65.342	
5,650.00	5,595.15	5,637.95	5,614.22	7.90	11.03	-24.05	-324.24	-1,336.82	1,202.37	1,183.44	18.93	63.517	
5,675.00	5,610.27	5,653.38	5,629.65	8.15	11.05	-25.97	-324.19	-1,336.75	1,183.12	1,163.91	19.21	61.592	
5,700.00	5,624.32	5,667.70	5,643.98	8.44	11.08	-28.22	-324.13	-1,336.68	1,163.16	1,143.63	19.52	59.583	
5,725.00	5,637.28	5,680.89	5,657.16	8.77	11.10	-30.86	-324.07	-1,336.62	1,142.55	1,122.68	19.87	57.506	
5,750.00	5,649.10	5,692.90	5,669.17	9.13	11.12	-33.96	-324.01	-1,336.56	1,121.35	1,101.10	20.25	55.379	
5,775.00	5,659.74	5,703.71	5,679.98	9.52	11.14	-37.63	-323.96	-1,336.50	1,099.64	1,078.97	20.66	53.222	
5,800.00	5,669.20	5,713.27	5,689.54	9.95	11.16	-41.96	-323.90	-1,336.45	1,077.46	1,056.36	21.10	51.054	
5,825.00	5,677.42	5,721.58	5,697.85	10.40	11.17	-47.05	-323.85	-1,336.41	1,054.89	1,033.32	21.58	48.893	
5,850.00	5,684.40	5,728.60	5,704.87	10.89	11.18	-52.98	-323.81	-1,336.37	1,032.01	1,009.93	22.07	46.756	
5,875.00	5,690.12	5,734.32	5,710.59	11.40	11.19	-59.77	-323.77	-1,336.34	1,008.86	986.27	22.59	44.657	
5,900.00	5,694.55	5,738.72	5,714.99	11.93	11.20	-67.34	-323.74	-1,336.31	985.54	962.41	23.13	42.608	
5,925.00	5,697.69	5,741.79	5,718.06	12.48	11.21	-75.48	-323.72	-1,336.30	962.10	938.42	23.68	40.621	
5,950.00	5,699.53	5,743.53	5,719.80	13.04	11.21	-83.84	-323.70	-1,336.29	938.62	914.37	24.25	38.703	
5,975.00	5,700.07	5,743.93	5,720.20	13.62	11.21	-92.02	-323.70	-1,336.28	915.17	890.34	24.83	36.860	
5,980.99	5,700.00	5,743.83	5,720.10	13.76	11.21	-93.91	-323.70	-1,336.29	909.57	884.60	24.97	36.430	
6,000.00	5,699.67	5,743.38	5,719.65	14.20	11.21	-93.83	-323.70	-1,336.29	891.81	866.39	25.41	35.094	
6,100.00	5,697.93	5,741.03	5,717.29	16.62	11.20	-93.41	-323.72	-1,336.30	799.34	771.51	27.83	28.726	
6,200.00	5,696.18	5,738.68	5,714.95	19.13	11.20	-92.99	-323.74	-1,336.31	708.91	678.58	30.33	23.372	
6,300.00	5,694.44	5,736.33	5,712.60	21.70	11.20	-92.58	-323.75	-1,336.33	621.42	588.52	32.90	18.890	
6,400.00	5,692.70	5,734.00	5,710.26	24.31	11.19	-92.16	-323.77	-1,336.34	538.29	502.78	35.50	15.162	
6,500.00	5,690.96	5,731.66	5,707.93	26.95	11.19	-91.74	-323.79	-1,336.35	461.88	423.74	38.14	12.111	
6,600.00	5,689.22	5,729.34	5,705.60	29.61	11.18	-91.33	-323.80	-1,336.37	396.11	355.32	40.79	9.710	
6,700.00	5,687.47	5,727.01	5,703.28	32.28	11.18	-90.91	-323.82	-1,336.38	347.08	303.61	43.46	7.985	
6,800.00	5,685.73	5,724.70	5,700.97	34.97	11.18	-90.50	-323.83	-1,336.39	322.51	276.36	46.15	6.989	
6,832.30	5,685.17	5,723.95	5,700.22	35.84	11.18	-90.37	-323.84	-1,336.39	320.89	273.87	47.02	6.825 CC, ES	
6,900.00	5,683.99	5,722.38	5,698.65	37.67	11.17	-90.09	-323.85	-1,336.40	327.95	279.11	48.84	6.715 SF	
7,000.00	5,682.25	5,720.08	5,696.35	40.37	11.17	-89.67	-323.86	-1,336.42	362.05	310.51	51.54	7.024	
7,100.00	5,680.51	5,717.78	5,694.05	43.09	11.16	-89.26	-323.87	-1,336.43	417.85	363.60	54.25	7.702	
7,200.00	5,678.77	5,715.48	5,691.75	45.80	11.16	-88.85	-323.89	-1,336.44	487.96	431.00	56.96	8.566	
7,300.00	5,677.02	5,713.19	5,689.46	48.52	11.16	-88.45	-323.90	-1,336.45	567.10	507.42	59.68	9.502	
7,400.00	5,675.28	5,710.90	5,687.17	51.25	11.15	-88.04	-323.92	-1,336.46	651.99	589.59	62.40	10.448	
7,500.00	5,673.54	5,708.62	5,684.89	53.98	11.15	-87.63	-323.93	-1,336.48	740.65	675.53	65.13	11.373	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1: Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal #61 - OH - Job #32D0610466 Actual														Offset Site Error:	0.00 usft
Survey Program: 100-Keeper, 1399-MWD														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance									
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
7,600.00	5,871.80	5,706.35	5,682.62	56.71	11.15	-87.23	-323.94	-1,336.49	831.88	764.03	67.85	12.260			
7,700.00	5,870.06	5,704.08	5,680.35	59.44	11.14	-86.82	-323.95	-1,336.50	924.93	854.34	70.58	13.104			
7,800.00	5,868.32	5,701.81	5,678.08	62.17	11.14	-86.42	-323.97	-1,336.51	1,019.28	945.97	73.31	13.903			
7,900.00	5,866.57	5,699.55	5,675.82	64.91	11.13	-86.02	-323.98	-1,336.52	1,114.62	1,038.57	76.04	14.657			
8,000.00	5,864.83	5,697.30	5,673.57	67.65	11.13	-85.62	-323.99	-1,336.53	1,210.70	1,131.92	78.78	15.368			
8,100.00	5,863.09	5,695.05	5,671.32	70.39	11.13	-85.22	-324.00	-1,336.55	1,307.37	1,225.85	81.51	16.039			
8,200.00	5,861.35	5,692.81	5,669.08	73.13	11.12	-84.82	-324.02	-1,336.56	1,404.50	1,320.25	84.25	16.671			
8,300.00	5,859.61	5,690.57	5,666.84	75.87	11.12	-84.43	-324.03	-1,336.57	1,502.00	1,415.01	86.99	17.287			
8,400.00	5,857.86	5,688.33	5,664.60	78.61	11.11	-84.03	-324.04	-1,336.58	1,599.81	1,510.08	89.73	17.830			
8,500.00	5,856.12	5,686.10	5,662.37	81.35	11.11	-83.64	-324.05	-1,336.59	1,697.87	1,605.41	92.47	18.362			
8,600.00	5,854.38	5,683.88	5,660.15	84.10	11.11	-83.25	-324.06	-1,336.60	1,796.14	1,700.94	95.21	18.866			
8,700.00	5,852.64	5,681.66	5,657.93	86.84	11.10	-82.86	-324.07	-1,336.61	1,894.59	1,796.65	97.95	19.343			
8,800.00	5,850.90	5,679.44	5,655.71	89.59	11.10	-82.47	-324.08	-1,336.62	1,993.20	1,892.51	100.69	19.796			
8,900.00	5,849.16	5,677.23	5,653.50	92.33	11.10	-82.08	-324.09	-1,336.63	2,091.93	1,988.50	103.43	20.226			
9,000.00	5,847.41	5,675.03	5,651.30	95.08	11.09	-81.70	-324.10	-1,336.64	2,190.77	2,084.60	106.17	20.634			
9,100.00	5,845.67	5,672.83	5,649.10	97.83	11.09	-81.31	-324.11	-1,336.66	2,289.72	2,180.80	108.92	21.023			
9,200.00	5,843.93	5,670.63	5,646.90	100.57	11.08	-80.93	-324.12	-1,336.67	2,388.75	2,277.09	111.66	21.393			
9,300.00	5,842.19	5,668.44	5,644.71	103.32	11.08	-80.55	-324.13	-1,336.68	2,487.85	2,373.45	114.40	21.746			
9,400.00	5,840.45	5,666.26	5,642.53	106.07	11.08	-80.17	-324.14	-1,336.69	2,587.02	2,469.88	117.15	22.084			
9,500.00	5,838.70	5,664.08	5,640.35	108.82	11.07	-79.80	-324.15	-1,336.70	2,686.26	2,566.36	119.89	22.406			
9,600.00	5,836.96	5,661.90	5,638.17	111.57	11.07	-79.42	-324.15	-1,336.71	2,785.54	2,662.90	122.64	22.714			
9,700.00	5,835.22	5,659.73	5,636.00	114.32	11.07	-79.05	-324.16	-1,336.72	2,884.87	2,759.49	125.38	23.009			
9,800.00	5,833.48	5,657.56	5,633.84	117.07	11.06	-78.68	-324.17	-1,336.73	2,984.25	2,856.12	128.13	23.291			
9,900.00	5,831.74	5,655.40	5,631.67	119.82	11.06	-78.31	-324.18	-1,336.74	3,083.66	2,952.79	130.87	23.562			
10,000.00	5,830.00	5,653.25	5,629.52	122.56	11.05	-77.94	-324.19	-1,336.75	3,183.11	3,049.49	133.62	23.822			
10,100.00	5,828.25	5,651.09	5,627.37	125.31	11.05	-77.57	-324.19	-1,336.76	3,282.59	3,146.23	136.37	24.072			
10,114.58	5,828.00	5,650.78	5,627.05	125.72	11.05	-77.52	-324.19	-1,336.76	3,297.10	3,160.34	136.77	24.108			

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #62 - OH - Plan #3 8-3/4" Hole													Offset Site Error: 0.00 usft	
Survey Program: 0-Keeper - 1150-MWD													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance					Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor				
0.00	0.00	0.00	0.00	0.00	0.00	-59.75	542.74	-930.67	1,077.36					
100.00	100.00	99.00	99.00	0.09	0.11	-59.75	542.74	-930.67	1,077.36	1,077.16	0.20	5,362.945		
200.00	200.00	199.00	199.00	0.22	0.22	-59.75	542.74	-930.67	1,077.36	1,076.92	0.44	2,437.079		
300.00	300.00	299.00	299.00	0.35	0.34	-59.75	542.74	-930.67	1,077.36	1,076.68	0.69	1,571.606		
400.00	400.00	399.00	399.00	0.48	0.45	-59.75	542.74	-930.67	1,077.36	1,076.44	0.93	1,159.228		
500.00	500.00	499.00	499.00	0.61	0.56	-59.75	542.74	-930.67	1,077.36	1,076.19	1.17	918.163		
600.00	600.00	599.00	599.00	0.74	0.67	-59.75	542.74	-930.67	1,077.36	1,075.95	1.42	760.061		
700.00	700.00	699.00	699.00	0.88	0.79	-59.75	542.74	-930.67	1,077.36	1,075.70	1.66	648.394		
800.00	800.00	799.00	799.00	1.01	0.90	-59.75	542.74	-930.67	1,077.36	1,075.46	1.91	565.329		
900.00	900.00	899.00	899.00	1.14	1.01	-59.75	542.74	-930.67	1,077.36	1,075.21	2.15	501.126		
1,000.00	1,000.00	999.00	999.00	1.27	1.12	-59.75	542.74	-930.67	1,077.36	1,074.97	2.39	450.017		
1,100.00	1,100.00	1,099.00	1,099.00	1.40	1.24	-59.75	542.74	-930.67	1,077.36	1,074.73	2.64	408.366		
1,200.00	1,200.00	1,199.00	1,199.00	1.53	1.35	-59.75	542.74	-930.67	1,077.36	1,074.48	2.88	373.772		
1,300.00	1,300.00	1,299.00	1,299.00	1.67	1.57	-59.75	542.74	-930.67	1,077.36	1,074.13	3.24	332.739		
1,400.00	1,400.00	1,399.00	1,399.00	1.80	1.80	-59.75	542.74	-930.67	1,077.36	1,073.77	3.59	299.729		
1,500.00	1,500.00	1,527.89	1,527.88	1.93	2.06	-59.76	542.07	-929.85	1,076.71	1,072.71	3.99	269.628		
1,600.00	1,600.00	1,686.38	1,686.11	2.06	2.37	-59.84	536.53	-923.16	1,071.30	1,066.87	4.43	241.798		
1,700.00	1,700.00	1,794.43	1,793.73	2.19	2.60	-59.92	530.37	-915.70	1,062.44	1,057.65	4.79	221.786		
1,800.00	1,800.00	1,894.02	1,892.91	2.33	2.82	-60.00	524.63	-908.76	1,053.52	1,048.37	5.15	204.717		
1,900.00	1,900.00	1,993.61	1,992.09	2.46	3.05	-60.08	518.89	-901.82	1,044.61	1,039.10	5.51	189.538		
2,000.00	2,000.00	2,093.20	2,091.28	2.59	3.29	-60.17	513.16	-894.89	1,035.70	1,029.81	5.88	176.031		
2,100.00	2,100.00	2,192.79	2,190.46	2.72	3.54	-60.25	507.42	-887.95	1,026.79	1,020.53	6.26	163.981		
2,200.00	2,200.00	2,292.38	2,289.64	2.85	3.79	-60.34	501.69	-881.01	1,017.88	1,011.24	6.64	153.196		
2,300.00	2,300.00	2,391.97	2,388.82	2.99	4.05	-60.43	495.95	-874.07	1,008.98	1,001.95	7.03	143.510		
2,400.00	2,400.00	2,491.56	2,488.01	3.12	4.30	-60.52	490.22	-867.13	1,000.08	992.66	7.42	134.778		
2,500.00	2,500.00	2,591.15	2,587.19	3.25	4.56	-60.61	484.48	-860.20	991.18	983.37	7.81	126.875		
2,600.00	2,600.00	2,690.74	2,686.37	3.38	4.83	-60.70	478.74	-853.26	982.28	974.08	8.21	119.696		
2,700.00	2,700.00	2,790.34	2,785.56	3.51	5.09	-60.80	473.01	-846.32	973.39	964.79	8.60	113.152		
2,800.00	2,800.00	2,889.93	2,884.74	3.64	5.36	-60.90	467.27	-839.38	964.50	955.50	9.00	107.165		
2,900.00	2,900.00	2,989.52	2,983.92	3.78	5.62	-60.99	461.54	-832.44	955.61	946.21	9.40	101.671		
3,000.00	3,000.00	3,089.11	3,083.11	3.91	5.89	-61.09	455.80	-825.51	946.73	936.93	9.80	96.613		
3,100.00	3,100.00	3,188.70	3,182.29	4.04	6.16	-61.20	450.06	-818.57	937.84	927.64	10.20	91.944		
3,200.00	3,200.00	3,288.29	3,281.47	4.17	6.43	-61.30	444.33	-811.63	928.96	918.36	10.60	87.621		
3,300.00	3,300.00	3,387.88	3,380.65	4.30	6.70	-61.41	438.59	-804.69	920.09	909.08	11.00	83.608		
3,400.00	3,400.00	3,487.47	3,479.84	4.44	6.97	-61.52	432.86	-797.75	911.21	899.81	11.41	79.873		
3,500.00	3,500.00	3,587.06	3,579.02	4.57	7.25	-61.63	427.12	-790.82	902.34	890.53	11.81	76.391		
3,600.00	3,600.00	3,686.65	3,678.20	4.70	7.52	-61.74	421.39	-783.88	893.48	881.26	12.22	73.136		
3,700.00	3,700.00	3,786.24	3,777.39	4.83	7.79	-61.85	415.65	-776.94	884.62	871.99	12.62	70.087		
3,800.00	3,800.00	3,885.83	3,876.57	4.96	8.06	-61.97	409.91	-770.00	875.76	862.73	13.03	67.225		
3,900.00	3,900.00	3,985.42	3,975.75	5.09	8.34	-62.09	404.18	-763.06	866.90	853.47	13.43	64.535		
4,000.00	4,000.00	4,085.01	4,074.93	5.23	8.61	-62.21	398.44	-756.13	858.05	844.21	13.84	62.001		
4,100.00	4,100.00	4,184.60	4,174.12	5.36	8.89	-62.34	392.71	-749.19	849.20	834.96	14.25	59.611		
4,200.00	4,200.00	4,284.20	4,273.30	5.49	9.16	-62.46	386.97	-742.25	840.36	825.71	14.65	57.352		
4,300.00	4,300.00	4,383.79	4,372.48	5.62	9.44	-62.59	381.24	-735.31	831.52	816.46	15.06	55.215		
4,400.00	4,400.00	4,483.38	4,471.67	5.75	9.71	-62.73	375.50	-728.37	822.68	807.22	15.47	53.190		
4,500.00	4,500.00	4,582.97	4,570.85	5.89	9.99	-62.86	369.76	-721.44	813.85	797.98	15.87	51.268		
4,600.00	4,600.00	4,682.56	4,670.03	6.02	10.26	-63.00	364.03	-714.50	805.03	788.74	16.28	49.442		
4,700.00	4,700.00	4,782.15	4,769.22	6.15	10.54	-63.14	358.29	-707.56	796.21	779.52	16.69	47.705		
4,800.00	4,800.00	4,881.74	4,868.40	6.28	10.82	-63.29	352.56	-700.62	787.39	770.29	17.10	46.051		
4,900.00	4,900.00	4,981.33	4,967.58	6.41	11.09	-63.44	346.82	-693.68	778.58	761.07	17.51	44.474		
5,000.00	5,000.00	5,080.92	5,066.76	6.54	11.37	-63.59	341.08	-686.74	769.77	751.86	17.91	42.968		
5,100.00	5,100.00	5,180.51	5,165.95	6.68	11.65	-63.74	335.35	-679.81	760.97	742.65	18.32	41.530		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft.
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design: Electra Federal - #62 - OH - Plan #3 8-3/4" Hole														Offset Site Error:	0.00 usft
Survey Program: 0-Keeper, 1150-MWD														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance									
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
5,200.00	5,200.00	5,280.10	5,265.13	6.81	11.92	-63.90	329.81	-672.87	752.18	733.44	18.73	40.155			
5,222.50	5,222.50	5,302.51	5,287.45	6.84	11.99	-63.94	328.32	-671.31	750.20	731.37	18.82	39.853			
5,225.00	5,225.00	5,305.00	5,289.93	6.84	11.99	26.20	328.18	-671.13	749.97	731.14	18.83	39.824			
5,250.00	5,249.98	5,329.83	5,314.65	6.84	12.06	26.34	326.75	-669.40	747.08	728.17	18.90	39.525			
5,275.00	5,274.89	5,354.49	5,339.21	6.84	12.13	26.59	325.33	-667.69	743.02	724.05	18.97	39.166			
5,300.00	5,299.66	5,378.92	5,363.54	6.84	12.20	26.96	323.92	-665.98	737.81	718.77	19.04	38.749			
5,325.00	5,324.21	5,403.05	5,387.57	6.85	12.27	27.44	322.53	-664.30	731.47	712.36	19.11	38.274			
5,350.00	5,348.49	5,426.81	5,411.24	6.85	12.33	28.06	321.16	-662.85	724.02	704.83	19.18	37.741			
5,375.00	5,372.42	5,450.14	5,434.47	6.86	12.40	28.81	319.82	-661.02	715.48	696.22	19.26	37.150			
5,400.00	5,395.94	5,472.97	5,457.21	6.88	12.46	29.71	318.50	-659.43	705.89	686.55	19.34	36.502			
5,425.00	5,418.99	5,495.25	5,479.40	6.90	12.52	30.77	317.22	-657.88	695.28	675.85	19.42	35.796			
5,450.00	5,441.49	5,516.91	5,500.97	6.93	12.58	32.01	315.97	-656.37	683.68	664.17	19.52	35.031			
5,475.00	5,463.40	5,537.89	5,521.86	6.98	12.64	33.45	314.77	-654.91	671.16	651.54	19.62	34.207			
5,500.00	5,484.85	5,558.13	5,542.02	7.04	12.70	35.11	313.60	-653.50	657.74	638.00	19.74	33.325			
5,525.00	5,505.17	5,577.58	5,561.40	7.12	12.75	37.00	312.48	-652.14	643.50	623.63	19.87	32.385			
5,550.00	5,524.93	5,596.19	5,579.93	7.22	12.80	39.16	311.41	-650.85	628.48	608.46	20.02	31.388			
5,575.00	5,543.85	5,613.90	5,597.57	7.35	12.85	41.59	310.39	-649.61	612.75	592.58	20.20	30.337			
5,600.00	5,561.90	5,630.67	5,614.27	7.50	12.90	44.33	309.42	-648.45	596.39	576.00	20.40	29.237			
5,625.00	5,579.01	5,646.45	5,629.98	7.68	12.94	47.39	308.51	-647.35	579.48	558.85	20.63	28.092			
5,650.00	5,595.15	5,661.20	5,644.66	7.90	12.98	50.76	307.66	-646.32	562.08	541.19	20.89	26.911			
5,675.00	5,610.27	5,674.87	5,658.28	8.15	13.02	54.43	306.88	-645.37	544.30	523.12	21.18	25.703			
5,700.00	5,624.32	5,687.43	5,670.79	8.44	13.06	58.38	306.15	-644.49	526.23	504.73	21.50	24.476			
5,725.00	5,637.28	5,698.84	5,682.16	8.77	13.09	62.54	305.50	-643.70	507.97	486.12	21.86	23.242			
5,750.00	5,649.10	5,709.08	5,692.35	9.13	13.12	66.84	304.91	-642.98	489.65	467.41	22.24	22.013			
5,775.00	5,659.74	5,718.11	5,701.35	9.52	13.14	71.18	304.39	-642.35	471.38	448.71	22.66	20.799			
5,800.00	5,669.20	5,725.91	5,709.12	9.95	13.16	75.44	303.94	-641.81	453.29	430.18	23.11	19.613			
5,825.00	5,677.42	5,732.47	5,715.64	10.40	13.18	79.50	303.56	-641.35	435.52	411.94	23.59	18.465			
5,850.00	5,684.40	5,737.75	5,720.90	10.89	13.20	83.28	303.26	-640.99	418.24	394.15	24.09	17.364			
5,875.00	5,690.12	5,741.75	5,724.89	11.40	13.21	86.68	303.03	-640.71	401.60	376.99	24.61	16.320			
5,900.00	5,694.55	5,744.45	5,727.58	11.93	13.22	89.64	302.87	-640.52	385.76	360.62	25.15	15.341			
5,925.00	5,697.69	5,745.86	5,728.98	12.48	13.22	92.11	302.79	-640.42	370.92	345.22	25.70	14.433			
5,950.00	5,699.53	5,745.96	5,729.08	13.04	13.22	94.09	302.78	-640.41	357.26	330.99	26.26	13.603			
5,975.00	5,700.07	5,744.75	5,727.87	13.62	13.22	95.55	302.85	-640.50	344.94	318.10	26.84	12.854			
5,980.99	5,700.00	5,744.27	5,727.39	13.76	13.22	95.83	302.88	-640.53	342.21	315.24	26.97	12.687			
6,000.00	5,699.67	5,742.61	5,725.75	14.20	13.21	95.52	302.98	-640.65	334.11	306.70	27.41	12.188			
6,100.00	5,697.93	5,733.93	5,717.10	16.62	13.19	93.90	303.48	-641.25	307.64	277.83	29.81	10.321			
6,135.61	5,697.31	5,730.83	5,714.02	17.51	13.18	93.32	303.65	-641.47	305.58	274.89	30.69	9.956 CC, ES			
6,200.00	5,696.18	5,725.24	5,708.44	19.13	13.16	92.28	303.98	-641.86	312.24	279.95	32.29	9.669 SF			
6,300.00	5,694.44	5,716.55	5,699.79	21.70	13.14	90.66	304.48	-642.46	346.70	311.86	34.84	9.952			
6,400.00	5,692.70	5,707.86	5,691.14	24.31	13.11	89.04	304.98	-643.07	403.43	366.01	37.42	10.780			
6,500.00	5,690.96	5,699.18	5,682.49	26.95	13.09	87.43	305.48	-643.67	474.51	434.47	40.04	11.852			
6,600.00	5,689.22	5,690.49	5,673.84	29.61	13.07	85.83	305.98	-644.28	554.45	511.78	42.67	12.993			
6,700.00	5,687.47	5,681.80	5,665.19	32.28	13.04	84.24	306.48	-644.88	639.93	594.61	45.33	14.119			
6,800.00	5,685.73	5,673.11	5,656.53	34.97	13.02	82.67	306.98	-645.49	729.02	681.03	47.99	15.191			
6,900.00	5,683.99	5,664.43	5,647.88	37.67	12.99	81.11	307.48	-646.09	820.53	769.87	50.66	16.196			
7,000.00	5,682.25	5,655.74	5,639.23	40.37	12.97	79.57	307.98	-646.70	913.74	860.39	53.34	17.129			
7,100.00	5,680.51	5,647.05	5,630.58	43.09	12.94	78.05	308.48	-647.30	1,008.17	952.14	56.03	17.993			
7,200.00	5,678.77	5,638.36	5,621.93	45.80	12.92	76.55	308.98	-647.91	1,103.52	1,044.80	58.72	18.792			
7,300.00	5,677.02	5,629.68	5,613.27	48.52	12.90	75.07	309.48	-648.52	1,199.57	1,138.15	61.42	19.530			
7,400.00	5,675.28	5,620.99	5,604.62	51.25	12.87	73.62	309.98	-649.12	1,296.15	1,232.03	64.12	20.214			
7,500.00	5,673.54	5,612.30	5,595.97	53.98	12.85	72.20	310.48	-649.73	1,393.16	1,326.34	66.82	20.848			
7,600.00	5,671.80	5,603.61	5,587.32	56.71	12.82	70.80	310.98	-650.33	1,490.52	1,420.99	69.53	21.437			

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.00 usft
Electra Federal - #62 - OH - Plan #3 8-3/4" Hole												Offset Well Error:	0.00 usft
Survey Program: 0-Keeper, 1150-MWD													
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,700.00	5,670.08	5,594.93	5,578.67	59.44	12.80	69.43	311.48	-650.94	1,588.15	1,515.92	72.24	21.985	
7,800.00	5,668.32	5,586.24	5,570.01	62.17	12.78	68.08	311.98	-651.54	1,686.02	1,611.07	74.95	22.495	
7,900.00	5,666.57	5,577.55	5,561.36	64.91	12.75	66.77	312.48	-652.15	1,784.09	1,708.43	77.66	22.972	
8,000.00	5,664.83	5,568.86	5,552.71	67.65	12.73	65.49	312.98	-652.75	1,882.31	1,801.94	80.38	23.419	
8,100.00	5,663.09	5,560.18	5,544.06	70.39	12.70	64.23	313.48	-653.36	1,980.68	1,897.59	83.09	23.838	
8,200.00	5,661.35	5,551.49	5,535.41	73.13	12.68	63.01	313.98	-653.96	2,079.17	1,993.36	85.81	24.231	
8,300.00	5,659.61	5,542.80	5,526.76	75.87	12.65	61.82	314.48	-654.57	2,177.76	2,089.23	88.52	24.601	
8,400.00	5,657.86	5,534.11	5,518.10	78.61	12.63	60.65	314.98	-655.17	2,276.44	2,185.19	91.24	24.949	
8,500.00	5,656.12	5,525.43	5,509.45	81.35	12.61	59.52	315.48	-655.78	2,375.19	2,281.23	93.96	25.278	
8,600.00	5,654.38	5,516.74	5,500.80	84.10	12.58	58.41	315.98	-656.38	2,474.02	2,377.34	96.68	25.590	
8,700.00	5,652.64	5,508.05	5,492.15	86.84	12.56	57.33	316.48	-656.99	2,572.91	2,473.51	99.40	25.884	
8,800.00	5,650.90	5,499.36	5,483.50	89.59	12.53	56.28	316.99	-657.59	2,671.85	2,569.73	102.12	26.163	
8,900.00	5,649.16	5,490.68	5,474.84	92.33	12.51	55.27	317.49	-658.20	2,770.84	2,666.00	104.84	26.428	
9,000.00	5,647.41	5,481.99	5,466.19	95.08	12.49	54.27	317.99	-658.80	2,869.88	2,762.31	107.57	26.680	
9,100.00	5,645.67	5,473.30	5,457.54	97.83	12.46	53.31	318.49	-659.41	2,968.95	2,858.66	110.29	26.920	
9,200.00	5,643.93	5,464.61	5,448.89	100.57	12.44	52.37	318.99	-660.01	3,068.06	2,955.05	113.01	27.148	
9,300.00	5,642.19	5,455.93	5,440.24	103.32	12.41	51.46	319.49	-660.62	3,167.21	3,051.47	115.74	27.366	
9,400.00	5,640.45	5,447.24	5,431.58	106.07	12.39	50.57	319.99	-661.22	3,266.38	3,147.92	118.46	27.574	
9,500.00	5,638.70	5,438.55	5,422.93	108.82	12.36	49.71	320.49	-661.83	3,365.57	3,244.39	121.18	27.773	
9,600.00	5,636.96	5,429.87	5,414.28	111.57	12.34	48.87	320.99	-662.44	3,464.80	3,340.89	123.91	27.963	
9,700.00	5,635.22	5,421.18	5,405.63	114.32	12.32	48.05	321.49	-663.04	3,564.04	3,437.41	126.63	28.145	
9,800.00	5,633.48	5,412.49	5,396.98	117.07	12.29	47.26	321.99	-663.65	3,663.31	3,533.95	129.36	28.319	
9,900.00	5,631.74	5,403.80	5,388.33	119.82	12.27	46.49	322.49	-664.25	3,762.59	3,630.51	132.08	28.487	
10,000.00	5,630.00	5,395.12	5,379.67	122.56	12.24	45.74	322.99	-664.86	3,861.89	3,727.08	134.81	28.647	
10,100.00	5,628.25	5,386.43	5,371.02	125.31	12.22	45.01	323.49	-665.46	3,961.21	3,823.67	137.53	28.802	
10,114.58	5,628.00	5,385.16	5,369.76	125.72	12.22	44.91	323.56	-665.55	3,975.69	3,837.76	137.93	28.824	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error	0.00 usft
Electra Federal - #63" OH - OH												Offset Well Error	0.00 usft
Survey Program: 726-UNKNOWN													
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	179.82	-130.01	0.40	130.01				
100.00	100.00	100.69	100.69	0.09	2.02	179.82	-129.74	0.40	129.74	127.63	2.11	61.386	
200.00	200.00	201.38	201.37	0.22	4.05	179.82	-128.94	0.40	128.95	124.68	4.27	30.225	
300.00	300.00	302.05	302.04	0.35	6.07	179.82	-127.60	0.40	127.61	121.19	6.42	19.875	
400.00	400.00	402.71	402.68	0.48	8.09	179.82	-125.72	0.40	125.75	117.17	8.58	14.664	
500.00	500.00	503.34	503.28	0.61	10.12	179.81	-123.31	0.40	123.35	112.62	10.73	11.496	
600.00	600.00	603.95	603.85	0.74	12.14	179.81	-120.36	0.40	120.43	107.54	12.88	9.347	
700.00	700.00	704.52	704.36	0.88	14.16	179.80	-116.89	0.40	116.97	101.93	15.04	7.778	
800.00	800.00	804.43	804.19	1.01	17.74	179.80	-113.12	0.40	113.19	94.44	18.75	6.037	
900.00	900.00	904.17	903.87	1.14	21.75	179.79	-109.51	0.40	109.58	86.69	22.89	4.788	
1,000.00	1,000.00	1,003.92	1,003.56	1.27	25.75	179.78	-106.07	0.40	106.13	79.11	27.02	3.927	
1,100.00	1,100.00	1,103.69	1,103.28	1.40	29.76	179.78	-102.81	0.40	102.86	71.70	31.16	3.301	
1,200.00	1,200.00	1,203.47	1,203.01	1.53	33.76	179.77	-99.71	0.40	99.76	64.46	35.30	2.826	
1,300.00	1,300.00	1,303.25	1,302.75	1.67	37.77	179.76	-96.79	0.40	96.83	57.39	39.44	2.455	
1,400.00	1,400.00	1,402.89	1,402.35	1.80	41.76	179.76	-94.11	0.40	94.14	50.58	43.56	2.161	
1,500.00	1,500.00	1,502.47	1,501.91	1.93	45.75	179.75	-91.83	0.40	91.85	44.18	47.68	1.927	
1,600.00	1,600.00	1,602.07	1,601.49	2.06	49.73	179.75	-89.98	0.40	89.99	38.19	51.79	1.737	
1,700.00	1,700.00	1,701.69	1,701.09	2.19	53.72	179.74	-88.54	0.40	88.54	32.63	55.91	1.584	
1,800.00	1,800.00	1,801.36	1,800.76	2.33	57.71	179.74	-87.51	0.40	87.51	27.48	60.03	1.458 Level 3	
1,900.00	1,900.00	1,901.32	1,900.72	2.46	61.70	179.74	-86.66	0.40	86.66	22.51	64.16	1.351 Level 3	
2,000.00	2,000.00	2,001.29	2,000.68	2.59	65.70	179.73	-85.85	0.40	85.85	17.57	68.28	1.257 Level 3	
2,100.00	2,100.00	2,101.25	2,100.64	2.72	69.69	179.73	-85.07	0.40	85.07	12.66	72.41	1.175 Level 2	
2,200.00	2,200.00	2,201.22	2,200.61	2.85	73.68	179.73	-84.33	0.40	84.33	7.80	76.54	1.102 Level 2	
2,300.00	2,300.00	2,301.18	2,300.56	2.99	77.68	179.73	-83.63	0.40	83.63	2.97	80.66	1.037 Level 2	
2,400.00	2,400.00	2,401.11	2,400.50	3.12	81.67	179.72	-83.00	0.40	83.00	-1.79	84.79	0.979 Level 1	
2,500.00	2,500.00	2,501.05	2,500.43	3.25	85.67	179.72	-82.43	0.40	82.44	-6.48	88.92	0.927 Level 1	
2,600.00	2,600.00	2,600.99	2,600.37	3.38	89.66	179.72	-81.94	0.40	81.95	-11.09	93.04	0.881 Level 1	
2,700.00	2,700.00	2,700.93	2,700.31	3.51	93.65	179.72	-81.53	0.40	81.53	-15.64	97.17	0.839 Level 1	
2,800.00	2,800.00	2,800.95	2,800.33	3.64	97.65	179.72	-81.15	0.40	81.16	-20.14	101.30	0.801 Level 1	
2,900.00	2,900.00	2,901.04	2,900.42	3.78	101.65	179.72	-80.69	0.40	80.69	-24.74	105.43	0.765 Level 1	
3,000.00	3,000.00	3,001.13	3,000.51	3.91	105.66	179.71	-80.11	0.40	80.11	-29.45	109.56	0.731 Level 1	
3,100.00	3,100.00	3,101.22	3,100.59	4.04	109.66	179.71	-79.42	0.40	79.42	-34.27	113.70	0.699 Level 1	
3,200.00	3,200.00	3,201.30	3,200.67	4.17	113.66	179.71	-78.62	0.40	78.63	-39.21	117.83	0.667 Level 1	
3,300.00	3,300.00	3,301.25	3,300.62	4.30	117.66	179.71	-77.78	0.40	77.79	-44.17	121.96	0.638 Level 1	
3,400.00	3,400.00	3,401.17	3,400.54	4.44	121.65	179.70	-77.04	0.40	77.04	-49.05	126.09	0.611 Level 1	
3,500.00	3,500.00	3,501.10	3,500.46	4.57	125.65	179.70	-76.39	0.40	76.39	-53.83	130.22	0.587 Level 1	
3,600.00	3,600.00	3,601.02	3,600.39	4.70	129.64	179.70	-75.83	0.40	75.83	-58.51	134.34	0.564 Level 1	
3,700.00	3,700.00	3,700.95	3,700.31	4.83	133.64	179.70	-75.37	0.40	75.37	-63.10	138.47	0.544 Level 1	
3,800.00	3,800.00	3,800.91	3,800.27	4.96	137.64	179.69	-74.99	0.40	75.00	-67.60	142.60	0.526 Level 1	
3,900.00	3,900.00	3,900.94	3,900.30	5.09	141.64	179.69	-74.61	0.40	74.61	-72.12	146.73	0.508 Level 1	
4,000.00	4,000.00	4,000.97	4,000.33	5.23	145.64	179.69	-74.18	0.40	74.19	-76.68	150.86	0.492 Level 1	
4,100.00	4,100.00	4,101.00	4,100.36	5.36	149.64	179.69	-73.71	0.40	73.72	-81.28	154.99	0.476 Level 1	
4,200.00	4,200.00	4,201.05	4,200.40	5.49	153.64	179.69	-73.20	0.40	73.20	-85.93	159.13	0.460 Level 1	
4,300.00	4,300.00	4,301.12	4,300.48	5.62	157.64	179.68	-72.60	0.40	72.60	-90.66	163.26	0.445 Level 1	
4,400.00	4,400.00	4,401.20	4,400.55	5.75	161.64	179.68	-71.88	0.40	71.89	-95.51	167.40	0.429 Level 1	
4,500.00	4,500.00	4,501.28	4,500.62	5.89	165.65	179.68	-71.06	0.40	71.06	-100.47	171.53	0.414 Level 1	
4,600.00	4,600.00	4,601.35	4,600.69	6.02	169.65	179.67	-70.13	0.40	70.13	-105.54	175.67	0.399 Level 1	
4,700.00	4,700.00	4,701.35	4,700.69	6.15	173.65	179.67	-69.11	0.40	69.11	-110.69	179.80	0.384 Level 1	
4,800.00	4,800.00	4,801.27	4,800.61	6.28	177.65	179.66	-68.16	0.40	68.17	-115.76	183.93	0.371 Level 1	
4,900.00	4,900.00	4,901.19	4,900.52	6.41	181.65	179.66	-67.33	0.40	67.34	-120.72	188.06	0.358 Level 1	
5,000.00	5,000.00	5,001.12	5,000.44	6.54	185.64	179.66	-66.61	0.40	66.61	-125.57	192.19	0.347 Level 1	
5,100.00	5,100.00	5,101.04	5,100.37	6.68	189.64	179.65	-66.00	0.40	66.00	-130.32	196.32	0.336 Level 1	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal - #63* - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 726-UNKNOWN													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum		Separation		Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,200.00	5,200.00	5,201.08	5,200.41	6.81	193.64	179.65	-65.43	0.40	65.44	-135.01	200.45	0.326	Level 1	
5,222.50	5,222.50	5,223.60	5,222.93	6.84	194.54	179.65	-65.29	0.40	65.29	-136.06	201.38	0.324	Level 1	
5,225.00	5,225.00	5,226.11	5,225.43	6.84	194.64	-90.23	-65.27	0.40	65.28	-136.21	201.48	0.324	Level 1	
5,250.00	5,249.98	5,251.12	5,250.44	6.84	195.64	-90.94	-65.10	0.40	65.11	-137.37	202.48	0.322	Level 1	
5,275.00	5,274.89	5,276.05	5,275.37	6.84	196.64	-92.80	-64.93	0.40	65.00	-138.48	203.48	0.319	Level 1	
5,281.37	5,281.22	5,282.38	5,281.70	6.84	196.89	-93.45	-64.88	0.40	65.00	-138.74	203.74	0.319	Level 1, CC	
5,300.00	5,299.66	5,300.84	5,300.16	6.84	197.63	-95.76	-64.74	0.40	65.07	-139.40	204.48	0.318	Level 1, SF	
5,325.00	5,324.21	5,325.41	5,324.73	6.85	198.62	-99.73	-64.55	0.40	65.52	-139.95	205.46	0.319	Level 1, ES	
5,350.00	5,348.49	5,349.71	5,349.03	6.85	199.59	-104.56	-64.35	0.40	66.60	-139.84	206.44	0.323	Level 1	
5,375.00	5,372.42	5,373.66	5,372.98	6.86	200.55	-110.00	-64.14	0.40	68.63	-138.78	207.41	0.331	Level 1	
5,400.00	5,395.94	5,397.20	5,396.52	6.88	201.49	-115.75	-63.93	0.40	71.89	-136.48	208.37	0.345	Level 1	
5,425.00	5,418.99	5,420.27	5,419.59	6.90	202.41	-121.49	-63.72	0.40	76.62	-132.69	209.31	0.366	Level 1	
5,450.00	5,441.49	5,442.79	5,442.11	6.93	203.31	-126.95	-63.50	0.40	82.99	-127.26	210.25	0.395	Level 1	
5,475.00	5,463.40	5,464.72	5,464.04	6.98	204.19	-131.93	-63.28	0.40	91.06	-120.11	211.17	0.431	Level 1	
5,500.00	5,484.65	5,485.98	5,485.30	7.04	205.04	-136.34	-63.07	0.40	100.81	-111.27	212.08	0.475	Level 1	
5,525.00	5,505.17	5,506.53	5,505.84	7.12	205.86	-140.14	-62.85	0.40	112.17	-100.81	212.98	0.527	Level 1	
5,550.00	5,524.93	5,526.30	5,525.61	7.22	206.65	-143.35	-62.64	0.40	125.04	-88.83	213.87	0.585	Level 1	
5,575.00	5,543.85	5,545.24	5,544.55	7.35	207.41	-146.02	-62.43	0.40	139.32	-75.43	214.76	0.649	Level 1	
5,600.00	5,561.90	5,563.30	5,562.61	7.50	208.13	-148.19	-62.22	0.40	154.90	-60.73	215.63	0.718	Level 1	
5,625.00	5,579.01	5,580.43	5,579.74	7.68	208.82	-149.91	-62.02	0.40	171.67	-44.83	216.50	0.793	Level 1	
5,650.00	5,595.15	5,596.58	5,595.89	7.90	209.47	-151.23	-61.83	0.40	189.53	-27.83	217.37	0.872	Level 1	
5,675.00	5,610.27	5,611.71	5,611.02	8.15	210.07	-152.18	-61.65	0.40	208.40	-9.83	218.23	0.955	Level 1	
5,700.00	5,624.32	5,625.77	5,625.07	8.44	210.63	-152.76	-61.47	0.40	228.18	9.10	219.08	1.042	Level 2	
5,725.00	5,637.28	5,638.73	5,638.03	8.77	211.15	-152.97	-61.31	0.40	248.80	28.88	219.92	1.131	Level 2	
5,750.00	5,649.10	5,650.55	5,649.85	9.13	211.62	-152.79	-61.17	0.40	270.17	49.41	220.75	1.224	Level 2	
5,775.00	5,659.74	5,661.20	5,660.50	9.52	212.05	-152.17	-61.03	0.40	292.21	70.64	221.57	1.319	Level 3	
5,800.00	5,669.20	5,670.65	5,669.95	9.95	212.43	-151.02	-60.92	0.40	314.86	92.48	222.38	1.416	Level 3	
5,825.00	5,677.42	5,678.88	5,678.18	10.40	212.76	-149.17	-60.81	0.40	338.03	114.86	223.16	1.515		
5,850.00	5,684.40	5,685.86	5,685.16	10.89	213.04	-146.37	-60.72	0.40	361.65	137.72	223.93	1.615		
5,875.00	5,690.12	5,691.58	5,690.88	11.40	213.27	-142.16	-60.65	0.40	385.65	160.98	224.67	1.717		
5,900.00	5,694.55	5,696.01	5,695.31	11.93	213.44	-135.75	-60.60	0.40	409.95	184.58	225.37	1.819		
5,925.00	5,697.69	5,699.15	5,698.45	12.48	213.57	-125.77	-60.56	0.40	434.49	208.44	226.05	1.922		
5,950.00	5,699.53	5,700.99	5,700.29	13.04	213.64	-110.27	-60.53	0.40	459.19	232.50	226.69	2.026		
5,975.00	5,700.07	5,701.52	5,700.82	13.62	213.67	-88.50	-60.53	0.40	483.97	256.69	227.28	2.129		
5,980.99	5,700.00	5,701.45	5,700.75	13.76	213.66	-82.74	-60.53	0.40	489.91	262.49	227.42	2.154		
6,000.00	5,699.67	5,701.12	5,700.42	14.20	213.65	-82.43	-60.53	0.40	508.78	280.93	227.85	2.233		
6,100.00	5,697.93	5,699.38	5,698.68	16.62	213.58	-80.82	-60.55	0.40	608.17	377.97	230.20	2.642		
6,200.00	5,696.18	5,697.63	5,696.93	19.13	213.51	-79.22	-60.58	0.40	707.73	475.09	232.64	3.042		
6,300.00	5,694.44	5,695.89	5,695.19	21.70	213.44	-77.64	-60.60	0.40	807.40	572.26	235.14	3.434		
6,400.00	5,692.70	5,694.14	5,693.44	24.31	213.37	-76.06	-60.62	0.40	907.13	669.46	237.68	3.817		
6,500.00	5,690.96	5,692.40	5,691.70	26.95	213.30	-74.54	-60.64	0.40	1,006.92	766.67	240.25	4.191		
6,600.00	5,689.22	5,690.65	5,689.95	29.61	213.23	-73.03	-60.66	0.40	1,106.74	863.90	242.84	4.558		
6,700.00	5,687.47	5,688.91	5,688.21	32.28	213.16	-71.54	-60.69	0.40	1,206.59	961.14	245.44	4.916		
6,800.00	5,685.73	5,687.16	5,686.46	34.97	213.09	-70.08	-60.71	0.40	1,306.46	1,058.39	248.06	5.267		
6,900.00	5,683.99	5,685.42	5,684.72	37.67	213.02	-68.65	-60.73	0.40	1,406.34	1,155.65	250.69	5.610		
7,000.00	5,682.25	5,683.67	5,682.97	40.37	212.95	-67.24	-60.75	0.40	1,506.24	1,252.92	253.33	5.946		
7,100.00	5,680.51	5,681.93	5,681.23	43.09	212.88	-65.86	-60.77	0.40	1,606.15	1,350.18	255.97	6.275		
7,200.00	5,678.77	5,680.18	5,679.48	45.80	212.81	-64.52	-60.80	0.40	1,706.07	1,447.45	258.61	6.597		
7,300.00	5,677.02	5,678.44	5,677.74	48.52	212.74	-63.20	-60.82	0.40	1,805.99	1,544.73	261.27	6.912		
7,400.00	5,675.28	5,676.69	5,675.99	51.25	212.67	-61.91	-60.84	0.40	1,905.93	1,642.01	263.92	7.222		
7,500.00	5,673.54	5,674.95	5,674.25	53.98	212.60	-60.66	-60.86	0.40	2,005.86	1,739.28	266.58	7.524		
7,600.00	5,671.80	5,673.20	5,672.50	56.71	212.53	-59.43	-60.88	0.40	2,105.80	1,836.57	269.24	7.821		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft.
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design Electra Federal #63* OH - OH													Offset Site Error:	0.00 usft
Survey Program: 726-UNKNOWN													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N/S (usft)	Offset Wellbore Centre E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
7,700.00	5,670.06	5,671.46	5,670.76	59.44	212.46	-58.24	-60.91	0.40	2,205.75	1,933.85	271.90	8.112		
7,800.00	5,668.32	5,669.71	5,669.02	62.17	212.39	-57.08	-60.93	0.40	2,305.70	2,031.13	274.57	8.398		
7,900.00	5,666.57	5,667.97	5,667.27	64.91	212.32	-55.95	-60.95	0.40	2,405.65	2,128.42	277.23	8.677		
8,000.00	5,664.83	5,666.22	5,665.53	67.65	212.25	-54.85	-60.97	0.40	2,505.60	2,225.70	279.90	8.952		
8,100.00	5,663.09	5,664.48	5,663.78	70.39	212.18	-53.78	-60.99	0.40	2,605.56	2,322.99	282.57	9.221		
8,200.00	5,661.35	5,662.73	5,662.04	73.13	212.11	-52.73	-61.01	0.40	2,705.52	2,420.28	285.24	9.485		
8,300.00	5,659.61	5,660.99	5,660.29	75.87	212.04	-51.72	-61.04	0.40	2,805.48	2,517.57	287.91	9.744		
8,400.00	5,657.86	5,659.24	5,658.55	78.61	211.97	-50.74	-61.06	0.40	2,905.44	2,614.86	290.58	9.999		
8,500.00	5,656.12	5,657.50	5,656.80	81.35	211.90	-49.78	-61.08	0.40	3,005.41	2,712.15	293.26	10.248		
8,600.00	5,654.38	5,655.75	5,655.06	84.10	211.83	-48.85	-61.10	0.40	3,105.37	2,809.44	295.93	10.494		
8,700.00	5,652.64	5,654.01	5,653.31	86.84	211.76	-47.94	-61.12	0.40	3,205.34	2,906.73	298.61	10.734		
8,800.00	5,650.90	5,652.26	5,651.57	89.59	211.69	-47.06	-61.15	0.40	3,305.31	3,004.02	301.28	10.971		
8,900.00	5,649.16	5,650.52	5,649.82	92.33	211.62	-46.21	-61.17	0.40	3,405.28	3,101.32	303.96	11.203		
9,000.00	5,647.41	5,648.77	5,648.08	95.08	211.55	-45.38	-61.19	0.40	3,505.24	3,198.61	306.63	11.431		
9,100.00	5,645.67	5,647.03	5,646.33	97.83	211.48	-44.58	-61.21	0.40	3,605.22	3,295.90	309.31	11.656		
9,200.00	5,643.93	5,645.28	5,644.59	100.57	211.41	-43.79	-61.23	0.40	3,705.19	3,393.20	311.99	11.876		
9,300.00	5,642.19	5,643.54	5,642.84	103.32	211.34	-43.03	-61.25	0.40	3,805.16	3,490.49	314.67	12.093		
9,400.00	5,640.45	5,641.79	5,641.10	106.07	211.27	-42.29	-61.28	0.40	3,905.13	3,587.79	317.35	12.306		
9,500.00	5,638.70	5,640.05	5,639.35	108.82	211.20	-41.57	-61.30	0.40	4,005.10	3,685.08	320.02	12.515		
9,600.00	5,636.96	5,638.30	5,637.61	111.57	211.13	-40.88	-61.32	0.40	4,105.08	3,782.38	322.70	12.721		
9,700.00	5,635.22	5,636.56	5,635.86	114.32	211.06	-40.20	-61.34	0.40	4,205.05	3,879.67	325.38	12.923		
9,800.00	5,633.48	5,634.81	5,634.12	117.07	211.00	-39.54	-61.36	0.40	4,305.03	3,976.97	328.06	13.123		
9,900.00	5,631.74	5,633.07	5,632.37	119.82	210.93	-38.90	-61.38	0.40	4,405.00	4,074.26	330.74	13.319		
10,000.00	5,630.00	5,631.33	5,630.63	122.56	210.86	-38.27	-61.40	0.40	4,504.98	4,171.56	333.42	13.511		
10,100.00	5,628.25	5,629.58	5,628.89	125.31	210.79	-37.67	-61.43	0.40	4,604.95	4,268.85	336.10	13.701		
10,114.58	5,628.00	5,629.33	5,628.63	125.72	210.78	-37.58	-61.43	0.40	4,619.53	4,283.04	336.49	13.729		

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:
Electra Federal #64" OH OH												0.00 usft
Survey Program: 274-UNKNOWN												Offset Well Error:
												0.00 usft
Reference	Offset	Semi Major Axis		Highside		Offset Wellbore Centre		Distance		Minimum		Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Separation Factor
0.00	0.00	0.00	0.00	0.00	0.00	-85.86	320.12	-4,424.93	4,436.58			
100.00	100.00	73.30	73.30	0.09	1.47	-85.86	320.09	-4,424.93	4,436.49	4,434.94	1.56	2,851.953
200.00	200.00	173.71	173.71	0.22	3.47	-85.86	319.93	-4,424.93	4,436.48	4,432.79	3.69	1,201.465
300.00	300.00	274.12	274.12	0.35	5.48	-85.87	319.65	-4,424.93	4,436.46	4,430.63	5.83	760.434
400.00	400.00	374.67	374.67	0.48	9.51	-85.87	319.21	-4,424.93	4,436.43	4,426.44	9.99	444.152
500.00	500.00	475.23	475.23	0.61	13.53	-85.88	318.59	-4,424.93	4,436.39	4,422.24	14.14	313.683
600.00	600.00	575.78	575.77	0.74	17.55	-85.89	317.80	-4,424.93	4,436.33	4,418.03	18.30	242.462
700.00	700.00	675.64	675.63	0.88	21.56	-85.90	316.95	-4,424.93	4,436.27	4,413.85	22.42	197.837
800.00	800.00	775.50	775.48	1.01	25.54	-85.91	316.15	-4,424.93	4,436.21	4,409.66	26.55	167.084
900.00	900.00	875.35	875.34	1.14	29.54	-85.92	315.38	-4,424.93	4,436.16	4,405.48	30.68	144.605
1,000.00	1,000.00	975.24	975.22	1.27	33.53	-85.93	314.66	-4,424.93	4,436.11	4,401.30	34.81	127.453
1,100.00	1,100.00	1,077.41	1,077.38	1.40	37.62	-85.95	313.59	-4,424.93	4,436.03	4,397.01	39.03	113.665
1,200.00	1,200.00	1,179.55	1,179.51	1.53	41.71	-85.97	311.81	-4,424.93	4,435.91	4,392.66	43.25	102.569
1,300.00	1,300.00	1,281.66	1,281.59	1.67	45.80	-86.00	309.33	-4,424.93	4,435.74	4,388.27	47.47	93.448
1,400.00	1,400.00	1,381.37	1,381.26	1.80	49.80	-86.04	306.59	-4,424.93	4,435.55	4,383.96	51.59	85.971
1,500.00	1,500.00	1,481.02	1,480.88	1.93	53.79	-86.07	303.96	-4,424.93	4,435.37	4,379.65	55.72	79.604
1,600.00	1,600.00	1,580.68	1,580.51	2.06	57.78	-86.10	301.43	-4,424.93	4,435.19	4,375.35	59.84	74.114
1,700.00	1,700.00	1,679.81	1,679.61	2.19	61.75	-86.13	299.06	-4,424.93	4,435.03	4,371.09	63.94	69.358
1,800.00	1,800.00	1,778.49	1,778.26	2.33	65.70	-86.16	297.09	-4,424.93	4,434.90	4,366.87	68.03	65.195
1,900.00	1,900.00	1,877.18	1,876.94	2.46	69.65	-86.18	295.56	-4,424.93	4,434.79	4,362.69	72.11	61.502
2,000.00	2,000.00	1,975.88	1,975.64	2.59	73.60	-86.19	294.46	-4,424.93	4,434.72	4,358.53	76.19	58.206
2,100.00	2,100.00	2,074.59	2,074.34	2.72	77.55	-86.20	293.79	-4,424.93	4,434.68	4,354.40	80.27	55.245
2,200.00	2,200.00	2,174.31	2,174.07	2.85	81.54	-86.21	293.43	-4,424.93	4,434.65	4,350.26	84.39	52.547
2,300.00	2,300.00	2,274.37	2,274.12	2.98	85.54	-86.21	293.05	-4,424.93	4,434.63	4,346.10	88.53	50.093
2,400.00	2,400.00	2,374.43	2,374.18	3.12	89.54	-86.22	292.66	-4,424.93	4,434.60	4,341.94	92.66	47.858
2,500.00	2,500.00	2,474.48	2,474.24	3.25	93.55	-86.22	292.24	-4,424.93	4,434.57	4,337.78	96.79	45.814
2,600.00	2,600.00	2,574.54	2,574.29	3.38	97.55	-86.23	291.81	-4,424.93	4,434.54	4,333.62	100.93	43.937
2,700.00	2,700.00	2,674.60	2,674.35	3.51	101.55	-86.23	291.36	-4,424.93	4,434.51	4,329.45	105.06	42.209
2,800.00	2,800.00	2,774.66	2,774.41	3.64	105.55	-86.24	290.88	-4,424.93	4,434.48	4,325.29	109.20	40.610
2,900.00	2,900.00	2,874.71	2,874.46	3.78	109.55	-86.25	290.39	-4,424.93	4,434.45	4,321.12	113.33	38.129
3,000.00	3,000.00	2,974.77	2,974.52	3.91	113.55	-86.25	289.88	-4,424.93	4,434.42	4,316.95	117.46	37.752
3,100.00	3,100.00	3,074.89	3,074.63	4.04	117.56	-86.26	289.33	-4,424.93	4,434.38	4,312.78	121.60	36.467
3,200.00	3,200.00	3,175.01	3,174.76	4.17	121.57	-86.27	288.75	-4,424.93	4,434.34	4,308.61	125.74	35.267
3,300.00	3,300.00	3,275.14	3,274.88	4.30	125.57	-86.27	288.11	-4,424.93	4,434.30	4,304.43	129.87	34.143
3,400.00	3,400.00	3,375.26	3,375.00	4.44	129.58	-86.28	287.44	-4,424.93	4,434.26	4,300.25	134.01	33.089
3,500.00	3,500.00	3,474.96	3,474.70	4.57	133.56	-86.29	286.79	-4,424.93	4,434.22	4,296.09	138.13	32.102
3,600.00	3,600.00	3,574.64	3,574.38	4.70	137.55	-86.30	286.26	-4,424.93	4,434.18	4,291.93	142.25	31.172
3,700.00	3,700.00	3,674.33	3,674.07	4.83	141.54	-86.30	285.83	-4,424.93	4,434.16	4,287.79	146.37	30.294
3,800.00	3,800.00	3,774.02	3,773.75	4.96	145.53	-86.31	285.52	-4,424.93	4,434.13	4,283.65	150.49	29.465
3,900.00	3,900.00	3,873.76	3,873.50	5.09	149.52	-86.31	285.31	-4,424.93	4,434.12	4,279.51	154.61	28.679
4,000.00	4,000.00	3,973.76	3,973.50	5.23	153.51	-86.31	285.13	-4,424.93	4,434.11	4,275.37	158.74	27.933
4,100.00	4,100.00	4,073.76	4,073.50	5.36	157.51	-86.32	284.96	-4,424.93	4,434.10	4,271.23	162.87	27.224
4,200.00	4,200.00	4,173.76	4,173.50	5.49	161.51	-86.32	284.78	-4,424.93	4,434.09	4,267.08	167.00	26.551
4,300.00	4,300.00	4,273.76	4,273.50	5.62	165.51	-86.32	284.61	-4,424.93	4,434.08	4,262.94	171.13	25.910
4,400.00	4,400.00	4,373.83	4,373.56	5.75	169.51	-86.32	284.43	-4,424.93	4,434.06	4,258.80	175.27	25.299
4,500.00	4,500.00	4,474.38	4,474.12	5.89	173.54	-86.33	284.14	-4,424.93	4,434.05	4,254.62	179.42	24.713
4,600.00	4,600.00	4,574.94	4,574.67	6.02	177.56	-86.33	283.64	-4,424.93	4,434.01	4,250.44	183.58	24.153
4,700.00	4,700.00	4,675.49	4,675.22	6.15	181.58	-86.34	282.95	-4,424.93	4,433.97	4,246.24	187.73	23.619
4,800.00	4,800.00	4,776.04	4,775.76	6.28	185.60	-86.35	282.07	-4,424.93	4,433.91	4,242.03	191.89	23.107
4,900.00	4,900.00	4,875.89	4,875.61	6.41	189.60	-86.37	281.07	-4,424.93	4,433.85	4,237.84	196.01	22.620
5,000.00	5,000.00	4,975.38	4,975.09	6.54	193.58	-86.38	280.24	-4,424.93	4,433.80	4,233.67	200.12	22.155
5,100.00	5,100.00	5,074.87	5,074.58	6.68	197.56	-86.38	279.58	-4,424.93	4,433.76	4,229.52	204.24	21.709

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid:
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.00 usft
Electra Federal - #64" - OH - OH												Offset Well Error:	0.00 usft
Survey Program: 274-UNKNOWN													
Reference		Offset		Semi Major Axis		Distance		Minimum		Separation		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
5,200.00	5,200.00	5,174.36	5,174.07	6.81	201.54	-86.39	279.11	-4,424.93	4,433.73	4,225.38	208.35	21.280	
5,222.50	5,222.50	5,196.74	5,196.46	6.84	202.43	-86.39	279.03	-4,424.93	4,433.72	4,224.45	209.27	21.186	
5,225.00	5,225.00	5,199.23	5,198.94	6.84	202.53	3.73	279.02	-4,424.93	4,433.71	4,224.34	209.37	21.176	
5,250.00	5,249.98	5,224.09	5,223.80	6.84	203.53	3.74	278.94	-4,424.93	4,432.93	4,222.56	210.37	21.072	
5,275.00	5,274.89	5,248.87	5,248.59	6.84	204.52	3.76	278.88	-4,424.93	4,430.84	4,219.47	211.36	20.963	
5,300.00	5,299.66	5,273.51	5,273.23	6.84	205.51	3.79	278.82	-4,424.93	4,427.45	4,215.10	212.35	20.850	
5,325.00	5,324.21	5,298.00	5,297.71	6.85	206.49	3.83	278.78	-4,424.93	4,422.77	4,209.44	213.33	20.732	
5,350.00	5,348.49	5,322.30	5,322.01	6.85	207.46	3.88	278.73	-4,424.93	4,416.82	4,202.51	214.31	20.610	
5,375.00	5,372.42	5,346.25	5,345.97	6.86	208.42	3.95	278.69	-4,424.93	4,409.61	4,194.33	215.28	20.483	
5,400.00	5,395.94	5,369.80	5,369.51	6.88	209.36	4.03	278.64	-4,424.93	4,401.16	4,184.92	216.24	20.354	
5,425.00	5,418.99	5,392.86	5,392.58	6.90	210.28	4.13	278.59	-4,424.93	4,391.49	4,174.31	217.18	20.220	
5,450.00	5,441.49	5,415.39	5,415.11	6.93	211.18	4.25	278.54	-4,424.93	4,380.63	4,162.52	218.11	20.084	
5,475.00	5,463.40	5,437.32	5,437.04	6.98	212.06	4.38	278.49	-4,424.93	4,368.82	4,149.58	219.04	19.945	
5,500.00	5,484.65	5,458.59	5,458.30	7.04	212.91	4.54	278.44	-4,424.93	4,355.47	4,135.53	219.95	19.802	
5,525.00	5,505.17	5,479.14	5,478.85	7.12	213.73	4.72	278.39	-4,424.93	4,341.24	4,120.39	220.85	19.657	
5,550.00	5,524.93	5,498.91	5,498.63	7.22	214.52	4.93	278.34	-4,424.93	4,325.95	4,104.21	221.74	19.509	
5,575.00	5,543.85	5,517.86	5,517.57	7.35	215.28	5.18	278.30	-4,424.93	4,309.65	4,087.03	222.62	19.358	
5,600.00	5,561.90	5,535.92	5,535.64	7.50	216.00	5.46	278.25	-4,424.93	4,292.39	4,068.89	223.50	19.205	
5,625.00	5,579.01	5,553.05	5,552.77	7.68	216.69	5.80	278.20	-4,424.93	4,274.21	4,049.84	224.37	19.050	
5,650.00	5,595.15	5,569.21	5,568.92	7.90	217.33	6.19	278.16	-4,424.93	4,255.16	4,029.93	225.24	18.892	
5,675.00	5,610.27	5,584.34	5,584.06	8.15	217.94	6.66	278.12	-4,424.93	4,235.30	4,009.20	226.09	18.733	
5,700.00	5,624.32	5,598.41	5,598.12	8.44	218.50	7.22	278.08	-4,424.93	4,214.67	3,987.73	226.94	18.571	
5,725.00	5,637.28	5,611.38	5,611.09	8.77	219.02	7.90	278.04	-4,424.93	4,193.34	3,965.55	227.79	18.409	
5,750.00	5,649.10	5,623.21	5,622.92	9.13	219.49	8.75	278.00	-4,424.93	4,171.36	3,942.74	228.62	18.246	
5,775.00	5,659.74	5,633.87	5,633.58	9.52	219.92	9.81	277.97	-4,424.93	4,148.80	3,919.36	229.44	18.082	
5,800.00	5,669.20	5,643.33	5,643.04	9.95	220.30	11.19	277.94	-4,424.93	4,125.71	3,895.47	230.24	17.919	
5,825.00	5,677.42	5,651.57	5,651.28	10.40	220.63	13.02	277.92	-4,424.93	4,102.16	3,871.13	231.03	17.756	
5,850.00	5,684.40	5,658.55	5,658.27	10.89	220.91	15.57	277.90	-4,424.93	4,078.22	3,846.42	231.80	17.594	
5,875.00	5,690.12	5,664.27	5,663.99	11.40	221.14	19.32	277.88	-4,424.93	4,053.94	3,821.41	232.53	17.434	
5,900.00	5,694.55	5,668.71	5,668.43	11.93	221.31	25.31	277.87	-4,424.93	4,029.40	3,796.16	233.24	17.276	
5,925.00	5,697.69	5,671.86	5,671.57	12.48	221.44	35.91	277.86	-4,424.93	4,004.67	3,770.75	233.92	17.120	
5,950.00	5,699.53	5,673.70	5,673.41	13.04	221.51	56.91	277.85	-4,424.93	3,979.80	3,745.25	234.56	16.967	
5,975.00	5,700.07	5,674.23	5,673.94	13.62	221.53	94.01	277.85	-4,424.93	3,954.88	3,719.72	235.15	16.818	
5,980.99	5,700.00	5,674.16	5,673.88	13.76	221.53	103.58	277.85	-4,424.93	3,948.91	3,713.62	235.29	16.783	
6,000.00	5,699.67	5,673.83	5,673.55	14.20	221.52	103.52	277.85	-4,424.93	3,929.95	3,694.23	235.72	16.672	
6,100.00	5,697.93	5,672.09	5,671.80	16.62	221.45	103.19	277.85	-4,424.93	3,830.24	3,592.17	238.07	16.089	
6,200.00	5,696.18	5,670.35	5,670.06	19.13	221.38	102.86	277.86	-4,424.93	3,730.54	3,490.03	240.51	15.511	
6,300.00	5,694.44	5,668.60	5,668.32	21.70	221.31	102.53	277.87	-4,424.93	3,630.86	3,387.86	243.01	14.941	
6,400.00	5,692.70	5,666.86	5,666.57	24.31	221.24	102.20	277.87	-4,424.93	3,531.20	3,285.65	245.55	14.381	
6,500.00	5,690.96	5,665.12	5,664.83	26.95	221.17	101.86	277.88	-4,424.93	3,431.56	3,183.44	248.12	13.830	
6,600.00	5,689.22	5,663.38	5,663.09	29.61	221.10	101.53	277.88	-4,424.93	3,331.94	3,081.23	250.71	13.290	
6,700.00	5,687.47	5,661.63	5,661.35	32.28	221.03	101.20	277.89	-4,424.93	3,232.34	2,979.03	253.31	12.760	
6,800.00	5,685.73	5,659.89	5,659.60	34.97	220.96	100.86	277.89	-4,424.93	3,132.76	2,876.83	255.93	12.241	
6,900.00	5,683.99	5,658.15	5,657.86	37.67	220.89	100.53	277.90	-4,424.93	3,033.22	2,774.66	258.56	11.731	
7,000.00	5,682.25	5,656.40	5,656.12	40.37	220.82	100.19	277.90	-4,424.93	2,933.70	2,672.50	261.20	11.232	
7,100.00	5,680.51	5,654.66	5,654.37	43.09	220.75	99.86	277.91	-4,424.93	2,834.21	2,570.37	263.84	10.742	
7,200.00	5,678.77	5,652.92	5,652.63	45.80	220.68	99.52	277.91	-4,424.93	2,734.76	2,468.28	266.48	10.262	
7,300.00	5,677.02	5,651.18	5,650.89	48.52	220.61	99.18	277.92	-4,424.93	2,635.35	2,366.22	269.14	9.792	
7,400.00	5,675.28	5,649.43	5,649.15	51.25	220.54	98.84	277.93	-4,424.93	2,535.99	2,264.20	271.79	9.331	
7,500.00	5,673.54	5,647.69	5,647.40	53.98	220.47	98.50	277.93	-4,424.93	2,436.68	2,162.23	274.45	8.878	
7,600.00	5,671.80	5,645.95	5,645.66	56.71	220.40	98.16	277.94	-4,424.93	2,337.42	2,060.31	277.11	8.435	
7,700.00	5,670.06	5,644.20	5,643.92	59.44	220.33	97.82	277.94	-4,424.93	2,238.23	1,958.46	279.77	8.000	

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



Scientific Drilling
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

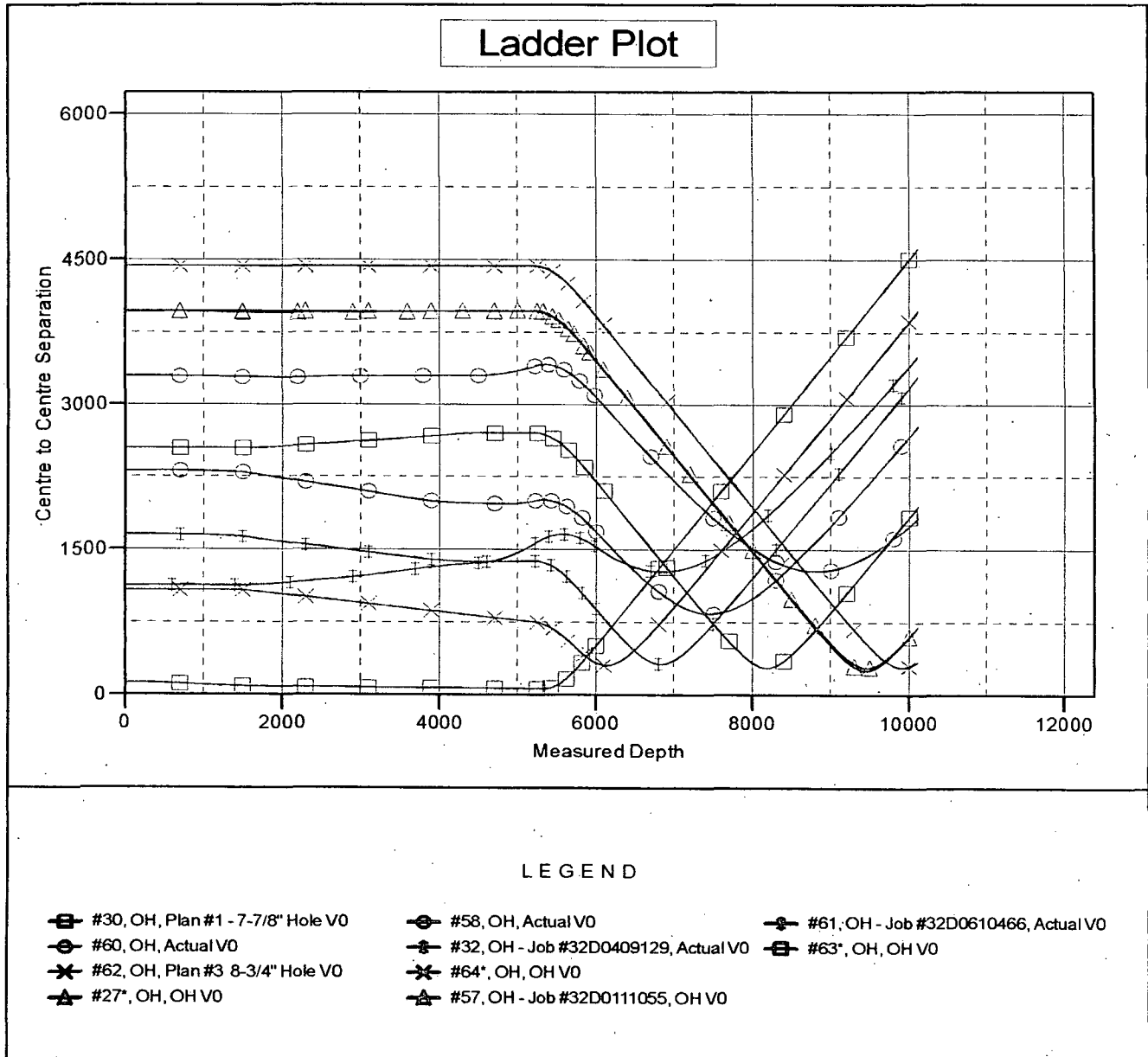
Offset Design Electra Federal - #64" - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 274-UNKNOWN													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre W/S (usft)	E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
7,800.00	5,668.32	5,642.46	5,642.17	62.17	220.26	97.48	277.95	-4,424.93	2,139.12	1,856.88	282.44	7.574		
7,900.00	5,666.57	5,640.72	5,640.43	64.91	220.19	97.14	277.95	-4,424.93	2,040.09	1,754.98	285.10	7.156		
8,000.00	5,664.83	5,638.98	5,638.69	67.65	220.12	96.80	277.96	-4,424.93	1,941.15	1,653.38	287.77	6.745		
8,100.00	5,663.09	5,637.23	5,636.95	70.39	220.05	96.45	277.96	-4,424.93	1,842.33	1,551.89	290.44	6.343		
8,200.00	5,661.35	5,635.49	5,635.20	73.13	219.98	96.11	277.97	-4,424.93	1,743.65	1,450.53	293.11	5.949		
8,300.00	5,659.61	5,633.75	5,633.46	75.87	219.91	95.77	277.97	-4,424.93	1,645.12	1,349.33	295.78	5.562		
8,400.00	5,657.86	5,632.00	5,631.72	78.61	219.84	95.42	277.98	-4,424.93	1,546.77	1,248.32	298.46	5.183		
8,500.00	5,656.12	5,630.26	5,629.97	81.35	219.77	95.08	277.98	-4,424.93	1,448.65	1,147.52	301.13	4.811		
8,600.00	5,654.38	5,628.52	5,628.23	84.10	219.71	94.74	277.99	-4,424.93	1,350.81	1,047.00	303.80	4.446		
8,700.00	5,652.64	5,626.78	5,626.49	86.84	219.64	94.39	277.99	-4,424.93	1,253.30	946.82	306.48	4.089		
8,800.00	5,650.90	5,625.03	5,624.75	89.59	219.57	94.05	278.00	-4,424.93	1,156.22	847.06	309.15	3.740		
8,900.00	5,649.16	5,623.29	5,623.00	92.33	219.50	93.70	278.00	-4,424.93	1,059.67	747.84	311.83	3.388		
9,000.00	5,647.41	5,621.55	5,621.26	95.08	219.43	93.35	278.01	-4,424.93	963.83	649.32	314.51	3.065		
9,100.00	5,645.67	5,619.80	5,619.52	97.83	219.36	93.01	278.01	-4,424.93	868.92	551.73	317.18	2.739		
9,200.00	5,643.93	5,618.06	5,617.77	100.57	219.29	92.66	278.02	-4,424.93	775.29	455.43	319.86	2.424		
9,300.00	5,642.19	5,616.32	5,616.03	103.32	219.22	92.32	278.02	-4,424.93	683.46	360.92	322.54	2.119		
9,400.00	5,640.45	5,614.57	5,614.29	106.07	219.15	91.97	278.03	-4,424.93	594.26	269.05	325.22	1.827		
9,500.00	5,638.70	5,612.83	5,612.54	108.82	219.08	91.62	278.03	-4,424.93	509.10	181.20	327.90	1.553		
9,600.00	5,636.96	5,611.09	5,610.80	111.57	219.01	91.28	278.04	-4,424.93	430.36	99.78	330.58	1.302 Level 3		
9,700.00	5,635.22	5,609.35	5,609.06	114.32	218.94	90.93	278.04	-4,424.93	362.25	29.00	333.25	1.087 Level 2		
9,800.00	5,633.48	5,607.60	5,607.32	117.07	218.87	90.58	278.05	-4,424.93	311.83	-24.10	335.93	0.928 Level 1		
9,900.00	5,631.74	5,605.86	5,605.57	119.82	218.80	90.24	278.05	-4,424.93	288.52	-50.09	338.61	0.852 Level 1		
9,919.98	5,631.39	5,605.51	5,605.22	120.36	218.79	90.17	278.06	-4,424.93	287.83	-51.32	339.15	0.849 Level 1, CC, ES, SF		
10,000.00	5,630.00	5,604.12	5,603.83	122.56	218.73	89.89	278.06	-4,424.93	298.74	-42.55	341.29	0.875 Level 1		
10,100.00	5,628.25	5,602.37	5,602.09	125.31	218.66	89.54	278.07	-4,424.93	339.47	-4.50	343.97	0.987 Level 1		
10,114.58	5,628.00	5,602.12	5,601.83	125.72	218.65	89.49	278.07	-4,424.93	347.42	3.06	344.37	1.009 Level 2		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL @ 3729.00usft
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: #101H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.21°



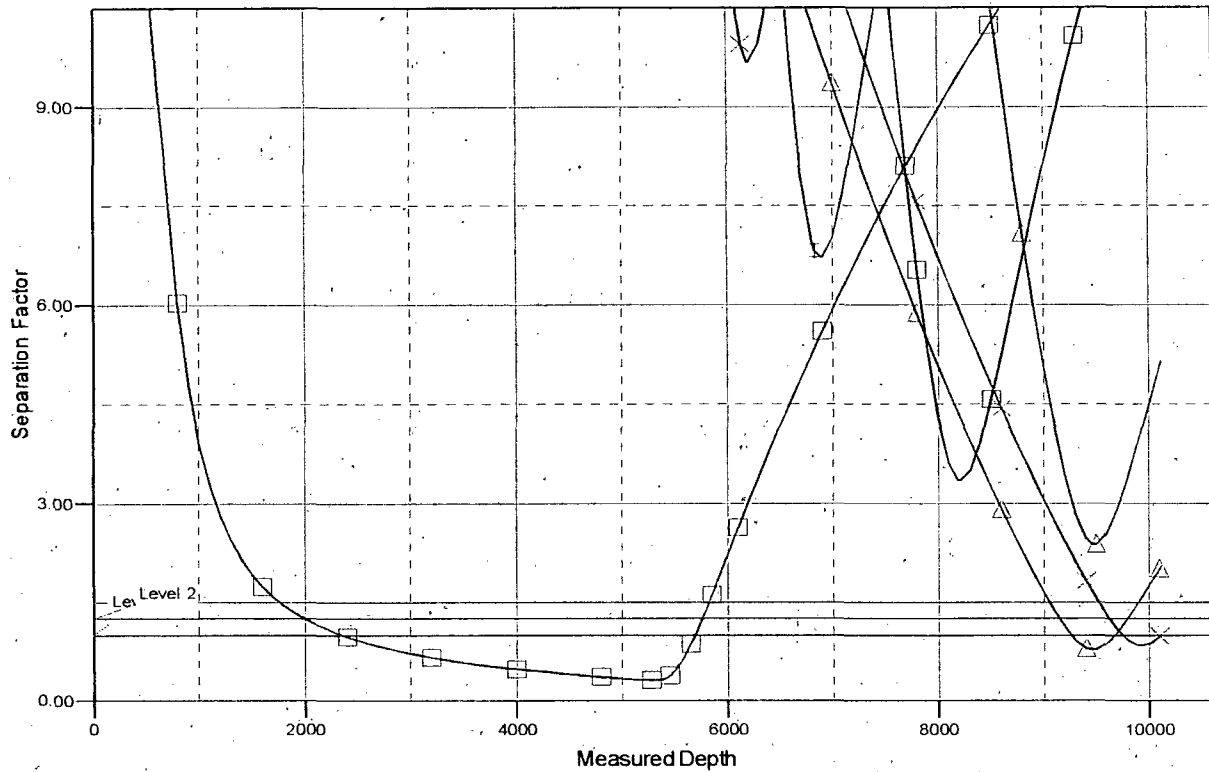
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well: #101H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	GL @ 3729.00usft
Reference Site:	Electra Federal	MD Reference:	GL @ 3729.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#101H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User.Db
Reference Design:	Plan #1 8-3/4" Hole	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL @ 3729.00usft
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: #101H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.21°

Separation Factor Plot



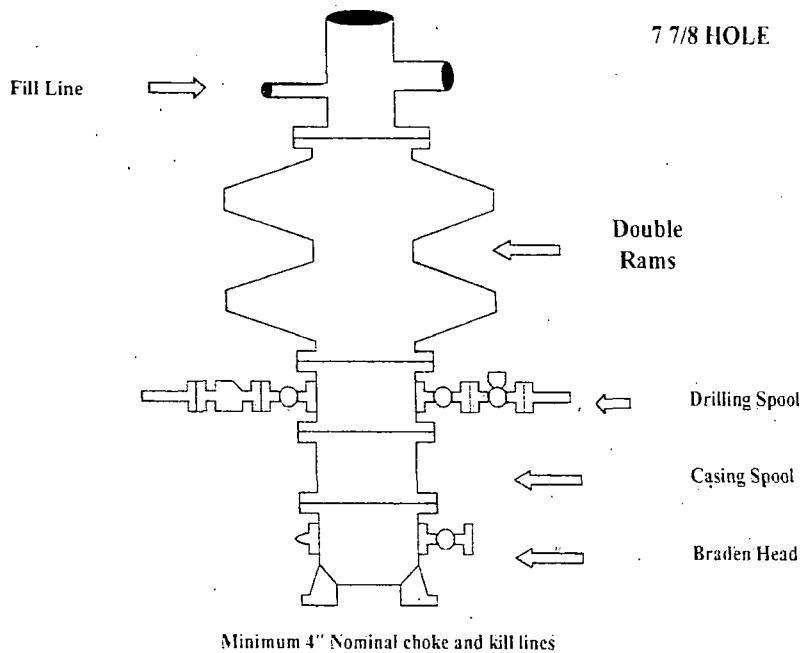
LEGEND

- #30, OH, Plan #1 - 7-7/8" Hole V0
- #58, OH, Actual V0
- ⊕ #61, OH - Job #32D0610466, Actual V0
- #60, OH, Actual V0
- ⊕ #32, OH - Job #32D0409129, Actual V0
- ⊕ #63, OH, OH V0
- ✕ #62, OH, Plan #3 8-3/4" Hole V0
- ✕ #64, OH, OH V0
- △ #27, OH, OH V0
- △ #57, OH - Job #32D0111055, OH V0

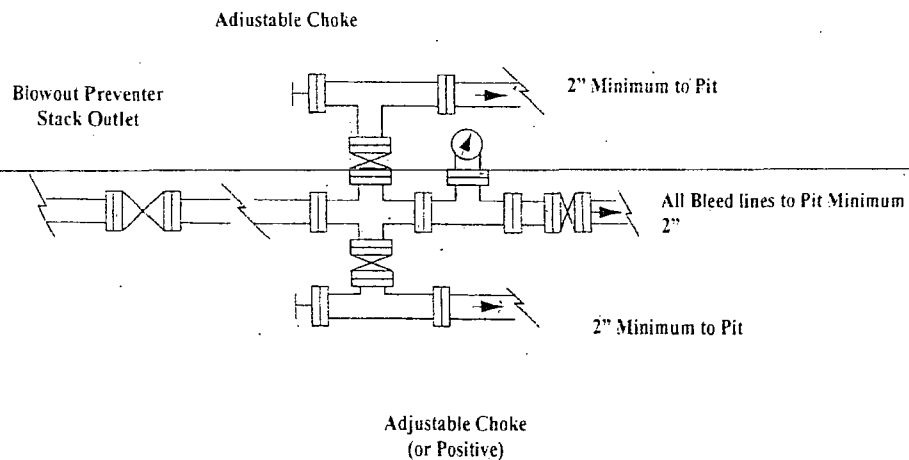
COG Operating LLC

Exhibit #9

BOPE and Choke Schematic



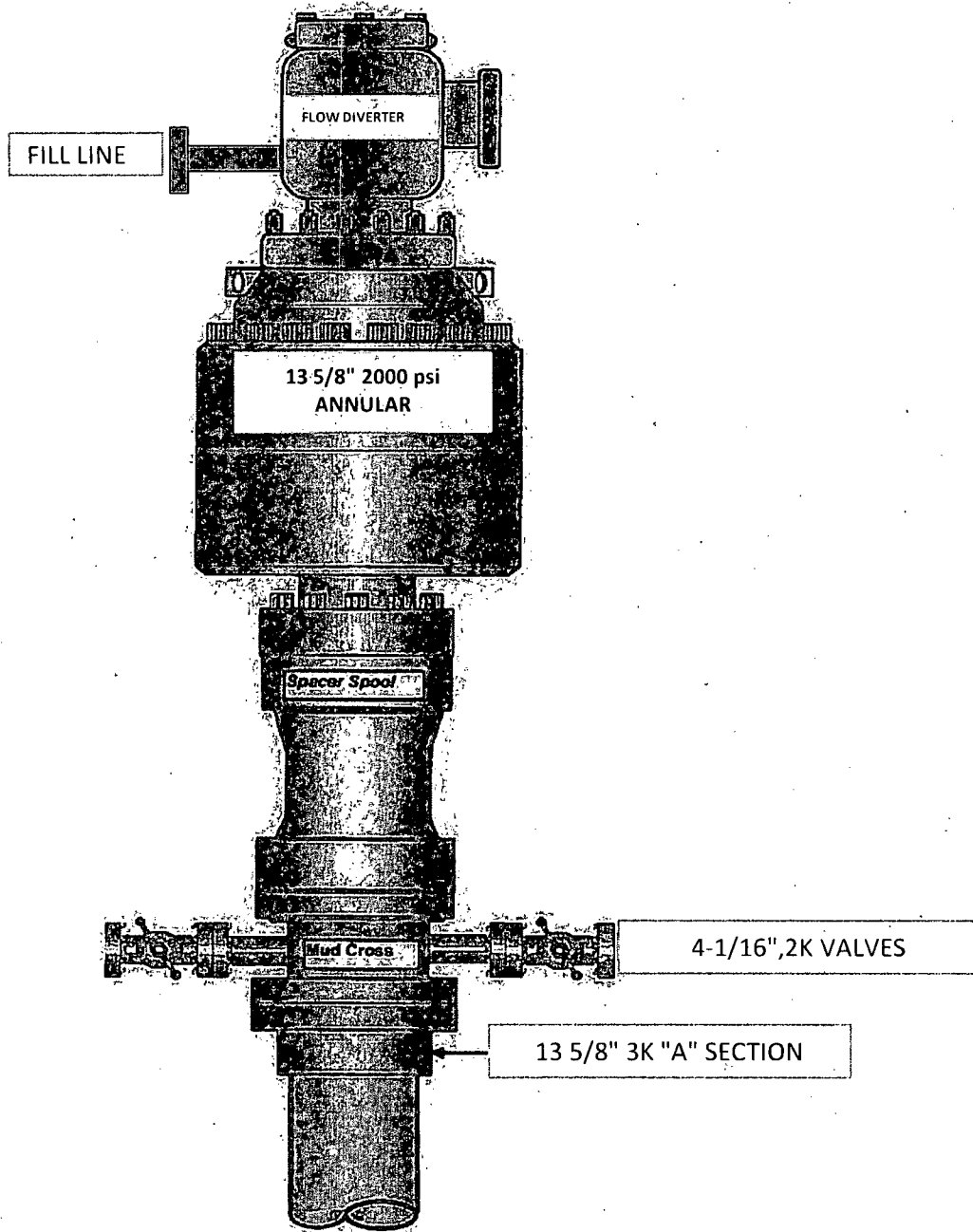
Choke Manifold Requirement (2000 psi WP)
No Annular Required



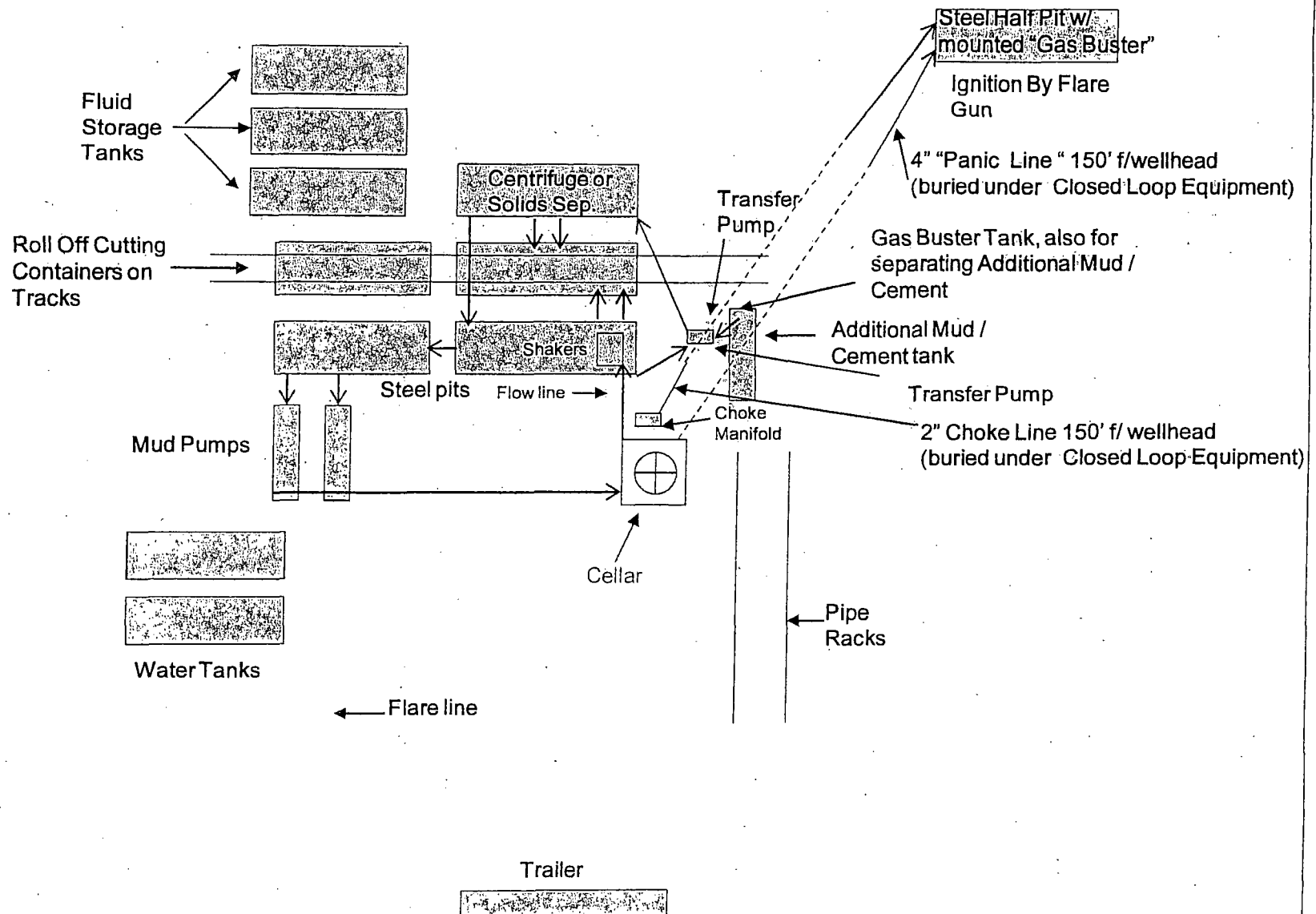
NOTES REGARDING THE BLOWOUT PREVENTERS**Master Drilling Plan
Eddy County, New Mexico**

1. Drilling nipple to be so constructed that it can be removed without use of a welder through rotary table opening, with minimum I.D. equal to preventer bore.
2. Wear ring to be properly installed in head.
3. Blow out preventer and all fittings must be in good condition, 2000 psi WP minimum.
4. All fittings to be flanged.
5. Safety valve must be available on rig floor at all times with proper connections, valve to be full 2000 psi WP minimum.
6. All choke and fill lines to be securely anchored especially ends of choke lines.
7. Equipment through which bit must pass shall be at least as large as the diameter of the casing being drilled through.
8. Kelly cock on Kelly.
9. Extension wrenches and hands wheels to be properly installed.
10. Blow out preventer control to be located as close to driller's position as feasible.
11. Blow out preventer closing equipment to include minimum 40-gallon accumulator, two independent sources of pump power on each closing unit installation all API specifications.

13 5/8" 2K ANNULAR



COG Operating LLC Closed Loop Equipment Diagram



COG Operating LLC

Hydrogen Sulfide Drilling Operation Plan

I. HYDROGEN SULFIDE TRAINING

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on this well:

1. The hazards and characteristics of hydrogen sulfide (H₂S)
2. The proper use and maintenance of personal protective equipment and life support systems.
3. The proper use of H₂S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
4. The proper techniques for first aid and rescue procedures.

In addition, supervisory personnel will be trained in the following areas:

1. The effects of H₂S on metal components. If high tensile tubular are to be used, personnel will be trained in their special maintenance requirements.
2. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
3. The contents and requirements of the H₂S Drilling Operations Plan and Public Protection Plan.

There will be an initial training session just prior to encountering a known or probable H₂S zone (within 3 days or 500 feet) and weekly H₂S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H₂S Drilling Operations Plan and the Public Protection Plan. **The concentrations of H₂S of wells in this area from surface to TD are low enough that a contingency plan is not required.**

II. H2S SAFETY EQUIPMENT AND SYSTEMS

Note: All H2S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonable expected to contain H2S.

1. Well Control Equipment:

- A. Flare line.
- B. Choke manifold. *w/ remotely operated choke*
- C. Closed Loop Blow Down Tank
- D. Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.
- E. Auxiliary equipment may include if applicable: annular preventer & rotating head.

2. Protective equipment for essential personnel:

- A. SCBA (Self contained breathing apparatus) 30-minute units located in the doghouse and at briefing areas, as indicated on well site diagram.

3. H2S detection and monitoring equipment:

- A. Portable H2S monitors positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 PPM are reached.

4. Visual warning systems:

- A. Wind direction indicators as shown on well site diagram.
- B. Caution/Danger signs (Exhibit #7) shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.

5. Mud program:

- A. The mud program has been designed to minimize the volume of H2S circulated to surface. Proper mud weight, safe drilling practices, and the use of H2S scavengers will minimize hazards when penetrating H2S bearing zones.
-

6. Metallurgy:

- A. All drill strings, casings, tubing, wellhead, blowout preventer, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H₂S service.
- B. All elastomers used for packing and seals shall be H₂S trim.

7. Communication:

- A. Radio communications in company vehicles including cellular telephone and 2-way radio.
- B. Land line (telephone) communication at Office.

8. Well testing:

- A. Drill stem testing will be performed with a minimum number of personnel in the immediate vicinity, which are necessary to safely and adequately conduct the test. The drill stem testing will be conducted during daylight hours and formation fluids will not be flowed to the surface. All drill-stem-testing operations conducted in an H₂S environment will use the closed chamber method of testing.
- B. There will be no drill stem testing.

EXHIBIT #7

WARNING
YOU ARE ENTERING AN H₂S
AUTHORIZED PERSONNEL ONLY

- 1. BEARDS OR CONTACT LENSES NOT ALLOWED**
- 2. HARD HATS REQUIRED**
- 3. SMOKING IN DESIGNATED AREAS ONLY**
- 4. BE WIND CONSCIOUS AT ALL TIMES**
- 5. CHECK WITH COG OPERATING FOREMAN AT**

COG OPERATING LLC
1-432-683-7443
1-575-746-2010

EDDY COUNTY EMERGENCY NUMBERS

ARTESIA FIRE DEPT. 575-746-5050
ARTESIA POLICE DEPT. 575-746-5000
EDDY CO. SHERIFF DEPT. 575-746-9888

LEA COUNTY EMERGENCY NUMBERS

HOBBS FIRE DEPT. 575-397-9308
HOBBS POLICE DEPT. 575-397-9285
LEA CO. SHERIFF DEPT. 575-396-1196

COG Operating LLC

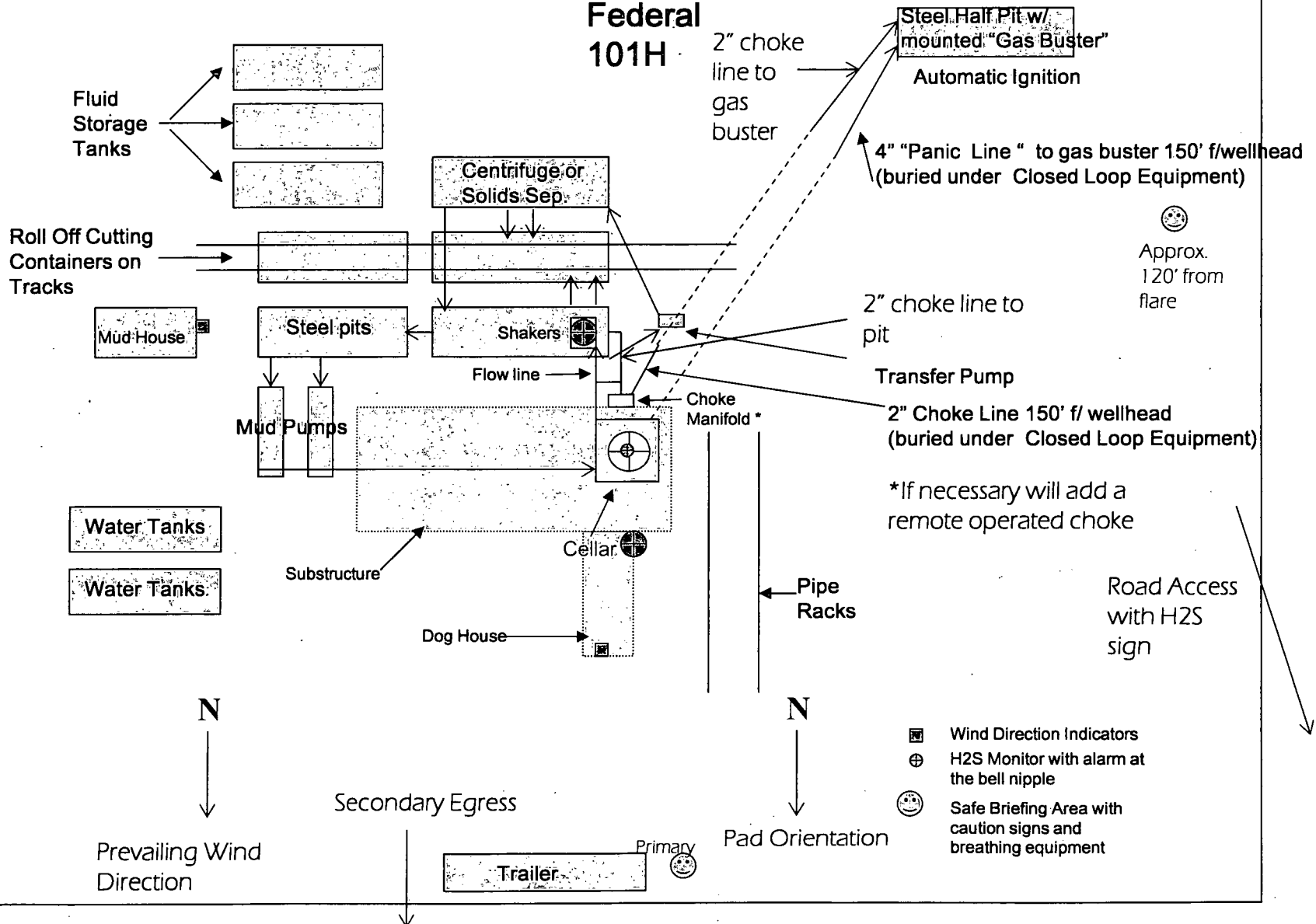
Drilling Location - H2S Safety Equipment Diagram

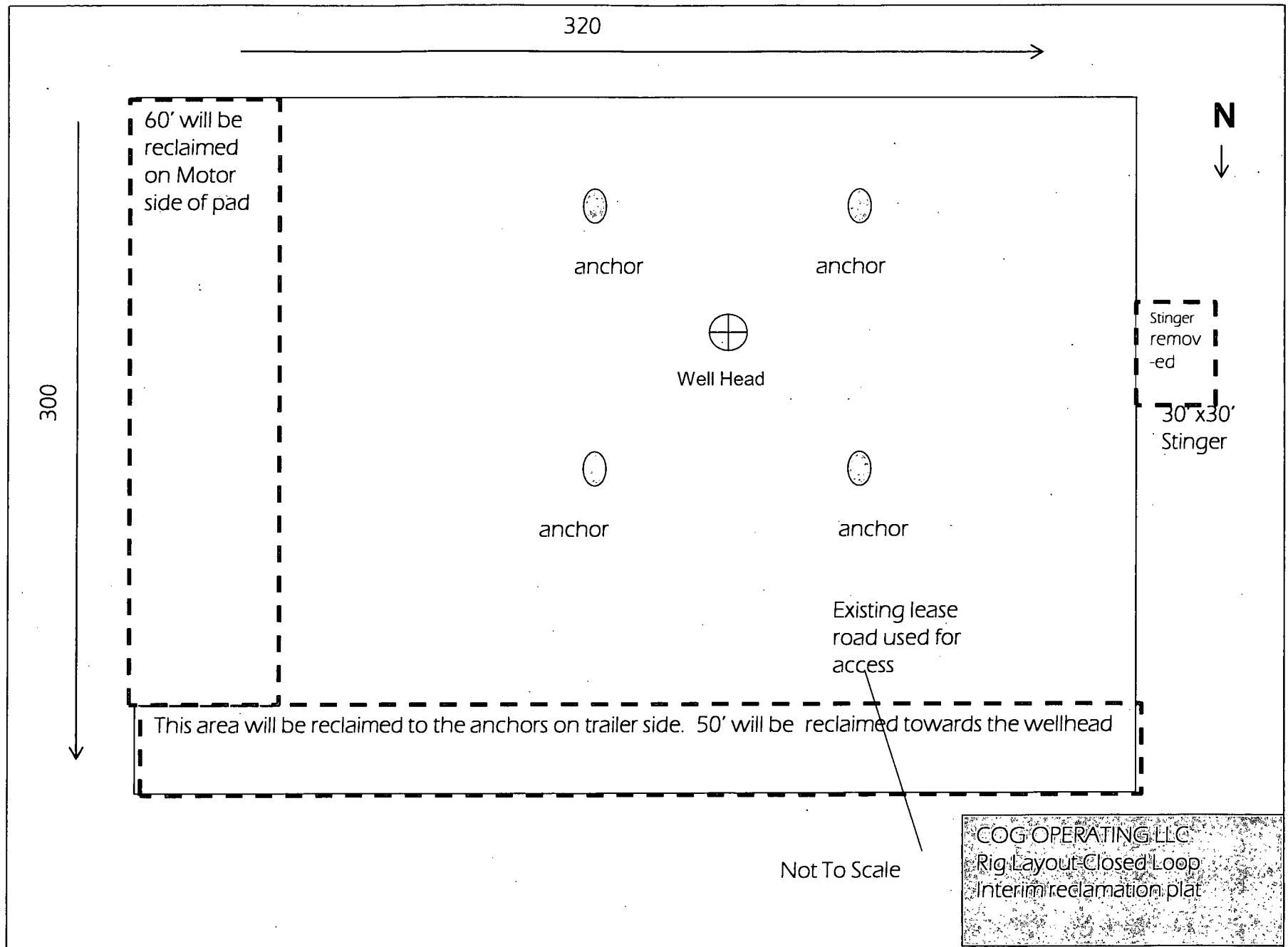
EXHIBIT 8-

Electra

Federal

101H





**PECOS DISTRICT
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NM-0467931
WELL NAME & NO.:	Electra Federal 101H
SURFACE HOLE FOOTAGE:	0660' FNL & 0330' FEL
BOTTOM HOLE FOOTAGE	0660' FNL & 0330' FWL
LOCATION:	Section 10, T. 17 S., R 30 E., NMPM
COUNTY:	Eddy County, New Mexico

TABLE OF CONTENTS

Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
 - Lesser Prairie-Chicken Timing Stipulations
 - Ground-level Abandoned Well Marker
- ☒ **Construction**
 - Notification
 - Topsoil
 - Closed Loop System
 - Federal Mineral Material Pits
 - Well Pads
 - Roads
- ☐ **Road Section Diagram**
- ☒ **Drilling**
 - H2S requirements
 - Logging Requirements
 - Waste Material and Fluids
- ☒ **Production (Post Drilling)**
 - Well Structures & Facilities
 - Pipelines
- ☐ **Interim Reclamation**
- ☒ **Final Abandonment & Reclamation**

I. GENERAL PROVISIONS

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

II. PERMIT EXPIRATION

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

IV. NOXIOUS WEEDS

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

V. SPECIAL REQUIREMENT(S)

Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken:

Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period.

Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted.

Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 feet from the source of the noise.

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well. For more installation details, contact the Carlsbad Field Office at 575-234-5972.

VI. CONSTRUCTION

A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5909 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

B. TOPSOIL

The operator shall stockpile the topsoil in a low profile manner in order to prevent wind/water erosion of the topsoil. The topsoil to be stripped is approximately 6 inches in depth. The topsoil will be used for interim and final reclamation.

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

The operator shall properly dispose of drilling contents at an authorized disposal site.

D. FEDERAL MINERAL MATERIALS PIT

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972.

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation.

The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

F. ON LEASE ACCESS ROADS

Road Width

The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed twenty-five (25) feet.

Surfacing

Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

Crowning

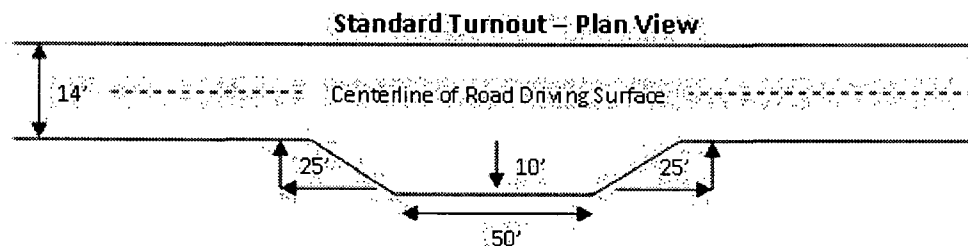
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

Ditching

Ditching shall be required on both sides of the road.

Turnouts

Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall be constructed on all blind curves. Turnouts shall conform to the following diagram:

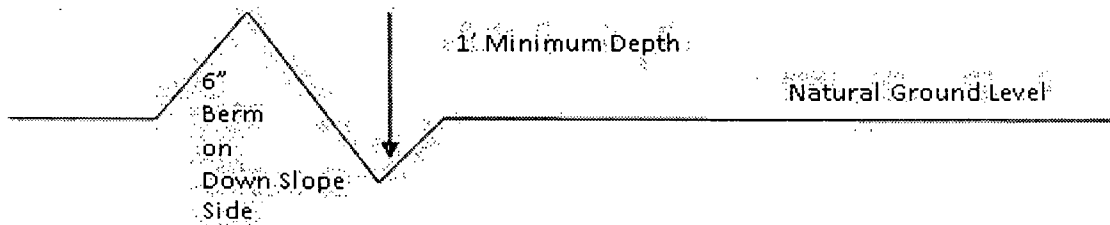


Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill out sloping and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

Cross Section of a Typical Lead-off Ditch



All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

Formula for Spacing Interval of Lead-off Ditches

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

$$400 \text{ foot road with } 4\% \text{ road slope: } \frac{400'}{4\%} + 100' = 200' \text{ lead-off ditch interval}$$

Cattleguards

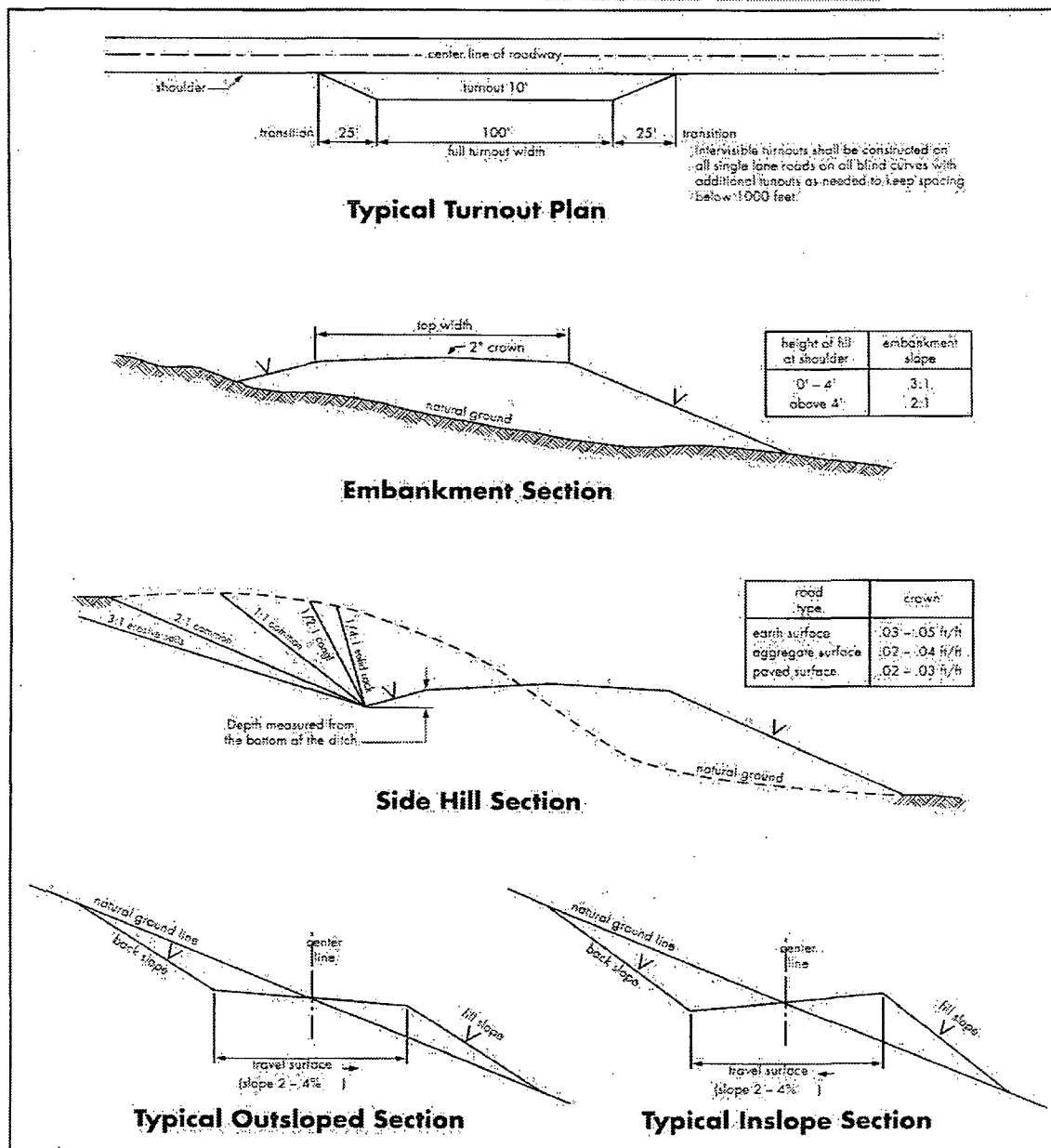
An appropriately sized cattleguard(s) sufficient to carry out the project shall be installed and maintained at fence crossing(s).

Any existing cattleguard(s) on the access road shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattleguard(s) that are in place and are utilized during lease operations.

Public Access

Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

Figure 1 – Cross Sections and Plans For Typical Road Sections



VII. 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. A Hydrogen Sulfide (H₂S) Drilling Plan shall be activated 500 feet prior to drilling into the **Grayburg** 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. 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 is located, this does not include the dog house or stairway area.
4. **The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.**

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. 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 and brine flows in the Artesia and Salado Groups
Possibility of lost circulation in the Grayburg and San Andres formations.**

- 1. The 13-3/8 inch surface casing shall be set at approximately 352 feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface. If salt is encountered, set casing at least 25 feet above the salt.**
 - 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, which shall be set at approximately 1300 feet in the Tansill formation, is:

☒ Cement to surface. If cement does not circulate see B.1.a, c-d above.

Contingency cement plan:

Operator has proposed DV tool at depth of 402', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

- a. First stage to DV tool:

☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job. Operator should have plans as to how they will achieve circulation on the next stage.

- b. Second stage above DV tool:

☒ Cement to surface. If cement does not circulate, contact the appropriate BLM office.

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

3. The minimum required fill of cement behind the 7 and 5-1/2 inch tapered production casing is:

☒ Cement to surface. If cement does not circulate see B.1.a, c-d above.

Contingency cement plan:

Operator has proposed DV tool at depth of 5223', but will adjust cement proportionately if moved. DV tool shall be set +/- 500' of proposed depth. Operator shall submit sundry if DV tool depth cannot be set in this range.

- a. First stage to DV tool:

☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job. Operator should have plans as to how they will achieve circulation on the next stage.

b. Second stage above DV tool:

- ☒ Cement to circulate to 2nd DV tool. If cement does not circulate, contact the appropriate BLM office before proceeding with third stage cement job. Operator should have plans as to how they will achieve circulation on the next stage.

Operator has proposed DV tool at depth of 1350', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and no deeper than 1000' below the shoe. Operator shall submit sundry if DV tool depth cannot be set in this range.

- ☒ Cement to surface. If cement does not circulate, contact the appropriate BLM office.

- 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.
 - a. **For surface casing only:** If the BOP/BOPE is to be tested against casing, the wait on cement (WOC) time for that casing is to be met (see WOC statement at start of casing section). Independent service company required.

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**. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (18 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
 - 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.
 - 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.

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VIII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities

Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

Containment Structures

The containment structure shall be constructed to hold the capacity of the entire contents of the largest tank, plus 24 hour production, unless more stringent protective requirements are deemed necessary by the Authorized Officer.

Painting Requirement

All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color
Shale Green, Munsell Soil Color Chart # 5Y 4/2

B. PIPELINES

STANDARD STIPULATIONS FOR SURFACE INSTALLED PIPELINES

A copy of the APD and attachments, including stipulations, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.
2. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.

3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to activity of the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. The holder shall be liable for damage or injury to the United States to the extent provided by 43 CFR Sec. 2883.1-4. The holder shall be held to a standard of strict liability for damage or injury to the United States resulting from pipe rupture, fire, or spills caused or substantially aggravated by any of the following within the right-of-way or permit area:

- a. Activities of the holder including, but not limited to construction, operation, maintenance, and termination of the facility.
- b. Activities of other parties including, but not limited to:
 - (1) Land clearing.
 - (2) Earth-disturbing and earth-moving work.
 - (3) Blasting.
 - (4) Vandalism and sabotage.
- c. Acts of God.

The maximum limitation for such strict liability damages shall not exceed one million dollars (\$1,000,000) for any one event, and any liability in excess of such amount shall be determined by the ordinary rules of negligence of the jurisdiction in which the damage or injury occurred.

This section shall not impose strict liability for damage or injury resulting primarily from an act of war or from the negligent acts or omissions of the United States.

5. If, during any phase of the construction, operation, maintenance, or termination of the pipeline, any oil, salt water, or other pollutant should be discharged from the pipeline system, impacting Federal lands, the control and total removal, disposal, and cleaning up of such oil, salt water, or other pollutant, wherever found, shall be the responsibility of the holder, regardless of fault. Upon failure of the holder to control, dispose of, or clean up such discharge on or affecting Federal lands, or to repair all damages resulting therefrom, on the Federal lands, the Authorized Officer may take such measures as he deems necessary to control and clean up the discharge and restore the area, including, where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the holder. Such action by the Authorized Officer shall not relieve the holder

of any responsibility as provided herein.

6. The pipeline shall be routed no farther than 6 feet from and parallel to existing roads. The authorized right-of-way width will be 20 feet. 14 feet of the right-of-way width will consist of existing disturbance (existing lease roads) and the remaining 6 feet will consist of area adjacent to the disturbance. All construction and maintenance activity will be confined to existing roads.

7. No blading or clearing of any vegetation will be allowed unless approved in writing by the Authorized Officer.

8. The holder shall install the pipeline on the surface in such a manner that will minimize suspension of the pipeline across low areas in the terrain. In hummocky or dune areas, the pipeline will be "snaked" around hummocks and dunes rather than suspended across these features.

9. The pipeline shall be buried with a minimum of 24 inches under all roads, "two-tracks," and trails. Burial of the pipe will continue for 20 feet on each side of each crossing. The condition of the road, upon completion of construction, shall be returned to at least its former state with no bumps or dips remaining in the road surface.

10. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.

11. In those areas where erosion control structures are required to stabilize soil conditions, the holder will install such structures as are suitable for the specific soil conditions being encountered and which are in accordance with sound resource management practices.

12. Excluding the pipe, all above-ground structures not subject to safety requirement shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2; designated by the Rocky Mountain Five State Interagency Committee.

13. The pipeline will be identified by signs at the point of origin and completion of the right-of-way and at all road crossings. At a minimum, signs will state the holder's name, BLM serial number, and the product being transported. Signs will be maintained in a legible condition for the life of the pipeline.

14. The holder shall not use the pipeline route as a road for purposes other than routine

maintenance as determined necessary by the Authorized Officer in consultation with the holder. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway.

15. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

16. The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, powerline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

IX. INTERIM RECLAMATION

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

Within six (6) months of well completion, operators should work with BLM surface management specialists (Jim Amos: 575-234-5909) to devise the best strategies to reduce the size of the location. Interim reclamation should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche that is free of contaminants may be used for road repairs, fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed. If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

All disturbed areas after they have been satisfactorily prepared need to be reseeded with the seed mixture provided below.

Upon completion of interim reclamation, the operator shall submit a Sundry Notices and Reports on Wells, Subsequent Report of Reclamation (Form 3160-5).

X. FINAL ABANDONMENT & RECLAMATION

At final abandonment, well locations, production facilities, and access roads must undergo "final" reclamation so that the character and productivity of the land are restored.

Earthwork for final reclamation must be completed within six (6) months of well plugging. All pads, pits, facility locations and roads must be reclaimed to a satisfactory revegetated, safe, and stable condition, unless an agreement is made with the landowner or BLM to keep the road and/or pad intact.

After all disturbed areas have been satisfactorily prepared, these areas need to be revegetated with the seed mixture provided below. Seeding should be accomplished by drilling on the contour whenever practical or by other approved methods. Seeding may need to be repeated until revegetation is successful, as determined by the BLM.

Operators shall contact a BLM surface protection specialist prior to surface abandonment operations for site specific objectives (Jim Amos: 575-234-5909).

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well.

Seed Mixture 2, for Sandy Sites

The holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed will be done in accordance with State law (s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). The holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed* per acre:

<u>Species</u>	<u>lb/acre</u>
Sand dropseed (<i>Sporobolus cryptandrus</i>)	1.0
Sand love grass (<i>Eragrostis trichodes</i>)	1.0
Plains bristlegrass (<i>Setaria macrostachya</i>)	2.0

*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed