

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

~~Confidential~~

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

SUNDRY NOTICES AND REPORTS ON WELLS
Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other instructions on reverse side.

1. Type of Well ☒ Oil Well ☐ Gas Well ☐ Other		5. Lease Serial No. NMNM128366
2. Name of Operator COG OPERATING LLC		6. If Indian, Allottee or Tribe Name
Contact: MAYTE X REYES E-Mail: mreyes1@concho.com		7. If Unit or CA/Agreement, Name and/or No.
3a. Address ONE CONCHO CENTER 600 W ILLINOIS AVENUE MIDLAND, TX 79701-4287	3b. Phone No. (include area code) Ph: 575-748-6945	8. Well Name and No. BLACK PEARL 1 FEDERAL 4H
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 1 T20S R34E Lot 4 190FNL 1160FWL 32.608889 N Lat, 103.518049 W Lon		9. API Well No. 30-025-42295-00-X1
		10. Field and Pool, or Exploratory LEA
		11. County or Parish, and State LEA COUNTY, NM

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

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Change to Original A
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	PD

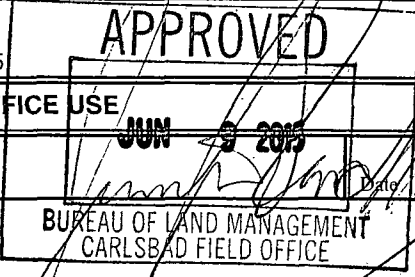
13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

COG Production LLC, respectfully requests approval for the following changes to the original approved APD.

BHL:
From BHL: 330' FSL & 660' FWL
To BHL: 660' FSL & 785' FWL
C102 attached.

Drilling Changes:
Drilling program, directional plan and anti-collision report attached.

Original COG still stand

14. I hereby certify that the foregoing is true and correct. Electronic Submission #304320 verified by the BLM Well Information System For COG OPERATING LLC, sent to the Hobbs Committed to AFMSS for processing by JENNIFER SANCHEZ on 06/09/2015 (15JAS0060SE)		
Name (Printed/Typed) MAYTE X REYES	Title REGULATORY ANALYST	
Signature (Electronic Submission)	Date 06/08/2015	
THIS SPACE FOR FEDERAL OR STATE OFFICE USE		
Approved By _____		
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.		
Title _____		Office _____

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

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

E-PERM KB

JUN 25 2015

DISTRICT I
1620 N. FRANCHIS DR., ROSA, NM 88240
Phone: (505) 334-0101 Fax: (505) 334-0720

DISTRICT II
811 S. FIRST ST., ARTESIA, NM 88210
Phone: (505) 740-1283 Fax: (505) 740-0720

DISTRICT III
1000 RIO BRAZOS RD., AZTEC, NM 87410
Phone: (505) 334-0178 Fax: (505) 334-0170

DISTRICT IV
1220 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 476-3400 Fax: (505) 476-3403

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 30-025-42295	Pool Code 37570	Pool Name Lea; Bone Spring
Property Code 313919	Property Name BLACK PEARL 1 FEDERAL	Well Number 4H
OGRID No. 229137	Operator Name COG OPERATING, LLC	Elevation 3695.7

Surface Location

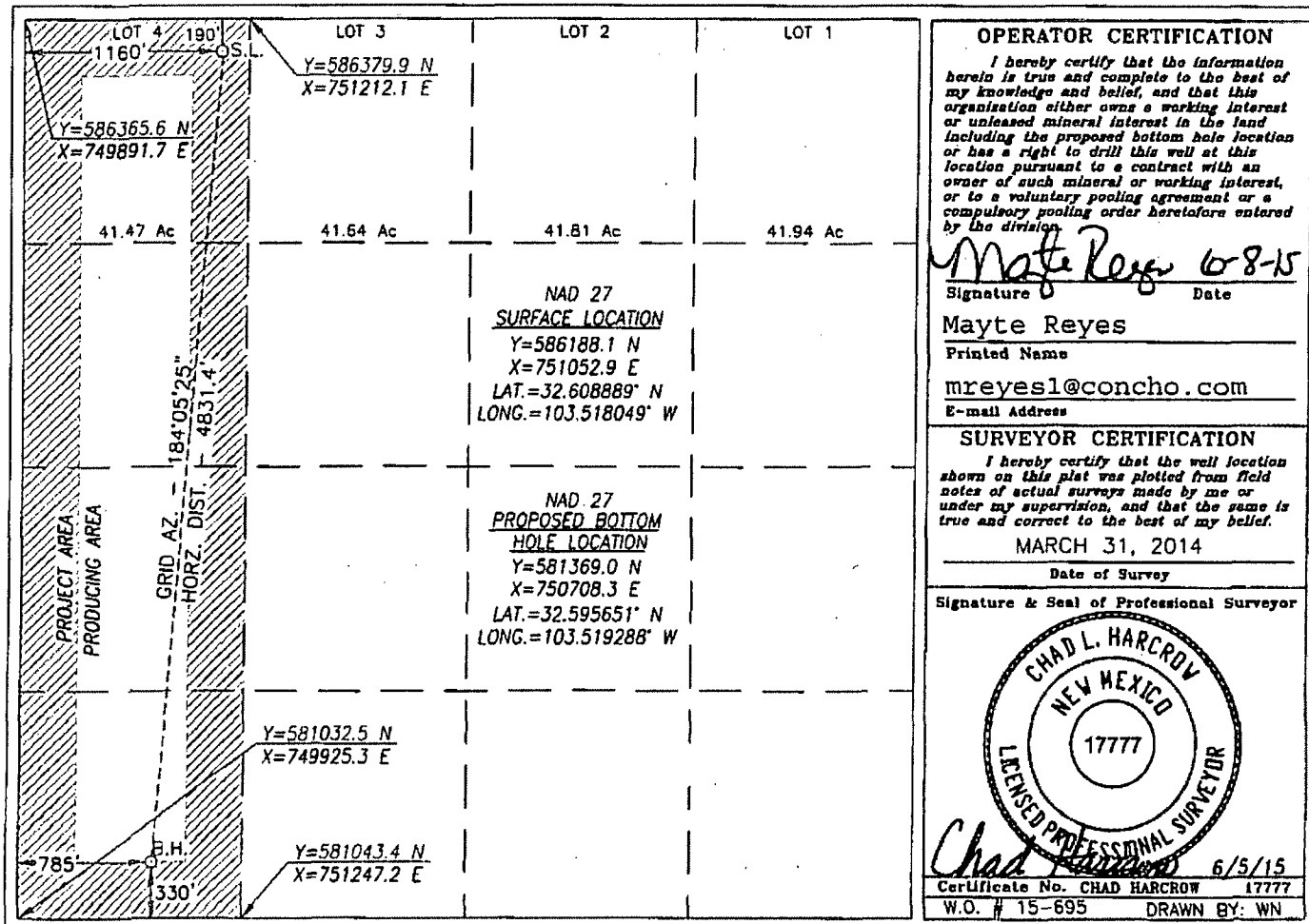
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
4	1	20-S	34-E		190	NORTH	1160	WEST	LEA

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	1	20-S	34-E		330	SOUTH	785	WEST	LEA

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
160.12			

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



Sundry notification of the following changes to the approved APD for the Black Pearl 1 Federal 4H:

- The End of Lateral Bottom Hole Location is changed as follows:
 - Was 330' FSL X 660' FWL Sec 1 24S – 34E Unit M
 - Now 330' FSL X **785' FWL** Sec 1 24S – 34E Unit M
 - Note: Surface Location as approved unchanged.
 - Revised Plat Attached – Note: No change to previously approved surface location.
- As result of change in End of Lateral Bottom Hole Location (PBHL), a revised Directional Drilling Plan is submitted to include a well path plan to maximize treatable lateral in the top 40 acre unit of the production unit (Lot 4) and mitigate collision risks with the Armstrong Quail Federal 1 (API 30-025-02408; NM-0250) and the Armstrong Quail Federal 2 (API 30-025-23601; NM-0250). All other wells along the well path are too shallow for anti-collision considerations.
- Proposed Casing and Cementing Program as follows:
 - Surface Section – No Change
 - Intermediate Section - No Change
 - Production, Curve and Lateral Section
 - Hole Size – Was 8-3/4" and 7-7/8" **Now 8-3/4" through the entire Production, Curve and Lateral Section**
 - 5-1/2" Casing – Setting Depth: Was 0 to 15,628' **Now 0 to 15,563'**
 - Weight: 17# Unchanged Grade: P-110 Unchanged Joint: LTC Unchanged
- Cementing Program
 - Surface Casing – No Change
 - Intermediate Casing – No Change
 - Production Casing
 - Lead: **1120 sx** of 50:50:10 H Blend (11.9 ppg – / 14.1 gal/sx / 2.51 cf/sk)
 - Tail: **1215 sx** of Versacem H + 0.3% CFR-3 + 1% Salt + 1% HR-601 (14.4 ppg – 5.7 gal/sk 1.24 cf/sk)
 - Volumes Adjusted for hole depth change and hole size change from 7-7/8" in the lateral to 8-3/4" in the lateral.
 - Volume Factors – Lead – 45% OH from KOP to Intermediate Casing Point. Cement calculated to tie back 1000' into intermediate casing.
 - Volume Factors Tail – 17% hole excess from TD (15,563') to KOP (10,422').

Attachments:

Revised Plat – Black Pearl 1 Federal 4H
Terra Directional Program dated 5.27.15
AC Report Armstrong Quail Federal #1 and #2



COG Operating LLC
Project: Lea County, NM
Site: Black Pearl 1 Federal
Well: #4H
Wellbore: OH
Plan: Plan #1 (#4H/OH)

Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0
2	10422.6	0.00	0.00	10422.6	0.0	0.0	0.00	0.00	0.0
3	11166.1	89.22	202.00	10900.0	-436.7	-176.4	12.00	202.00	448.2
4	11691.1	89.22	181.00	10907.3	-948.2	-280.5	4.00	-90.15	965.9
5	15563.2	89.22	181.00	10960.0	-4819.4	-348.1	0.00	0.00	4831.9

WELL DETAILS: #4H

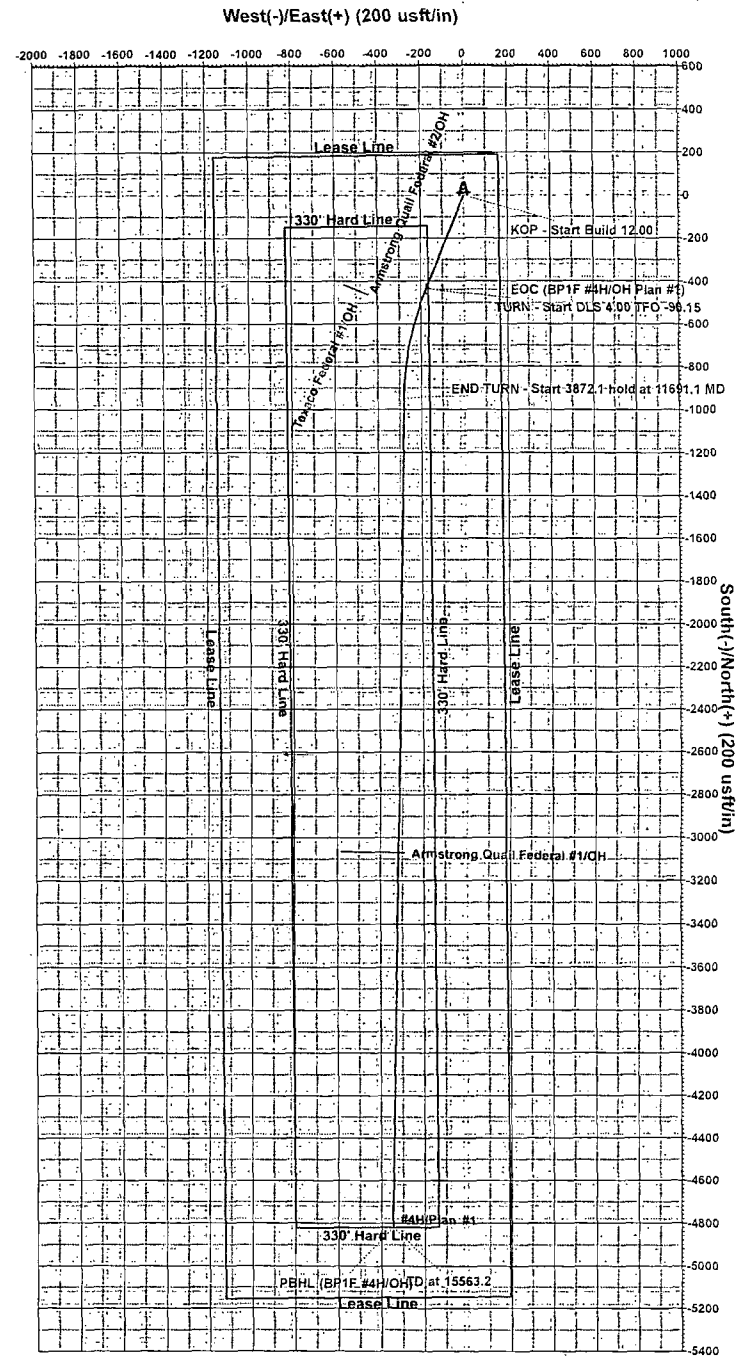
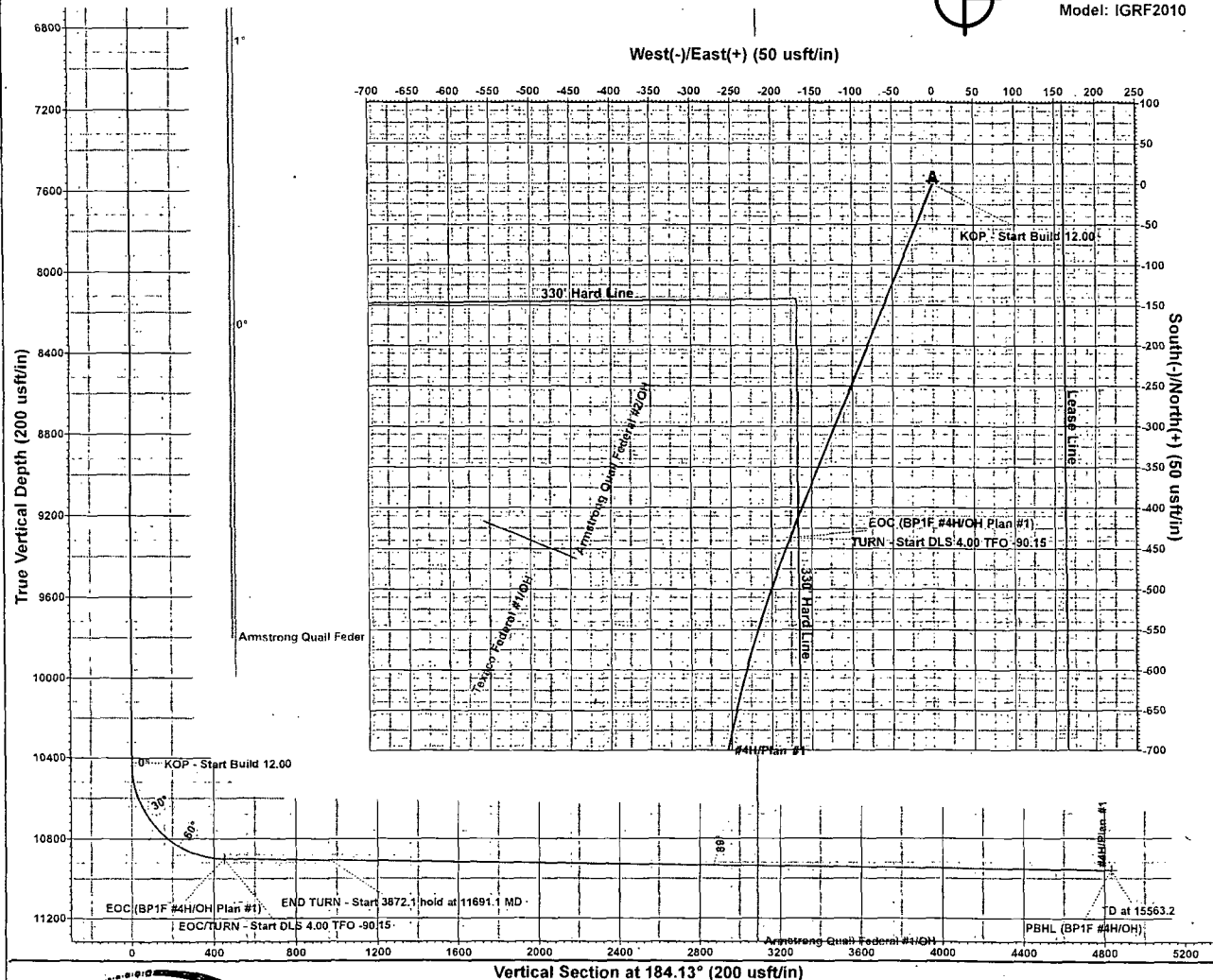
Ground Elevation:: 3695.7
RKB Elevation: KB @ 3713.7usft (McVay 6)
Rig Name: McVay 6

Northing 586188.10 Easting 751052.90 Latitude 32° 36' 32.002 N Longitude 103° 31' 4.978 W



Azimuths to Grid North
True North: -0.44°
Magnetic North: 6.66°

Magnetic Field
Strength: 48456.2snT
Dip Angle: 60.45°
Date: 5/25/2015
Model: IGRF2010



Plan: Plan #1 (#4H/OH)
Created By: Well Planner Date: 16:38, May 27 2015

Terra Directional Services
322 Spring Hill Drive, Suite A100, Spring, Texas 77386
432.425.7532

PROJECT DETAILS: Lea County, NM
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
Local North: Grid



COG Operating LLC

Lea County, NM

Black Pearl 1 Federal

#4H

OH

Plan: Plan #1

Standard Planning Report

27 May, 2015





TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #4H
Company:	COG Operating LLC	TVD Reference:	KB @ 3713.7usft (McVay 6)
Project:	Lea County, NM	MD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	North Reference:	Grid
Well:	#4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

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

Site	Black Pearl 1 Federal		
Site Position:		Northing:	586,220.00 usft
From: Map		Easting:	754,185.00 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 36' 32.078 N
		Longitude:	103° 30' 28.361 W
		Grid Convergence:	0.44 °

Well	#4H		
Well Position	+N/-S	-31.9 usft	Northing:
	+E/-W	-3,132.1 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 36' 32.002 N
		Longitude:	103° 31' 4.978 W
		Ground Level:	3,695.7 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	5/25/2015	7.10
			Dip Angle
			(°)
			60.45
			Field Strength
			(nT)
			48,456

Design	Plan #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			184.13

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
10,422.6	0.00	0.00	10,422.6	0.0	0.0	0.00	0.00	0.00	0.00	
11,166.1	89.22	202.00	10,900.0	-436.7	-176.4	12.00	12.00	0.00	202.00	
11,691.1	89.22	181.00	10,907.3	-948.2	-280.5	4.00	0.00	-4.00	-90.15	
15,563.2	89.22	181.00	10,960.0	-4,819.4	-348.1	0.00	0.00	0.00	0.00	PBHL (BP1F #4H/OH)



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #4H
Company:	COG Operating LLC	TVD Reference:	KB @ 3713.7usft (McVay 6)
Project:	Lea County, NM	MD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	North Reference:	Grid
Well:	#4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #4H
Company:	COG Operating LLC	TVD Reference:	KB @ 3713.7usft (McVay 6)
Project:	Lea County, NM	MD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	North Reference:	Grid
Well:	#4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,500.0	0.00	0.00	8,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,600.0	0.00	0.00	8,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,700.0	0.00	0.00	8,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,800.0	0.00	0.00	8,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,900.0	0.00	0.00	8,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,000.0	0.00	0.00	9,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,100.0	0.00	0.00	9,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,200.0	0.00	0.00	9,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,300.0	0.00	0.00	9,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,400.0	0.00	0.00	9,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,500.0	0.00	0.00	9,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,600.0	0.00	0.00	9,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,700.0	0.00	0.00	9,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,800.0	0.00	0.00	9,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,900.0	0.00	0.00	9,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
10,000.0	0.00	0.00	10,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
10,100.0	0.00	0.00	10,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
10,200.0	0.00	0.00	10,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
10,300.0	0.00	0.00	10,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
10,400.0	0.00	0.00	10,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
10,422.6	0.00	0.00	10,422.6	0.0	0.0	0.0	0.00	0.00	0.00	
KOP - Start Build 12.00										



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #4H
Company:	COG Operating LLC	TVD Reference:	KB @ 3713.7usft (McVay 6)
Project:	Lea County, NM	MD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	North Reference:	Grid
Well:	#4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,425.0	0.29	202.00	10,425.0	0.0	0.0	0.0	12.00	12.00	0.00
10,450.0	3.29	202.00	10,450.0	-0.7	-0.3	0.7	12.00	12.00	0.00
10,475.0	6.29	202.00	10,474.9	-2.7	-1.1	2.7	12.00	12.00	0.00
10,500.0	9.29	202.00	10,499.7	-5.8	-2.3	6.0	12.00	12.00	0.00
10,525.0	12.29	202.00	10,524.2	-10.1	-4.1	10.4	12.00	12.00	0.00
10,550.0	15.29	202.00	10,548.5	-15.7	-6.3	16.1	12.00	12.00	0.00
10,575.0	18.29	202.00	10,572.4	-22.4	-9.0	23.0	12.00	12.00	0.00
10,600.0	21.29	202.00	10,595.9	-30.2	-12.2	31.0	12.00	12.00	0.00
10,625.0	24.29	202.00	10,619.0	-39.2	-15.8	40.2	12.00	12.00	0.00
10,650.0	27.29	202.00	10,641.5	-49.3	-19.9	50.6	12.00	12.00	0.00
10,675.0	30.29	202.00	10,663.4	-60.4	-24.4	62.0	12.00	12.00	0.00
10,700.0	33.29	202.00	10,684.7	-72.6	-29.3	74.6	12.00	12.00	0.00
10,725.0	36.29	202.00	10,705.2	-85.9	-34.7	88.1	12.00	12.00	0.00
10,750.0	39.29	202.00	10,724.9	-100.1	-40.4	102.7	12.00	12.00	0.00
10,775.0	42.29	202.00	10,743.9	-115.2	-46.5	118.3	12.00	12.00	0.00
10,800.0	45.29	202.00	10,761.9	-131.2	-53.0	134.7	12.00	12.00	0.00
10,825.0	48.29	202.00	10,779.0	-148.1	-59.8	152.1	12.00	12.00	0.00
10,850.0	51.29	202.00	10,795.2	-165.8	-67.0	170.2	12.00	12.00	0.00
10,875.0	54.29	202.00	10,810.3	-184.3	-74.5	189.2	12.00	12.00	0.00
10,900.0	57.29	202.00	10,824.3	-203.5	-82.2	208.8	12.00	12.00	0.00
10,925.0	60.29	202.00	10,837.3	-223.3	-90.2	229.2	12.00	12.00	0.00
10,950.0	63.29	202.00	10,849.1	-243.7	-98.5	250.2	12.00	12.00	0.00
10,975.0	66.29	202.00	10,859.8	-264.7	-106.9	271.7	12.00	12.00	0.00
11,000.0	69.29	202.00	10,869.2	-286.1	-115.6	293.7	12.00	12.00	0.00
11,025.0	72.29	202.00	10,877.4	-308.0	-124.4	316.2	12.00	12.00	0.00
11,050.0	75.29	202.00	10,884.4	-330.3	-133.4	339.0	12.00	12.00	0.00
11,075.0	78.29	202.00	10,890.1	-352.8	-142.6	362.2	12.00	12.00	0.00
11,100.0	81.29	202.00	10,894.6	-375.6	-151.8	385.6	12.00	12.00	0.00
11,125.0	84.29	202.00	10,897.7	-398.6	-161.1	409.2	12.00	12.00	0.00
11,150.0	87.29	202.00	10,899.5	-421.8	-170.4	432.9	12.00	12.00	0.00
11,166.1	89.22	202.00	10,900.0	-436.7	-176.4	448.2	12.00	12.00	0.00
EOC/TURN - Start DLS 4.00 TFO -90.16									
11,200.0	89.22	200.64	10,900.5	-468.2	-188.8	480.6	4.00	-0.01	-4.00
11,300.0	89.21	196.64	10,901.9	-563.0	-220.7	577.4	4.00	-0.01	-4.00
11,400.0	89.21	192.64	10,903.2	-659.7	-246.0	675.7	4.00	0.00	-4.00
11,500.0	89.21	188.64	10,904.6	-757.9	-264.4	775.0	4.00	0.00	-4.00
11,600.0	89.21	184.64	10,906.0	-857.2	-276.0	874.9	4.00	0.00	-4.00
11,691.1	89.22	181.00	10,907.3	-948.2	-280.5	965.9	4.00	0.01	-4.00
END TURN - Start 3872.1 hold at 11691.1 MD									
11,700.0	89.22	181.00	10,907.4	-957.1	-280.6	974.8	0.00	0.00	0.00
11,800.0	89.22	181.00	10,908.7	-1,057.1	-282.4	1,074.7	0.00	0.00	0.00
11,900.0	89.22	181.00	10,910.1	-1,157.1	-284.1	1,174.5	0.00	0.00	0.00
12,000.0	89.22	181.00	10,911.5	-1,257.0	-285.9	1,274.4	0.00	0.00	0.00
12,100.0	89.22	181.00	10,912.8	-1,357.0	-287.6	1,374.2	0.00	0.00	0.00
12,200.0	89.22	181.00	10,914.2	-1,457.0	-289.4	1,474.0	0.00	0.00	0.00
12,300.0	89.22	181.00	10,915.5	-1,557.0	-291.1	1,573.9	0.00	0.00	0.00
12,400.0	89.22	181.00	10,916.9	-1,656.9	-292.9	1,673.7	0.00	0.00	0.00
12,500.0	89.22	181.00	10,918.3	-1,756.9	-294.6	1,773.6	0.00	0.00	0.00
12,600.0	89.22	181.00	10,919.6	-1,856.9	-296.4	1,873.4	0.00	0.00	0.00
12,700.0	89.22	181.00	10,921.0	-1,956.9	-298.1	1,973.3	0.00	0.00	0.00
12,800.0	89.22	181.00	10,922.4	-2,056.8	-299.8	2,073.1	0.00	0.00	0.00
12,900.0	89.22	181.00	10,923.7	-2,156.8	-301.6	2,172.9	0.00	0.00	0.00
13,000.0	89.22	181.00	10,925.1	-2,256.8	-303.3	2,272.8	0.00	0.00	0.00
13,100.0	89.22	181.00	10,926.4	-2,356.8	-305.1	2,372.6	0.00	0.00	0.00



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well #4H
Company:	COG Operating LLC	TVD Reference:	KB @ 3713.7usft (McVay 6)
Project:	Lea County, NM	MD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	North Reference:	Grid
Well:	#4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

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)
13,200.0	89.22	181.00	10,927.8	-2,456.7	-306.8	2,472.5	0.00	0.00	0.00
13,300.0	89.22	181.00	10,929.2	-2,556.7	-308.6	2,572.3	0.00	0.00	0.00
13,400.0	89.22	181.00	10,930.5	-2,656.7	-310.3	2,672.1	0.00	0.00	0.00
13,500.0	89.22	181.00	10,931.9	-2,756.7	-312.1	2,772.0	0.00	0.00	0.00
13,600.0	89.22	181.00	10,933.3	-2,856.6	-313.8	2,871.8	0.00	0.00	0.00
13,700.0	89.22	181.00	10,934.6	-2,956.6	-315.5	2,971.7	0.00	0.00	0.00
13,800.0	89.22	181.00	10,936.0	-3,056.6	-317.3	3,071.5	0.00	0.00	0.00
13,900.0	89.22	181.00	10,937.3	-3,156.6	-319.0	3,171.3	0.00	0.00	0.00
14,000.0	89.22	181.00	10,938.7	-3,256.5	-320.8	3,271.2	0.00	0.00	0.00
14,100.0	89.22	181.00	10,940.1	-3,356.5	-322.5	3,371.0	0.00	0.00	0.00
14,200.0	89.22	181.00	10,941.4	-3,456.5	-324.3	3,470.9	0.00	0.00	0.00
14,300.0	89.22	181.00	10,942.8	-3,556.5	-326.0	3,570.7	0.00	0.00	0.00
14,400.0	89.22	181.00	10,944.2	-3,656.4	-327.8	3,670.6	0.00	0.00	0.00
14,500.0	89.22	181.00	10,945.5	-3,756.4	-329.5	3,770.4	0.00	0.00	0.00
14,600.0	89.22	181.00	10,946.9	-3,856.4	-331.3	3,870.2	0.00	0.00	0.00
14,700.0	89.22	181.00	10,948.2	-3,956.4	-333.0	3,970.1	0.00	0.00	0.00
14,800.0	89.22	181.00	10,949.6	-4,056.3	-334.7	4,069.9	0.00	0.00	0.00
14,900.0	89.22	181.00	10,951.0	-4,156.3	-336.5	4,169.8	0.00	0.00	0.00
15,000.0	89.22	181.00	10,952.3	-4,256.3	-338.2	4,269.6	0.00	0.00	0.00
15,100.0	89.22	181.00	10,953.7	-4,356.3	-340.0	4,369.4	0.00	0.00	0.00
15,200.0	89.22	181.00	10,955.1	-4,456.2	-341.7	4,469.3	0.00	0.00	0.00
15,300.0	89.22	181.00	10,956.4	-4,556.2	-343.5	4,569.1	0.00	0.00	0.00
15,400.0	89.22	181.00	10,957.8	-4,656.2	-345.2	4,669.0	0.00	0.00	0.00
15,500.0	89.22	181.00	10,959.1	-4,756.2	-347.0	4,768.8	0.00	0.00	0.00
15,563.2	89.22	181.00	10,960.0	-4,819.4	-348.1	4,831.9	0.00	0.00	0.00
TD at 15563.2									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
EOC (BP1F #4H/OH Pla - hit/miss target - Shape - Point	0.00	0.00	10,900.0	-436.7	-176.4	585,751.43	750,876.47	32° 36' 27.695 N	103° 31' 7.079 W
PBHL (BP1F #4H/OH) - plan hits target center - Point	0.00	0.00	10,960.0	-4,819.4	-348.1	581,368.74	750,704.84	32° 35' 44.342 N	103° 31' 9.478 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
10,422.6	10,422.6	0.0	0.0	KOP - Start Build 12.00
11,166.1	10,900.0	-436.7	-176.4	EOC/TURN - Start DLS 4.00 TFO -90.15
11,691.1	10,907.3	-948.2	-280.5	END TURN - Start 3872.1 hold at 11691.1 MD
15,563.2	10,960.0	-4,819.4	-348.1	TD at 15563.2



COG Operating LLC

Lea County, NM

Black Pearl 1 Federal

#4H

OH

Plan #1

Anticollision Report

27 May, 2015





TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference	Plan #1		
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 10,000.0 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	5/27/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.0	15,563.2	Plan #1 (OH)	MWD	MWD - Standard	

Summary						
Site Name	Reference	Offset	Distance		Separation	Warning
	Measured	Measured	Between	Between		
Offset Well - Wellbore - Design	Depth	Depth	Centres	Ellipses	Factor	
	(usft)	(usft)	(usft)	(usft)		
Black Pearl 1 Federal						
Armstrong Quail Federal #1 - OH - OH	13,813.1	10,923.2	60.9	-20.8	0.745	Level 1, CC, ES, SF
Armstrong Quail Federal #2 - OH - OH	9,799.7	9,800.0	640.3	598.0	15.106	CC
Armstrong Quail Federal #2 - OH - OH	9,800.0	9,800.0	640.3	598.0	15.105	ES, SF
Texaco Federal #1 - OH - OH	9,965.1	9,969.7	688.0	533.3	4.446	CC
Texaco Federal #1 - OH - OH	10,000.0	10,000.0	688.1	532.8	4.432	ES, SF

Offset Design	Black Pearl 1 Federal - Armstrong Quail Federal #1 - OH - OH										Offset Site Error:	0.0 usft
Survey Program:	870-MWD										Offset Well Error:	0.0 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)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-169.20	-3,065.0	-584.8	3,120.4			
100.0	100.0	83.7	83.7	0.1	0.1	-169.20	-3,065.0	-584.7	3,120.3	3,120.1	0.18	N/A
200.0	200.0	184.3	184.3	0.3	0.2	-169.20	-3,065.0	-584.6	3,120.3	3,119.8	0.52	5,999.514
300.0	300.0	284.8	284.8	0.5	0.3	-169.21	-3,065.0	-584.4	3,120.3	3,119.4	0.86	3,646.446
400.0	400.0	385.4	385.4	0.8	0.4	-169.21	-3,065.1	-584.0	3,120.2	3,119.0	1.19	2,619.147
500.0	500.0	485.9	485.9	1.0	0.5	-169.22	-3,065.1	-583.6	3,120.1	3,118.6	1.53	2,043.427
600.0	600.0	586.4	586.4	1.2	0.6	-169.23	-3,065.1	-583.0	3,120.0	3,118.2	1.86	1,675.175
700.0	700.0	686.9	686.9	1.4	0.8	-169.24	-3,065.1	-582.4	3,119.9	3,117.7	2.20	1,419.365
800.0	800.0	787.5	787.5	1.7	0.9	-169.25	-3,065.1	-581.7	3,119.8	3,117.3	2.53	1,231.315
900.0	900.0	888.0	888.0	1.9	1.0	-169.27	-3,065.1	-580.8	3,119.7	3,116.8	2.89	1,079.480
1,000.0	1,000.0	988.3	988.3	2.1	1.2	-169.29	-3,065.1	-579.9	3,119.5	3,116.2	3.34	933.747
1,100.0	1,100.0	1,088.6	1,088.6	2.3	1.5	-169.30	-3,065.1	-578.9	3,119.3	3,115.5	3.79	822.671
1,200.0	1,200.0	1,188.9	1,188.9	2.6	1.7	-169.32	-3,065.2	-577.9	3,119.2	3,114.9	4.24	735.202
1,300.0	1,300.0	1,289.2	1,289.2	2.8	1.9	-169.34	-3,065.2	-576.8	3,119.0	3,114.3	4.69	664.537
1,400.0	1,400.0	1,389.5	1,389.5	3.0	2.1	-169.36	-3,065.2	-575.6	3,118.8	3,113.6	5.14	606.257
1,500.0	1,500.0	1,489.8	1,489.8	3.2	2.4	-169.39	-3,065.2	-574.4	3,118.6	3,113.0	5.60	557.368
1,600.0	1,600.0	1,590.2	1,590.1	3.5	2.6	-169.41	-3,065.2	-573.1	3,118.4	3,112.3	6.05	515.768
1,700.0	1,700.0	1,694.1	1,694.0	3.7	2.8	-169.44	-3,065.3	-571.4	3,118.1	3,111.6	6.51	479.270
1,800.0	1,800.0	1,793.1	1,793.0	3.9	3.0	-169.48	-3,065.3	-569.3	3,117.7	3,110.8	6.93	449.707
1,900.0	1,900.0	1,891.2	1,891.1	4.1	3.2	-169.51	-3,065.3	-567.7	3,117.5	3,110.1	7.35	423.924
2,000.0	2,000.0	1,989.3	1,989.2	4.4	3.4	-169.53	-3,065.4	-566.4	3,117.2	3,109.5	7.77	400.940
2,100.0	2,100.0	2,087.5	2,087.4	4.6	3.6	-169.55	-3,065.4	-565.4	3,117.1	3,108.9	8.20	380.324

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design Black Pearl 1 Federal - Armstrong Quail Federal #1 - OH - OH												Offset Site Error:	0.0 usft
Survey Program: 870-MWD												Offset Well Error:	0.0 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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
2,200.0	2,200.0	2,185.7	2,185.5	4.8	3.8	-169.56	-3,065.4	-564.8	3,117.0	3,108.4	8.62	361.726	
2,300.0	2,300.0	2,286.5	2,286.4	5.0	4.0	-169.57	-3,065.4	-564.3	3,116.9	3,107.9	9.05	344.512	
2,400.0	2,400.0	2,387.3	2,387.2	5.3	4.2	-169.58	-3,065.4	-563.6	3,116.8	3,107.3	9.48	328.858	
2,500.0	2,500.0	2,468.1	2,468.0	5.5	4.4	-169.60	-3,065.4	-562.7	3,116.7	3,106.7	9.91	314.562	
2,600.0	2,600.0	2,588.9	2,588.8	5.7	4.6	-169.62	-3,065.4	-561.7	3,116.5	3,106.2	10.34	301.454	
2,700.0	2,700.0	2,689.7	2,689.6	5.9	4.8	-169.64	-3,065.5	-560.6	3,116.3	3,105.5	10.77	289.391	
2,800.0	2,800.0	2,790.5	2,790.3	6.2	5.1	-169.66	-3,065.5	-559.2	3,116.1	3,104.9	11.21	277.951	
2,900.0	2,900.0	2,891.2	2,891.0	6.4	5.3	-169.69	-3,065.5	-557.8	3,115.8	3,104.2	11.66	267.193	
3,000.0	3,000.0	2,991.8	2,991.7	6.6	5.5	-169.72	-3,065.5	-556.2	3,115.6	3,103.5	12.11	257.233	
3,100.0	3,100.0	3,092.5	3,092.3	6.8	5.7	-169.75	-3,065.6	-554.4	3,115.3	3,102.7	12.56	247.987	
3,200.0	3,200.0	3,193.2	3,193.0	7.1	6.0	-169.78	-3,065.6	-552.5	3,115.0	3,102.0	13.01	239.379	
3,300.0	3,300.0	3,293.9	3,293.6	7.3	6.2	-169.82	-3,065.6	-550.5	3,114.7	3,101.2	13.46	231.346	
3,400.0	3,400.0	3,394.1	3,393.8	7.5	6.4	-169.86	-3,065.7	-548.4	3,114.3	3,100.4	13.91	223.921	
3,500.0	3,500.0	3,492.9	3,492.6	7.7	6.6	-169.89	-3,065.7	-546.4	3,114.0	3,099.7	14.34	217.215	
3,600.0	3,600.0	3,591.8	3,591.5	8.0	6.8	-169.93	-3,065.7	-544.6	3,113.8	3,099.0	14.76	210.900	
3,700.0	3,700.0	3,690.6	3,690.3	8.2	7.0	-169.95	-3,065.8	-543.1	3,113.5	3,098.3	15.19	204.943	
3,800.0	3,800.0	3,789.5	3,789.2	8.4	7.2	-169.98	-3,065.8	-541.8	3,113.3	3,097.7	15.62	199.314	
3,900.0	3,900.0	3,888.3	3,888.0	8.6	7.4	-170.00	-3,065.8	-540.7	3,113.1	3,097.1	16.05	193.988	
4,000.0	4,000.0	3,988.6	3,988.3	8.9	7.6	-170.01	-3,065.8	-539.8	3,113.0	3,096.5	16.48	188.902	
4,100.0	4,100.0	4,089.9	4,089.6	9.1	7.8	-170.04	-3,065.8	-538.6	3,112.8	3,095.9	16.91	184.045	
4,200.0	4,200.0	4,191.2	4,190.9	9.3	8.0	-170.06	-3,065.9	-537.1	3,112.6	3,095.2	17.35	179.430	
4,300.0	4,300.0	4,292.1	4,291.7	9.5	8.3	-170.09	-3,065.9	-535.4	3,112.3	3,094.5	17.79	174.992	
4,400.0	4,400.0	4,392.0	4,391.7	9.8	8.5	-170.13	-3,065.9	-533.7	3,112.0	3,093.8	18.23	170.677	
4,500.0	4,500.0	4,492.0	4,491.6	10.0	8.7	-170.16	-3,066.0	-532.0	3,111.8	3,093.1	18.68	166.569	
4,600.0	4,600.0	4,592.0	4,591.6	10.2	8.9	-170.19	-3,066.0	-530.2	3,111.5	3,092.4	19.13	162.653	
4,700.0	4,700.0	4,692.0	4,691.6	10.4	9.2	-170.22	-3,066.0	-528.5	3,111.2	3,091.7	19.58	158.917	
4,800.0	4,800.0	4,792.0	4,791.6	10.7	9.4	-170.25	-3,066.1	-526.7	3,111.0	3,091.0	20.03	155.348	
4,900.0	4,900.0	4,893.7	4,893.3	10.9	9.6	-170.29	-3,066.1	-524.8	3,110.7	3,090.2	20.48	151.888	
5,000.0	5,000.0	4,995.5	4,995.0	11.1	9.8	-170.33	-3,066.1	-522.4	3,110.3	3,089.4	20.93	148.575	
5,100.0	5,100.0	5,097.2	5,096.7	11.3	10.1	-170.38	-3,066.2	-519.7	3,109.9	3,088.5	21.39	145.400	
5,200.0	5,200.0	5,199.0	5,198.4	11.6	10.3	-170.44	-3,066.2	-516.6	3,109.5	3,087.6	21.84	142.355	
5,300.0	5,300.0	5,299.3	5,298.7	11.8	10.5	-170.50	-3,066.3	-513.2	3,109.0	3,086.7	22.29	139.495	
5,400.0	5,400.0	5,397.6	5,396.9	12.0	10.7	-170.56	-3,066.3	-510.0	3,108.5	3,085.8	22.72	136.838	
5,500.0	5,500.0	5,495.9	5,495.2	12.2	10.9	-170.61	-3,066.4	-507.3	3,108.1	3,084.9	23.15	134.283	
5,600.0	5,600.0	5,594.2	5,593.5	12.5	11.1	-170.65	-3,066.4	-504.9	3,107.7	3,084.2	23.58	131.822	
5,700.0	5,700.0	5,692.6	5,691.8	12.7	11.3	-170.69	-3,066.5	-502.8	3,107.4	3,083.4	24.00	129.451	
5,800.0	5,800.0	5,791.9	5,791.1	12.9	11.5	-170.72	-3,066.5	-501.1	3,107.2	3,082.7	24.44	127.158	
5,900.0	5,900.0	5,891.9	5,891.1	13.1	11.7	-170.75	-3,066.5	-499.3	3,106.9	3,082.1	24.87	124.939	
6,000.0	6,000.0	5,991.8	5,991.0	13.4	12.0	-170.78	-3,066.6	-497.6	3,106.7	3,081.4	25.30	122.796	
6,100.0	6,100.0	6,091.8	6,091.0	13.6	12.2	-170.82	-3,066.6	-495.8	3,106.4	3,080.7	25.73	120.724	
6,200.0	6,200.0	6,191.8	6,191.0	13.8	12.4	-170.85	-3,066.6	-494.1	3,106.2	3,080.0	26.16	118.721	
6,300.0	6,300.0	6,291.8	6,291.0	14.0	12.6	-170.88	-3,066.7	-492.4	3,105.9	3,079.3	26.60	116.783	
6,400.0	6,400.0	6,391.8	6,390.9	14.3	12.8	-170.91	-3,066.7	-490.6	3,105.7	3,078.7	27.03	114.908	
6,500.0	6,500.0	6,491.8	6,490.9	14.5	13.0	-170.94	-3,066.7	-488.9	3,105.4	3,078.0	27.47	113.057	
6,600.0	6,600.0	6,591.8	6,590.9	14.7	13.2	-170.97	-3,066.7	-487.1	3,105.2	3,077.3	27.92	111.235	
6,700.0	6,700.0	6,691.7	6,690.8	14.9	13.4	-171.01	-3,066.8	-485.4	3,105.0	3,076.6	28.36	109.471	
6,800.0	6,800.0	6,791.7	6,790.8	15.2	13.7	-171.04	-3,066.8	-483.6	3,104.7	3,075.9	28.81	107.761	
6,900.0	6,900.0	6,891.7	6,890.7	15.4	13.9	-171.07	-3,066.8	-481.9	3,104.5	3,075.2	29.26	106.111	
7,000.0	7,000.0	6,991.4	6,990.5	15.6	14.1	-171.10	-3,066.9	-480.2	3,104.2	3,074.5	29.69	104.561	
7,100.0	7,100.0	7,091.2	7,090.2	15.8	14.3	-171.13	-3,066.9	-478.5	3,104.0	3,073.9	30.12	103.055	
7,200.0	7,200.0	7,190.9	7,190.0	16.1	14.5	-171.16	-3,066.9	-476.9	3,103.8	3,073.2	30.55	101.593	
7,300.0	7,300.0	7,290.7	7,289.7	16.3	14.7	-171.19	-3,066.9	-475.4	3,103.6	3,072.6	30.98	100.171	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design											Offset Site Error:	0.0 usft
Black Pearl 1 Federal - Armstrong Quail Federal #1 - OH - OH											Offset Well Error:	0.0 usft
Survey Program: 870-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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor
7,400.0	7,400.0	7,390.4	7,389.4	16.5	14.9	-171.22	-3,067.0	-473.9	3,103.4	3,072.0	31.41	98.789
7,500.0	7,500.0	7,490.2	7,489.2	16.7	15.1	-171.24	-3,067.0	-472.5	3,103.2	3,071.3	31.85	97.444
7,600.0	7,600.0	7,589.9	7,588.9	16.9	15.3	-171.27	-3,067.0	-471.1	3,103.0	3,070.7	32.28	96.135
7,700.0	7,700.0	7,580.4	7,579.3	17.2	15.5	-171.29	-3,067.0	-469.8	3,102.8	3,070.1	32.71	94.856
7,800.0	7,800.0	7,792.3	7,791.3	17.4	15.8	-171.32	-3,067.1	-468.0	3,102.6	3,069.4	33.15	93.598
7,900.0	7,900.0	7,894.3	7,893.2	17.6	16.0	-171.36	-3,067.1	-465.8	3,102.3	3,068.7	33.59	92.370
8,000.0	8,000.0	7,995.6	7,994.5	17.8	16.2	-171.41	-3,067.2	-463.2	3,102.0	3,067.9	34.03	91.151
8,100.0	8,100.0	8,096.3	8,095.2	18.1	16.4	-171.46	-3,067.2	-460.4	3,101.6	3,067.1	34.48	89.947
8,200.0	8,200.0	8,197.0	8,195.8	18.3	16.6	-171.52	-3,067.3	-457.3	3,101.2	3,066.3	34.93	88.773
8,300.0	8,300.0	8,297.7	8,296.5	18.5	16.9	-171.58	-3,067.3	-454.1	3,100.8	3,065.4	35.39	87.628
8,400.0	8,400.0	8,398.4	8,397.2	18.7	17.1	-171.64	-3,067.4	-450.7	3,100.3	3,064.5	35.84	86.512
8,500.0	8,500.0	8,498.4	8,497.0	19.0	17.3	-171.71	-3,067.4	-447.2	3,099.9	3,063.6	36.29	85.424
8,600.0	8,600.0	8,598.3	8,596.9	19.2	17.6	-171.77	-3,067.5	-443.7	3,099.5	3,062.7	36.74	84.362
8,700.0	8,700.0	8,698.3	8,696.8	19.4	17.8	-171.83	-3,067.6	-440.2	3,099.0	3,061.8	37.19	83.327
8,800.0	8,800.0	8,798.2	8,796.7	19.6	18.0	-171.90	-3,067.6	-436.7	3,098.6	3,060.9	37.64	82.316
8,900.0	8,900.0	8,898.2	8,896.6	19.9	18.2	-171.96	-3,067.7	-433.2	3,098.2	3,060.1	38.09	81.328
9,000.0	9,000.0	8,998.4	8,996.7	20.1	18.5	-172.03	-3,067.7	-429.7	3,097.7	3,059.2	38.55	80.361
9,100.0	9,100.0	9,098.5	9,096.8	20.3	18.7	-172.09	-3,067.8	-426.1	3,097.3	3,058.3	39.00	79.416
9,200.0	9,200.0	9,198.7	9,196.9	20.5	18.9	-172.16	-3,067.9	-422.4	3,096.9	3,057.4	39.45	78.493
9,300.0	9,300.0	9,298.8	9,297.0	20.8	19.2	-172.23	-3,067.9	-418.7	3,096.4	3,056.5	39.91	77.591
9,400.0	9,400.0	9,399.0	9,397.0	21.0	19.4	-172.30	-3,068.0	-415.0	3,096.0	3,055.6	40.36	76.709
9,500.0	9,500.0	9,499.1	9,497.1	21.2	19.6	-172.37	-3,068.1	-411.1	3,095.5	3,054.7	40.81	75.847
9,600.0	9,600.0	9,599.2	9,597.1	21.4	19.8	-172.44	-3,068.1	-407.2	3,095.1	3,053.8	41.27	75.003
9,700.0	9,700.0	9,699.3	9,697.2	21.7	20.1	-172.51	-3,068.2	-403.6	3,094.7	3,053.0	41.70	74.208
9,800.0	9,800.0	9,794.6	9,792.4	21.9	20.3	-172.56	-3,068.3	-400.7	3,094.3	3,052.2	42.13	73.444
9,900.0	9,900.0	9,892.9	9,890.7	22.1	20.5	-172.60	-3,068.3	-398.4	3,094.1	3,051.5	42.56	72.707
10,000.0	10,000.0	9,992.5	9,990.2	22.3	20.7	-172.64	-3,068.3	-396.3	3,093.8	3,050.9	42.97	71.997
10,100.0	10,100.0	10,092.1	10,089.8	22.6	20.8	-172.68	-3,068.4	-394.4	3,093.6	3,050.2	43.39	71.301
10,200.0	10,200.0	10,191.7	10,189.4	22.8	21.0	-172.71	-3,068.4	-392.5	3,093.4	3,049.6	43.80	70.619
10,300.0	10,300.0	10,291.6	10,289.3	23.0	21.2	-172.74	-3,068.4	-390.8	3,093.2	3,049.0	44.23	69.936
10,400.0	10,400.0	10,391.8	10,389.4	23.2	21.4	-172.78	-3,068.5	-388.9	3,093.0	3,048.4	44.66	69.253
10,422.6	10,422.6	10,414.4	10,412.1	23.3	21.5	-172.78	-3,068.5	-388.5	3,093.0	3,048.2	44.76	69.100
10,425.0	10,425.0	10,416.8	10,414.5	23.3	21.5	-14.78	-3,068.5	-388.5	3,093.0	3,048.2	44.80	69.046
10,450.0	10,450.0	10,441.8	10,439.5	23.3	21.6	-14.82	-3,068.5	-388.0	3,092.2	3,047.3	44.83	68.969
10,475.0	10,474.9	10,466.8	10,464.4	23.4	21.6	-14.90	-3,068.5	-387.6	3,090.1	3,045.3	44.78	69.005
10,500.0	10,499.7	10,491.5	10,489.2	23.4	21.7	-15.03	-3,068.5	-387.1	3,088.8	3,042.1	44.64	69.152
10,525.0	10,524.2	10,516.1	10,513.8	23.5	21.7	-15.21	-3,068.5	-386.6	3,082.2	3,037.8	44.41	69.410
10,550.0	10,548.5	10,540.4	10,538.1	23.5	21.8	-15.44	-3,068.5	-386.2	3,076.4	3,032.3	44.09	69.779
10,575.0	10,572.4	10,564.3	10,562.0	23.6	21.8	-15.72	-3,068.5	-385.7	3,069.4	3,025.7	43.69	70.259
10,600.0	10,595.9	10,587.8	10,585.5	23.6	21.9	-16.06	-3,068.5	-385.2	3,061.1	3,017.9	43.21	70.850
10,625.0	10,619.0	10,610.8	10,608.5	23.6	21.9	-16.46	-3,068.5	-384.8	3,051.7	3,009.1	42.65	71.548
10,650.0	10,641.5	10,633.3	10,630.9	23.7	22.0	-16.93	-3,068.5	-384.4	3,041.2	2,999.2	42.03	72.353
10,675.0	10,663.4	10,655.2	10,652.8	23.7	22.0	-17.47	-3,068.5	-383.9	3,029.5	2,988.2	41.35	73.258
10,700.0	10,684.7	10,676.3	10,674.0	23.8	22.0	-18.10	-3,068.6	-383.5	3,016.8	2,976.2	40.63	74.255
10,725.0	10,705.2	10,698.8	10,694.4	23.8	22.1	-18.82	-3,068.6	-383.1	3,003.0	2,963.1	39.86	75.332
10,750.0	10,724.9	10,716.5	10,714.1	23.9	22.1	-19.65	-3,068.6	-382.7	2,988.2	2,949.1	39.08	76.467
10,775.0	10,743.9	10,735.3	10,732.9	23.9	22.2	-20.60	-3,068.6	-382.3	2,972.4	2,934.1	38.29	77.632
10,800.0	10,761.9	10,753.3	10,750.9	24.0	22.2	-21.70	-3,068.6	-381.9	2,955.7	2,918.2	37.52	78.784
10,825.0	10,779.0	10,770.3	10,767.9	24.0	22.2	-22.96	-3,068.6	-381.6	2,938.1	2,901.3	36.79	79.862
10,850.0	10,795.2	10,786.3	10,783.9	24.1	22.3	-24.43	-3,068.6	-381.3	2,919.7	2,883.6	36.14	80.787
10,875.0	10,810.3	10,801.3	10,798.9	24.2	22.3	-26.12	-3,068.6	-381.0	2,900.6	2,864.9	35.61	81.455
10,900.0	10,824.3	10,815.2	10,812.8	24.2	22.3	-28.10	-3,068.6	-380.7	2,880.7	2,845.4	35.24	81.738

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:
Black Pearl 1 Federal - Armstrong Quail Federal #1 - OH - OH													0.0'usft
Survey Program: 870-MWD													Offset Well Error: 0.0'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	
10,925.0	10,837.3	10,828.0	10,825.6	24.3	22.4	-30.42	-3,068.6	-380.4	2,860.1	2,825.0	35.10	81.494	
10,950.0	10,849.1	10,839.7	10,837.3	24.4	22.4	-33.15	-3,068.6	-380.2	2,838.9	2,803.7	35.23	80.582	
10,975.0	10,859.8	10,850.2	10,847.8	24.5	22.4	-36.38	-3,068.6	-379.9	2,817.2	2,781.5	35.71	78.892	
11,000.0	10,869.2	10,859.4	10,857.0	24.6	22.4	-40.21	-3,068.6	-379.7	2,795.0	2,758.4	36.59	76.384	
11,025.0	10,877.4	10,867.5	10,865.1	24.7	22.4	-44.78	-3,068.6	-379.6	2,772.4	2,734.5	37.91	73.131	
11,050.0	10,884.4	10,874.3	10,871.9	24.8	22.5	-50.22	-3,068.6	-379.4	2,749.4	2,709.7	39.65	69.338	
11,075.0	10,890.1	10,879.8	10,877.4	25.0	22.5	-56.84	-3,068.6	-379.3	2,726.1	2,684.4	41.73	65.334	
11,100.0	10,894.6	10,884.1	10,881.7	25.1	22.5	-64.11	-3,068.6	-379.2	2,702.6	2,658.7	43.92	61.531	
11,125.0	10,897.7	10,887.0	10,884.6	25.2	22.5	-72.55	-3,068.6	-379.2	2,678.9	2,633.0	45.91	58.351	
11,150.0	10,899.5	10,888.7	10,886.3	25.4	22.5	-81.70	-3,068.6	-379.1	2,655.1	2,607.8	47.30	56.136	
11,166.1	10,900.0	10,889.1	10,886.6	25.5	22.5	-87.78	-3,068.6	-379.1	2,639.8	2,592.0	47.72	55.312	
11,200.0	10,900.5	10,889.3	10,886.9	25.7	22.5	-87.59	-3,068.6	-379.1	2,607.3	2,559.4	47.92	54.411	
11,300.0	10,901.9	10,890.0	10,887.6	26.3	22.5	-86.83	-3,068.6	-379.1	2,510.7	2,462.1	48.52	51.740	
11,400.0	10,903.2	10,890.9	10,888.5	27.1	22.5	-85.54	-3,068.6	-379.1	2,412.6	2,363.4	49.17	49.063	
11,500.0	10,904.6	10,891.9	10,889.5	27.9	22.5	-82.63	-3,068.6	-379.1	2,313.5	2,263.8	49.74	46.517	
11,600.0	10,906.0	10,893.1	10,890.7	28.8	22.5	-69.15	-3,068.6	-379.0	2,213.8	2,165.5	48.32	45.813	
11,691.1	10,907.3	10,894.3	10,891.9	29.6	22.5	65.83	-3,068.6	-379.0	2,122.8	2,074.8	47.97	44.256	
11,700.0	10,907.4	10,894.4	10,892.0	29.7	22.5	65.92	-3,068.6	-379.0	2,113.8	2,065.7	48.07	43.971	
11,800.0	10,908.7	10,895.8	10,893.3	30.7	22.5	66.98	-3,068.6	-379.0	2,013.9	1,964.6	49.30	40.850	
11,900.0	10,910.1	10,897.1	10,894.7	31.8	22.5	68.05	-3,068.6	-378.9	1,913.9	1,863.3	50.60	37.826	
12,000.0	10,911.5	10,898.5	10,896.1	32.9	22.5	69.15	-3,068.6	-378.9	1,814.0	1,762.0	51.97	34.908	
12,100.0	10,912.8	10,899.8	10,897.4	34.1	22.5	70.26	-3,068.6	-378.9	1,714.1	1,660.7	53.39	32.103	
12,200.0	10,914.2	10,901.2	10,898.8	35.3	22.5	71.38	-3,068.6	-378.9	1,614.1	1,559.3	54.87	29.415	
12,300.0	10,915.5	10,902.6	10,900.2	36.6	22.5	72.52	-3,068.6	-378.8	1,514.2	1,457.8	56.40	26.846	
12,400.0	10,916.9	10,903.9	10,901.5	37.9	22.5	73.68	-3,068.6	-378.8	1,414.3	1,356.3	57.97	24.396	
12,500.0	10,918.3	10,905.3	10,902.9	39.3	22.5	74.86	-3,068.6	-378.8	1,314.4	1,254.8	59.58	22.061	
12,600.0	10,919.6	10,906.6	10,904.2	40.7	22.5	76.04	-3,068.6	-378.7	1,214.5	1,153.3	61.22	19.840	
12,700.0	10,921.0	10,908.0	10,905.6	42.1	22.5	77.24	-3,068.6	-378.7	1,114.7	1,051.8	62.88	17.727	
12,800.0	10,922.4	10,909.4	10,907.0	43.6	22.5	78.46	-3,068.6	-378.7	1,014.9	950.3	64.56	15.719	
12,900.0	10,923.7	10,910.7	10,908.3	45.1	22.5	79.68	-3,068.6	-378.7	915.1	848.8	66.26	13.811	
13,000.0	10,925.1	10,912.1	10,909.7	46.6	22.5	80.92	-3,068.6	-378.6	815.3	747.4	67.97	11.996	
13,100.0	10,926.4	10,913.5	10,911.0	48.1	22.5	82.16	-3,068.6	-378.6	715.7	646.0	69.68	10.271	
13,200.0	10,927.8	10,914.8	10,912.4	49.7	22.5	83.42	-3,068.6	-378.6	616.1	544.7	71.39	8.629	
13,300.0	10,929.2	10,916.2	10,913.8	51.3	22.5	84.68	-3,068.6	-378.5	516.7	443.6	73.11	7.068	
13,400.0	10,930.5	10,917.5	10,915.1	52.9	22.5	85.95	-3,068.6	-378.5	417.6	342.7	74.81	5.581	
13,500.0	10,931.9	10,918.9	10,916.5	54.5	22.5	87.22	-3,068.6	-378.5	319.0	242.5	76.51	4.169	
13,600.0	10,933.3	10,920.3	10,917.9	56.1	22.5	88.50	-3,068.6	-378.5	221.6	143.5	78.19	2.835	
13,700.0	10,934.6	10,921.6	10,919.2	57.7	22.6	89.78	-3,068.6	-378.4	128.5	48.6	79.85	1.609	
13,800.0	10,936.0	10,923.0	10,920.6	59.4	22.6	91.06	-3,068.6	-378.4	62.3	-19.2	81.49	0.764 Level 1	
13,813.1	10,936.2	10,923.2	10,920.8	59.6	22.6	91.23	-3,068.6	-378.4	60.9	-20.8	81.71	0.745 Level 1, CC, ES, SF	
13,900.0	10,937.3	10,924.4	10,921.9	61.0	22.6	92.34	-3,068.6	-378.4	106.1	23.0	83.11	1.276 Level 3	
14,000.0	10,938.7	10,925.7	10,923.3	62.7	22.6	93.62	-3,068.6	-378.3	196.5	111.8	84.70	2.320	
14,100.0	10,940.1	10,927.1	10,924.7	64.3	22.6	94.90	-3,068.6	-378.3	293.2	207.0	86.27	3.399	
14,200.0	10,941.4	10,928.4	10,926.0	66.0	22.6	96.17	-3,068.6	-378.3	391.6	303.8	87.80	4.460	
14,300.0	10,942.8	10,929.8	10,927.4	67.7	22.6	97.44	-3,068.6	-378.2	490.6	401.3	89.29	5.494	
14,400.0	10,944.2	10,931.2	10,928.8	69.4	22.6	98.71	-3,068.6	-378.2	590.0	499.2	90.76	6.501	
14,500.0	10,945.5	10,932.5	10,930.1	71.1	22.6	99.96	-3,068.6	-378.2	689.5	597.3	92.18	7.480	
14,600.0	10,946.9	10,933.9	10,931.5	72.8	22.6	101.21	-3,068.6	-378.2	789.1	695.6	93.57	8.434	
14,700.0	10,948.2	10,935.3	10,932.8	74.5	22.6	102.45	-3,068.6	-378.1	888.9	794.0	94.92	9.365	
14,800.0	10,949.6	10,936.6	10,934.2	76.2	22.6	103.68	-3,068.6	-378.1	988.7	892.4	96.22	10.275	
14,900.0	10,951.0	10,938.0	10,935.6	78.0	22.6	104.89	-3,068.6	-378.1	1,088.5	991.0	97.49	11.165	
15,000.0	10,952.3	10,939.3	10,936.9	79.7	22.6	106.10	-3,068.6	-378.0	1,188.3	1,089.6	98.71	12.038	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Survey Program: 870-MWD												Offset Well Error:	0.0 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)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,100.0	10,953.7	10,940.7	10,938.3	81.4	22.6	107.29	-3,068.6	-378.0	1,288.2	1,188.3	99.90	12.895	
15,200.0	10,955.1	10,942.1	10,939.7	83.1	22.6	108.47	-3,068.6	-378.0	1,368.1	1,287.0	101.04	13.738	
15,300.0	10,956.4	10,943.4	10,941.0	84.9	22.6	109.63	-3,068.6	-378.0	1,488.0	1,385.8	102.14	14.568	
15,400.0	10,957.8	10,944.8	10,942.4	86.6	22.6	110.77	-3,068.7	-377.9	1,587.9	1,484.7	103.20	15.386	
15,500.0	10,959.1	10,946.2	10,943.7	88.4	22.6	111.90	-3,068.7	-377.9	1,687.8	1,583.6	104.22	16.194	
15,583.2	10,960.0	10,947.0	10,944.6	89.5	22.6	112.61	-3,068.7	-377.9	1,751.0	1,646.1	104.85	16.700	



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design											Offset Site Error:		0.0 usft
Black Pearl 1 Federal - Armstrong Quail Federal #2 - OH - OH											Offset Well Error:		0.0 usft
Survey Program: 185-MWD		Offset		Semi Major Axis		Distance							
Reference	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre		Between	Between	Minimum	Separation	Warning:
Depth (usft)	Depth (usft)	Depth (usft)	Depth (usft)	(usft)	(usft)	Toolface (°)	+N/-S (usft)	+E/-W (usft)	Centres (usft)	Ellipses (usft)	Separation (usft)	Factor	
0.0	0.0	0.0	0.0	0.0	0.0	-126.76	-416.3	-557.4	695.8				
100.0	100.0	101.9	101.9	0.1	0.1	-126.78	-416.5	-557.1	695.6	695.4	0.20	3,544.095	
200.0	200.0	203.9	203.9	0.3	0.2	-126.86	-416.9	-556.1	695.0	694.5	0.55	1,275.234	
300.0	300.0	303.1	303.1	0.5	0.4	-126.94	-417.3	-555.0	694.4	693.5	0.97	712.951	
400.0	400.0	402.5	402.5	0.8	0.6	-127.01	-417.7	-554.1	693.9	692.5	1.40	494.481	
500.0	500.0	504.0	504.0	1.0	0.8	-127.09	-418.1	-553.1	693.4	691.5	1.84	376.707	
600.0	600.0	603.7	603.7	1.2	1.1	-127.18	-418.6	-551.9	692.7	690.4	2.27	304.523	
700.0	700.0	703.4	703.4	1.4	1.3	-127.26	-419.0	-550.8	692.1	689.4	2.71	255.490	
800.0	800.0	803.2	803.1	1.7	1.5	-127.34	-419.5	-549.8	691.5	688.4	3.14	220.016	
900.0	900.0	902.9	902.9	1.9	1.7	-127.42	-419.8	-548.8	691.0	687.4	3.58	193.163	
1,000.0	1,000.0	1,002.6	1,002.6	2.1	1.9	-127.49	-420.2	-547.9	690.5	686.5	4.01	172.133	
1,100.0	1,100.0	1,102.5	1,102.4	2.3	2.1	-127.55	-420.5	-547.1	690.0	685.6	4.45	155.212	
1,200.0	1,200.0	1,202.8	1,202.8	2.6	2.3	-127.62	-420.9	-546.2	689.6	684.7	4.88	141.261	
1,300.0	1,300.0	1,303.2	1,303.1	2.8	2.5	-127.69	-421.3	-545.2	689.0	683.7	5.32	129.586	
1,400.0	1,400.0	1,403.6	1,403.5	3.0	2.7	-127.78	-421.7	-544.2	688.5	682.7	5.75	119.671	
1,500.0	1,500.0	1,504.0	1,503.9	3.2	3.0	-127.87	-422.2	-543.0	687.8	681.6	6.19	111.138	
1,600.0	1,600.0	1,605.2	1,605.1	3.5	3.2	-127.98	-422.8	-541.6	687.1	680.4	6.63	103.604	
1,700.0	1,700.0	1,706.4	1,706.3	3.7	3.4	-128.11	-423.5	-539.8	686.1	679.1	7.07	96.988	
1,800.0	1,800.0	1,806.4	1,806.3	3.9	3.6	-128.27	-424.3	-537.9	685.1	677.6	7.51	91.200	
1,900.0	1,900.0	1,905.8	1,905.6	4.1	3.8	-128.41	-425.0	-536.1	684.1	676.2	7.95	86.098	
2,000.0	2,000.0	2,005.1	2,004.9	4.4	4.0	-128.54	-425.7	-534.4	683.2	674.9	8.38	81.537	
2,100.0	2,100.0	2,104.4	2,104.2	4.6	4.2	-128.65	-426.2	-533.0	682.5	673.7	8.81	77.435	
2,200.0	2,200.0	2,203.7	2,203.5	4.8	4.4	-128.75	-426.7	-531.7	681.8	672.6	9.25	73.730	
2,300.0	2,300.0	2,303.0	2,302.8	5.0	4.6	-128.83	-427.2	-530.7	681.2	671.6	9.68	70.366	
2,400.0	2,400.0	2,402.4	2,402.2	5.3	4.9	-128.90	-427.5	-529.8	680.8	670.7	10.12	67.301	
2,500.0	2,500.0	2,502.4	2,502.2	5.5	5.1	-128.97	-427.9	-529.0	680.3	669.8	10.55	64.490	
2,600.0	2,600.0	2,602.4	2,602.2	5.7	5.3	-129.03	-428.2	-528.1	679.9	668.9	10.98	61.902	
2,700.0	2,700.0	2,702.4	2,702.2	5.9	5.5	-129.10	-428.5	-527.3	679.5	668.1	11.42	59.511	
2,800.0	2,800.0	2,803.9	2,803.6	6.2	5.7	-129.18	-428.9	-526.3	679.0	667.1	11.86	57.240	
2,900.0	2,900.0	2,905.6	2,905.4	6.4	5.9	-129.30	-429.5	-524.8	678.2	665.9	12.31	55.103	
3,000.0	3,000.0	3,007.4	3,007.1	6.6	6.1	-129.46	-430.3	-522.8	677.2	664.4	12.75	53.096	
3,100.0	3,100.0	3,109.1	3,108.8	6.8	6.4	-129.66	-431.4	-520.3	675.9	662.7	13.20	51.205	
3,200.0	3,200.0	3,209.6	3,209.3	7.1	6.6	-129.90	-432.5	-517.4	674.4	660.8	13.65	49.417	
3,300.0	3,300.0	3,309.9	3,309.5	7.3	6.8	-130.14	-433.7	-514.4	672.9	658.8	14.10	47.739	
3,400.0	3,400.0	3,410.2	3,409.8	7.5	7.0	-130.39	-435.0	-511.3	671.4	656.9	14.54	46.162	
3,500.0	3,500.0	3,510.5	3,510.0	7.7	7.3	-130.65	-436.3	-508.2	669.8	654.8	14.99	44.676	
3,600.0	3,600.0	3,609.4	3,608.9	8.0	7.5	-130.90	-437.5	-505.1	668.3	652.9	15.43	43.312	
3,700.0	3,700.0	3,708.2	3,707.6	8.2	7.7	-131.12	-438.6	-502.4	667.0	651.1	15.86	42.041	
3,800.0	3,800.0	3,807.2	3,806.6	8.4	7.9	-131.32	-439.5	-500.0	665.8	649.5	16.29	40.864	
3,900.0	3,900.0	3,906.3	3,905.7	8.6	8.1	-131.49	-440.4	-497.9	664.8	648.1	16.72	39.762	
4,000.0	4,000.0	4,005.5	4,004.8	8.9	8.3	-131.65	-441.1	-496.1	663.9	646.7	17.14	38.722	
4,100.0	4,100.0	4,105.1	4,104.4	9.1	8.5	-131.78	-441.8	-494.4	663.1	645.5	17.58	37.728	
4,200.0	4,200.0	4,205.1	4,204.4	9.3	8.7	-131.92	-442.5	-492.8	662.3	644.3	18.01	36.773	
4,300.0	4,300.0	4,304.9	4,304.2	9.5	8.9	-132.05	-443.1	-491.2	661.6	643.1	18.45	35.865	
4,400.0	4,400.0	4,404.7	4,403.9	9.8	9.1	-132.18	-443.7	-489.7	660.9	642.0	18.88	35.001	
4,500.0	4,500.0	4,504.4	4,503.7	10.0	9.3	-132.30	-444.3	-488.3	660.2	640.9	19.32	34.178	
4,600.0	4,600.0	4,604.2	4,603.5	10.2	9.5	-132.42	-444.9	-486.9	659.5	639.8	19.75	33.393	
4,700.0	4,700.0	4,704.0	4,703.2	10.4	9.8	-132.53	-445.4	-485.6	658.9	638.7	20.19	32.643	
4,800.0	4,800.0	4,803.8	4,803.0	10.7	10.0	-132.64	-445.9	-484.3	658.3	637.7	20.62	31.927	
4,900.0	4,900.0	4,903.8	4,903.0	10.9	10.2	-132.74	-446.4	-483.1	657.8	636.7	21.05	31.241	
5,000.0	5,000.0	5,003.8	5,003.0	11.1	10.4	-132.84	-446.9	-481.9	657.2	635.7	21.49	30.583	
5,100.0	5,100.0	5,103.8	5,102.9	11.3	10.6	-132.94	-447.4	-480.7	656.7	634.7	21.92	29.951	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design Black Pearl 1 Federal - Armstrong Quail Federal #2 - OH - OH												Offset Site Error:	0.0 usft
Survey Program: 185-MWD												Offset Well Error:	0.0 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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.0	5,200.0	5,203.7	5,202.9	11.6	10.8	-133.05	-447.9	-479.5	656.1	633.7	22.36	29.344	
5,300.0	5,300.0	5,303.7	5,302.9	11.8	11.0	-133.15	-448.4	-478.2	655.6	632.8	22.79	28.760	
5,400.0	5,400.0	5,403.6	5,402.8	12.0	11.2	-133.25	-448.8	-477.1	655.0	631.8	23.23	28.199	
5,500.0	5,500.0	5,503.5	5,502.6	12.2	11.4	-133.35	-449.3	-475.9	654.5	630.8	23.66	27.660	
5,600.0	5,600.0	5,603.4	5,602.5	12.5	11.6	-133.45	-449.8	-474.8	654.0	629.9	24.10	27.140	
5,700.0	5,700.0	5,703.3	5,702.4	12.7	11.9	-133.54	-450.2	-473.7	653.5	629.0	24.53	26.640	
5,800.0	5,800.0	5,803.1	5,802.3	12.9	12.1	-133.63	-450.6	-472.7	653.0	628.1	24.97	26.158	
5,900.0	5,900.0	5,903.0	5,902.1	13.1	12.3	-133.72	-451.0	-471.7	652.6	627.2	25.40	25.693	
6,000.0	6,000.0	6,002.9	6,002.0	13.4	12.5	-133.80	-451.4	-470.7	652.2	626.3	25.83	25.245	
6,100.0	6,100.0	6,102.8	6,101.9	13.6	12.7	-133.88	-451.8	-469.8	651.8	625.5	26.27	24.812	
6,200.0	6,200.0	6,202.7	6,201.8	13.8	12.9	-133.96	-452.1	-468.9	651.4	624.7	26.70	24.394	
6,300.0	6,300.0	6,302.6	6,301.7	14.0	13.1	-134.03	-452.5	-468.1	651.0	623.9	27.14	23.990	
6,400.0	6,400.0	6,402.5	6,401.6	14.3	13.3	-134.10	-452.8	-467.2	650.6	623.1	27.57	23.599	
6,500.0	6,500.0	6,502.5	6,501.6	14.5	13.5	-134.17	-453.1	-466.4	650.3	622.3	28.01	23.221	
6,600.0	6,600.0	6,602.5	6,601.6	14.7	13.7	-134.24	-453.5	-465.6	649.9	621.5	28.44	22.854	
6,700.0	6,700.0	6,702.5	6,701.6	14.9	13.9	-134.31	-453.8	-464.8	649.6	620.7	28.87	22.498	
6,800.0	6,800.0	6,802.5	6,801.6	15.2	14.2	-134.38	-454.1	-464.0	649.2	619.9	29.31	22.153	
6,900.0	6,900.0	6,902.5	6,901.6	15.4	14.4	-134.45	-454.4	-463.2	648.9	619.2	29.74	21.818	
7,000.0	7,000.0	7,002.5	7,001.6	15.6	14.6	-134.52	-454.8	-462.4	648.5	618.4	30.18	21.492	
7,100.0	7,100.0	7,102.5	7,101.5	15.8	14.8	-134.59	-455.1	-461.6	648.2	617.6	30.61	21.176	
7,200.0	7,200.0	7,202.5	7,201.5	16.1	15.0	-134.67	-455.4	-460.8	647.9	616.8	31.04	20.869	
7,300.0	7,300.0	7,302.5	7,301.5	16.3	15.2	-134.74	-455.7	-460.0	647.5	616.0	31.48	20.570	
7,400.0	7,400.0	7,402.4	7,401.4	16.5	15.4	-134.81	-456.1	-459.2	647.2	615.3	31.91	20.279	
7,500.0	7,500.0	7,502.0	7,501.1	16.7	15.6	-134.87	-456.4	-458.4	646.9	614.5	32.35	19.998	
7,600.0	7,600.0	7,601.7	7,600.7	16.9	15.8	-134.92	-456.6	-457.9	646.6	613.8	32.78	19.727	
7,700.0	7,700.0	7,701.3	7,700.4	17.2	16.0	-134.96	-456.8	-457.4	646.4	613.2	33.21	19.464	
7,800.0	7,800.0	7,801.3	7,800.4	17.4	16.2	-135.00	-456.9	-457.0	646.3	612.6	33.65	19.208	
7,900.0	7,900.0	7,901.3	7,900.4	17.6	16.5	-135.03	-457.1	-456.6	646.1	612.0	34.08	18.958	
8,000.0	8,000.0	8,001.3	8,000.4	17.8	16.7	-135.07	-457.3	-456.2	645.9	611.4	34.51	18.715	
8,100.0	8,100.0	8,101.3	8,100.4	18.1	16.9	-135.10	-457.4	-455.8	645.7	610.8	34.95	18.478	
8,200.0	8,200.0	8,201.3	8,200.4	18.3	17.1	-135.14	-457.6	-455.4	645.6	610.2	35.38	18.247	
8,300.0	8,300.0	8,301.3	8,300.4	18.5	17.3	-135.17	-457.7	-455.0	645.4	609.6	35.82	18.020	
8,400.0	8,400.0	8,401.3	8,400.4	18.7	17.5	-135.21	-457.9	-454.6	645.2	609.0	36.25	17.798	
8,500.0	8,500.0	8,501.3	8,500.4	19.0	17.7	-135.25	-458.1	-454.2	645.1	608.4	36.69	17.581	
8,600.0	8,600.0	8,601.3	8,600.4	19.2	17.9	-135.28	-458.2	-453.8	644.9	607.8	37.13	17.369	
8,700.0	8,700.0	8,701.3	8,700.4	19.4	18.1	-135.32	-458.4	-453.4	644.7	607.2	37.57	17.162	
8,800.0	8,800.0	8,801.3	8,800.4	19.6	18.4	-135.35	-458.6	-453.0	644.6	606.6	38.00	16.960	
8,900.0	8,900.0	8,901.6	8,900.7	19.9	18.6	-135.39	-458.7	-452.5	644.4	605.9	38.44	16.761	
9,000.0	9,000.0	9,002.1	9,001.1	20.1	18.8	-135.44	-459.0	-451.9	644.1	605.2	38.88	16.565	
9,100.0	9,100.0	9,102.5	9,101.5	20.3	19.0	-135.51	-459.3	-451.2	643.8	604.5	39.33	16.372	
9,200.0	9,200.0	9,202.9	9,202.0	20.5	19.2	-135.59	-459.7	-450.2	643.4	603.7	39.77	16.180	
9,300.0	9,300.0	9,303.4	9,302.4	20.8	19.4	-135.69	-460.1	-449.1	643.0	602.8	40.21	15.991	
9,400.0	9,400.0	9,403.9	9,402.9	21.0	19.7	-135.81	-460.6	-447.8	642.5	601.8	40.65	15.804	
9,500.0	9,500.0	9,504.3	9,503.3	21.2	19.9	-135.94	-461.2	-446.4	641.9	600.8	41.09	15.619	
9,600.0	9,600.0	9,604.0	9,603.0	21.4	20.1	-136.08	-461.9	-444.8	641.2	599.7	41.53	15.440	
9,700.0	9,700.0	9,703.2	9,702.2	21.7	20.3	-136.19	-462.4	-443.6	640.7	598.8	41.96	15.268	
9,799.7	9,799.7	9,800.0	9,799.0	21.9	20.5	-136.27	-462.7	-442.6	640.3	598.0	42.39	15.106 CC	
9,800.0	9,800.0	9,800.0	9,799.0	21.9	20.5	-136.27	-462.7	-442.6	640.3	598.0	42.39	15.105 ES, SF	
9,900.0	9,900.0	9,800.0	9,799.0	22.1	20.5	-136.27	-462.7	-442.6	640.2	605.5	42.62	15.209	
10,000.0	10,000.0	9,800.0	9,799.0	22.3	20.5	-136.27	-462.7	-442.6	671.0	628.1	42.84	15.661	
10,100.0	10,100.0	9,800.0	9,799.0	22.6	20.5	-136.27	-462.7	-442.6	707.3	664.2	43.07	16.423	
10,200.0	10,200.0	9,800.0	9,799.0	22.8	20.5	-136.27	-462.7	-442.6	755.2	711.9	43.29	17.444	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 usft
Black Pearl 1 Federal - Armstrong Quail Federal #2 - OH - OH													Offset Well Error:	0.0 usft
Survey Program: 185-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 Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor		
10,300.0	10,300.0	9,800.0	9,799.0	23.0	20.5	-136.27	-462.7	-442.6	812.6	769.1	43.52	18.674		
10,400.0	10,400.0	9,800.0	9,799.0	23.2	20.5	-136.27	-462.7	-442.6	877.7	834.0	43.74	20.067		
10,422.6	10,422.6	9,800.0	9,799.0	23.3	20.5	-136.27	-462.7	-442.6	893.4	849.6	43.79	20.400		
10,425.0	10,425.0	9,800.0	9,799.0	23.3	20.5	21.62	-462.7	-442.6	895.0	851.2	43.78	20.441		
10,450.0	10,450.0	9,800.0	9,799.0	23.3	20.5	20.61	-462.7	-442.6	912.1	868.4	43.77	20.838		
10,475.0	10,474.9	9,800.0	9,799.0	23.4	20.5	19.69	-462.7	-442.6	928.7	885.1	43.67	21.266		
10,500.0	10,499.7	9,800.0	9,799.0	23.4	20.5	18.86	-462.7	-442.6	944.8	901.3	43.48	21.727		
10,525.0	10,524.2	9,800.0	9,799.0	23.5	20.5	18.11	-462.7	-442.6	960.3	917.1	43.20	22.227		
10,550.0	10,548.5	9,800.0	9,799.0	23.5	20.5	17.43	-462.7	-442.6	975.2	932.3	42.83	22.767		
10,575.0	10,572.4	9,800.0	9,799.0	23.6	20.5	16.82	-462.7	-442.6	989.5	947.1	42.37	23.352		
10,600.0	10,595.9	9,800.0	9,799.0	23.6	20.5	16.26	-462.7	-442.6	1,003.2	961.4	41.83	23.985		
10,625.0	10,619.0	9,800.0	9,799.0	23.6	20.5	15.75	-462.7	-442.6	1,016.3	975.1	41.19	24.670		
10,650.0	10,641.5	9,800.0	9,799.0	23.7	20.5	15.29	-462.7	-442.6	1,028.7	988.3	40.48	25.413		
10,675.0	10,663.4	9,800.0	9,799.0	23.7	20.5	14.87	-462.7	-442.6	1,040.6	1,000.9	39.69	26.218		
10,700.0	10,684.7	9,800.0	9,799.0	23.8	20.5	14.49	-462.7	-442.6	1,051.7	1,012.9	38.82	27.089		
10,725.0	10,705.2	9,800.0	9,799.0	23.8	20.5	14.14	-462.7	-442.6	1,062.3	1,024.4	37.89	28.034		
10,750.0	10,724.9	9,800.0	9,799.0	23.9	20.5	13.83	-462.7	-442.6	1,072.1	1,035.2	36.90	29.056		
10,775.0	10,743.9	9,800.0	9,799.0	23.9	20.5	13.55	-462.7	-442.6	1,081.3	1,045.4	35.85	30.162		
10,800.0	10,761.9	9,800.0	9,799.0	24.0	20.5	13.30	-462.7	-442.6	1,089.8	1,055.0	34.75	31.358		
10,825.0	10,779.0	9,800.0	9,799.0	24.0	20.5	13.08	-462.7	-442.6	1,097.5	1,063.9	33.62	32.649		
10,850.0	10,795.2	9,800.0	9,799.0	24.1	20.5	12.88	-462.7	-442.6	1,104.6	1,072.2	32.45	34.038		
10,875.0	10,810.3	9,800.0	9,799.0	24.2	20.5	12.70	-462.7	-442.6	1,111.0	1,079.8	31.27	35.528		
10,900.0	10,824.3	9,800.0	9,799.0	24.2	20.5	12.55	-462.7	-442.6	1,116.7	1,086.6	30.09	37.117		
10,925.0	10,837.3	9,800.0	9,799.0	24.3	20.5	12.42	-462.7	-442.6	1,121.7	1,092.8	28.91	38.799		
10,950.0	10,849.1	9,800.0	9,799.0	24.4	20.5	12.31	-462.7	-442.6	1,125.9	1,098.2	27.76	40.561		
10,975.0	10,869.8	9,800.0	9,799.0	24.5	20.5	12.21	-462.7	-442.6	1,129.5	1,102.8	26.65	42.380		
11,000.0	10,889.2	9,800.0	9,799.0	24.6	20.5	12.14	-462.7	-442.6	1,132.3	1,106.7	25.61	44.219		
11,025.0	10,877.4	9,800.0	9,799.0	24.7	20.5	12.09	-462.7	-442.6	1,134.3	1,109.7	24.64	46.029		
11,050.0	10,884.4	9,800.0	9,799.0	24.8	20.5	12.06	-462.7	-442.6	1,135.7	1,111.9	23.79	47.740		
11,075.0	10,890.1	9,800.0	9,799.0	25.0	20.5	12.04	-462.7	-442.6	1,136.3	1,113.2	23.06	49.270		
11,100.0	10,894.6	9,800.0	9,799.0	25.1	20.5	12.04	-462.7	-442.6	1,136.2	1,113.7	22.49	50.524		
11,125.0	10,897.7	9,800.0	9,799.0	25.2	20.5	12.07	-462.7	-442.6	1,135.4	1,113.3	22.08	51.411		
11,150.0	10,899.5	9,800.0	9,799.0	25.4	20.5	12.11	-462.7	-442.6	1,133.8	1,111.9	21.87	51.852		
11,166.1	10,900.0	9,800.0	9,799.0	25.5	20.5	12.14	-462.7	-442.6	1,132.4	1,110.6	21.83	51.878		
11,200.0	10,900.5	9,800.0	9,799.0	25.7	20.5	12.26	-462.7	-442.6	1,129.7	1,107.8	21.94	51.498		
11,259.2	10,901.3	9,800.0	9,799.0	26.1	20.5	12.37	-462.7	-442.6	1,127.9	1,105.8	22.12	51.000		
11,300.0	10,901.9	9,800.0	9,799.0	26.3	20.5	12.36	-462.7	-442.6	1,128.8	1,106.5	22.22	50.810		
11,400.0	10,903.2	9,800.0	9,799.0	27.1	20.5	12.04	-462.7	-442.6	1,138.1	1,115.7	22.42	50.759		
11,500.0	10,904.6	9,800.0	9,799.0	27.9	20.5	11.32	-462.7	-442.6	1,157.5	1,134.9	22.55	51.325		
11,600.0	10,906.0	9,800.0	9,799.0	28.8	20.5	10.19	-462.7	-442.6	1,186.3	1,163.7	22.61	52.459		
11,691.1	10,907.3	9,800.0	9,799.0	29.6	20.5	8.81	-462.7	-442.6	1,220.1	1,197.5	22.63	53.918		
11,700.0	10,907.4	9,800.0	9,799.0	29.7	20.5	8.81	-462.7	-442.6	1,223.8	1,201.1	22.66	53.994		
11,800.0	10,908.7	9,800.0	9,799.0	30.7	20.5	8.81	-462.7	-442.6	1,268.4	1,245.3	23.09	54.943		
11,900.0	10,910.1	9,800.0	9,799.0	31.8	20.5	8.81	-462.7	-442.6	1,319.2	1,295.6	23.54	56.045		
12,000.0	10,911.5	9,800.0	9,799.0	32.9	20.5	8.81	-462.7	-442.6	1,375.3	1,351.3	24.02	57.268		
12,100.0	10,912.8	9,800.0	9,799.0	34.1	20.5	8.81	-462.7	-442.6	1,436.3	1,411.7	24.52	58.579		
12,200.0	10,914.2	9,800.0	9,799.0	35.3	20.5	8.81	-462.7	-442.6	1,501.4	1,476.3	25.04	59.952		
12,300.0	10,915.5	9,800.0	9,799.0	36.6	20.5	8.81	-462.7	-442.6	1,570.2	1,544.6	25.59	61.365		
12,400.0	10,916.9	9,800.0	9,799.0	37.9	20.5	8.81	-462.7	-442.6	1,642.2	1,616.0	26.15	62.798		
12,500.0	10,918.3	9,800.0	9,799.0	39.3	20.5	8.81	-462.7	-442.6	1,717.0	1,690.3	26.73	64.237		
12,600.0	10,919.6	9,800.0	9,799.0	40.7	20.5	8.81	-462.7	-442.6	1,794.2	1,766.9	27.32	65.668		
12,700.0	10,921.0	9,800.0	9,799.0	42.1	20.5	8.81	-462.7	-442.6	1,873.7	1,845.7	27.93	67.085		

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design														Offset Site Error: 0.0 usft	
Survey Program: 185-MWD														Offset Well Error: 0.0 usft	
Reference		Offset		Semi Major Axis		Highside Tooface (")	Distance		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth: (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)										
12,800.0	10,922.4	9,800.0	9,799.0	43.6	20.5	8.81	-462.7	-442.6	1,955.0	1,926.4	28.55	68.477			
12,900.0	10,923.7	9,800.0	9,799.0	45.1	20.5	8.81	-462.7	-442.6	2,037.9	2,008.8	29.18	69.842			
13,000.0	10,925.1	9,800.0	9,799.0	46.6	20.5	8.81	-462.7	-442.6	2,122.4	2,092.6	29.82	71.174			
13,100.0	10,926.4	9,800.0	9,799.0	48.1	20.5	8.81	-462.7	-442.6	2,208.1	2,177.7	30.47	72.472			
13,200.0	10,927.8	9,800.0	9,799.0	49.7	20.5	8.81	-462.7	-442.6	2,295.0	2,263.9	31.13	73.733			
13,300.0	10,929.2	9,800.0	9,799.0	51.3	20.5	8.81	-462.7	-442.6	2,382.9	2,351.2	31.79	74.956			
13,400.0	10,930.5	9,800.0	9,799.0	52.9	20.5	8.81	-462.7	-442.6	2,471.8	2,439.3	32.46	76.141			
13,500.0	10,931.9	9,800.0	9,799.0	54.5	20.5	8.81	-462.7	-442.6	2,561.5	2,528.3	33.14	77.288			
13,600.0	10,933.3	9,800.0	9,799.0	56.1	20.5	8.81	-462.7	-442.6	2,651.9	2,618.0	33.83	78.398			
13,700.0	10,934.6	9,800.0	9,799.0	57.7	20.5	8.81	-462.7	-442.6	2,742.9	2,708.4	34.52	79.470			
13,800.0	10,936.0	9,800.0	9,799.0	59.4	20.5	8.81	-462.7	-442.6	2,834.6	2,799.4	35.21	80.507			
13,900.0	10,937.3	9,800.0	9,799.0	61.0	20.5	8.81	-462.7	-442.6	2,926.8	2,890.9	35.91	81.508			
14,000.0	10,938.7	9,800.0	9,799.0	62.7	20.5	8.81	-462.7	-442.6	3,019.5	2,982.9	36.61	82.476			
14,100.0	10,940.1	9,800.0	9,799.0	64.3	20.5	8.81	-462.7	-442.6	3,112.7	3,075.4	37.32	83.410			
14,200.0	10,941.4	9,800.0	9,799.0	66.0	20.5	8.81	-462.7	-442.6	3,206.3	3,168.2	38.03	84.312			
14,300.0	10,942.8	9,800.0	9,799.0	67.7	20.5	8.81	-462.7	-442.6	3,300.2	3,261.5	38.74	85.184			
14,400.0	10,944.2	9,800.0	9,799.0	69.4	20.5	8.81	-462.7	-442.6	3,394.5	3,355.1	39.46	86.026			
14,500.0	10,945.5	9,800.0	9,799.0	71.1	20.5	8.81	-462.7	-442.6	3,489.1	3,449.0	40.18	86.840			
14,600.0	10,946.9	9,800.0	9,799.0	72.8	20.5	8.81	-462.7	-442.6	3,584.0	3,543.1	40.90	87.627			
14,700.0	10,948.2	9,800.0	9,799.0	74.5	20.5	8.81	-462.7	-442.6	3,679.2	3,637.6	41.63	88.387			
14,800.0	10,949.6	9,800.0	9,799.0	76.2	20.5	8.81	-462.7	-442.6	3,774.6	3,732.3	42.35	89.123			
14,900.0	10,951.0	9,800.0	9,799.0	78.0	20.5	8.81	-462.7	-442.6	3,870.3	3,827.2	43.08	89.834			
15,000.0	10,952.3	9,800.0	9,799.0	79.7	20.5	8.81	-462.7	-442.6	3,966.2	3,922.4	43.81	90.523			
15,100.0	10,953.7	9,800.0	9,799.0	81.4	20.5	8.81	-462.7	-442.6	4,062.2	4,017.7	44.55	91.189			
15,200.0	10,955.1	9,800.0	9,799.0	83.1	20.5	8.81	-462.7	-442.6	4,158.5	4,113.2	45.28	91.834			
15,300.0	10,956.4	9,800.0	9,799.0	84.9	20.5	8.81	-462.7	-442.6	4,254.9	4,208.9	46.02	92.459			
15,400.0	10,957.8	9,800.0	9,799.0	86.6	20.5	8.81	-462.7	-442.6	4,351.5	4,304.8	46.76	93.065			
15,500.0	10,959.1	9,800.0	9,799.0	88.4	20.5	8.81	-462.7	-442.6	4,448.3	4,400.8	47.50	93.652			
15,563.2	10,960.0	9,800.0	9,799.0	89.5	20.5	8.81	-462.7	-442.6	4,509.5	4,461.5	47.97	94.013			

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:
Black Pearl 1 Federal - Texaco Federal #1 - OH - OH													0.0 usft
Survey Program: 10000:INC													Offset Well Error:
													0.0 usft
Reference	Offset	Semi Major Axis		Distance		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	Warning
0.0	0.0	4.6	4.6	0.0	0.1	-133.74	-475.7	-497.1	688.0				
100.0	100.0	104.6	104.6	0.1	1.4	-133.74	-475.7	-497.1	688.0	686.6	1.48	464.187	
200.0	200.0	204.6	204.6	0.3	2.7	-133.74	-475.7	-497.1	688.0	685.0	3.04	226.629	
300.0	300.0	304.6	304.6	0.5	4.0	-133.74	-475.7	-497.1	688.0	683.4	4.59	149.909	
400.0	400.0	404.6	404.6	0.8	5.4	-133.74	-475.7	-497.1	688.0	681.9	6.14	111.996	
500.0	500.0	504.6	504.6	1.0	6.7	-133.74	-475.7	-497.1	688.0	680.3	7.70	89.389	
600.0	600.0	604.6	604.6	1.2	8.0	-133.74	-475.7	-497.1	688.0	678.8	9.25	74.376	
700.0	700.0	704.6	704.6	1.4	9.4	-133.74	-475.7	-497.1	688.0	677.2	10.80	63.680	
800.0	800.0	804.6	804.6	1.7	10.7	-133.74	-475.7	-497.1	688.0	675.7	12.36	55.874	
900.0	900.0	904.6	904.6	1.9	12.0	-133.74	-475.7	-497.1	688.0	674.1	13.91	49.456	
1,000.0	1,000.0	1,004.6	1,004.6	2.1	13.4	-133.74	-475.7	-497.1	688.0	672.6	15.47	44.488	
1,100.0	1,100.0	1,104.6	1,104.6	2.3	14.7	-133.74	-475.7	-497.1	688.0	671.0	17.02	40.426	
1,200.0	1,200.0	1,204.6	1,204.6	2.6	16.0	-133.74	-475.7	-497.1	688.0	669.5	18.57	37.045	
1,300.0	1,300.0	1,304.6	1,304.6	2.8	17.3	-133.74	-475.7	-497.1	688.0	667.9	20.13	34.185	
1,400.0	1,400.0	1,404.6	1,404.6	3.0	18.7	-133.74	-475.7	-497.1	688.0	666.4	21.68	31.735	
1,500.0	1,500.0	1,504.6	1,504.6	3.2	20.0	-133.74	-475.7	-497.1	688.0	664.8	23.23	29.613	
1,600.0	1,600.0	1,604.6	1,604.6	3.5	21.3	-133.74	-475.7	-497.1	688.0	663.3	24.79	27.757	
1,700.0	1,700.0	1,704.6	1,704.6	3.7	22.7	-133.74	-475.7	-497.1	688.0	661.7	26.34	26.120	
1,800.0	1,800.0	1,804.6	1,804.6	3.9	24.0	-133.74	-475.7	-497.1	688.0	660.1	27.90	24.665	
1,900.0	1,900.0	1,904.6	1,904.6	4.1	25.3	-133.74	-475.7	-497.1	688.0	658.6	29.45	23.363	
2,000.0	2,000.0	2,004.6	2,004.6	4.4	26.6	-133.74	-475.7	-497.1	688.0	657.0	31.00	22.193	
2,100.0	2,100.0	2,104.6	2,104.6	4.6	28.0	-133.74	-475.7	-497.1	688.0	655.5	32.56	21.134	
2,200.0	2,200.0	2,204.6	2,204.6	4.8	29.3	-133.74	-475.7	-497.1	688.0	653.9	34.11	20.171	
2,300.0	2,300.0	2,304.6	2,304.6	5.0	30.6	-133.74	-475.7	-497.1	688.0	652.4	35.66	19.292	
2,400.0	2,400.0	2,404.6	2,404.6	5.3	32.0	-133.74	-475.7	-497.1	688.0	650.8	37.22	18.487	
2,500.0	2,500.0	2,504.6	2,504.6	5.5	33.3	-133.74	-475.7	-497.1	688.0	649.3	38.77	17.746	
2,600.0	2,600.0	2,604.6	2,604.6	5.7	34.6	-133.74	-475.7	-497.1	688.0	647.7	40.33	17.062	
2,700.0	2,700.0	2,704.6	2,704.6	5.9	35.9	-133.74	-475.7	-497.1	688.0	646.2	41.88	16.429	
2,800.0	2,800.0	2,804.6	2,804.6	6.2	37.3	-133.74	-475.7	-497.1	688.0	644.6	43.43	15.841	
2,900.0	2,900.0	2,904.6	2,904.6	6.4	38.6	-133.74	-475.7	-497.1	688.0	643.1	44.99	15.294	
3,000.0	3,000.0	3,004.6	3,004.6	6.6	39.9	-133.74	-475.7	-497.1	688.0	641.5	46.54	14.784	
3,100.0	3,100.0	3,104.6	3,104.6	6.8	41.3	-133.74	-475.7	-497.1	688.0	639.9	48.09	14.306	
3,200.0	3,200.0	3,204.6	3,204.6	7.1	42.6	-133.74	-475.7	-497.1	688.0	638.4	49.65	13.858	
3,300.0	3,300.0	3,304.6	3,304.6	7.3	43.9	-133.74	-475.7	-497.1	688.0	636.8	51.20	13.438	
3,400.0	3,400.0	3,404.6	3,404.6	7.5	45.2	-133.74	-475.7	-497.1	688.0	635.3	52.76	13.042	
3,500.0	3,500.0	3,504.6	3,504.6	7.7	46.6	-133.74	-475.7	-497.1	688.0	633.7	54.31	12.669	
3,600.0	3,600.0	3,604.6	3,604.6	8.0	47.9	-133.74	-475.7	-497.1	688.0	632.2	55.86	12.317	
3,700.0	3,700.0	3,704.6	3,704.6	8.2	49.2	-133.74	-475.7	-497.1	688.0	630.6	57.42	11.983	
3,800.0	3,800.0	3,804.6	3,804.6	8.4	50.6	-133.74	-475.7	-497.1	688.0	629.1	58.97	11.668	
3,900.0	3,900.0	3,904.6	3,904.6	8.6	51.9	-133.74	-475.7	-497.1	688.0	627.5	60.52	11.368	
4,000.0	4,000.0	4,004.6	4,004.6	8.9	53.2	-133.74	-475.7	-497.1	688.0	626.0	62.08	11.084	
4,100.0	4,100.0	4,104.6	4,104.6	9.1	54.5	-133.74	-475.7	-497.1	688.0	624.4	63.63	10.813	
4,200.0	4,200.0	4,204.6	4,204.6	9.3	55.9	-133.74	-475.7	-497.1	688.0	622.9	65.19	10.555	
4,300.0	4,300.0	4,304.6	4,304.6	9.5	57.2	-133.74	-475.7	-497.1	688.0	621.3	66.74	10.309	
4,400.0	4,400.0	4,404.6	4,404.6	9.8	58.5	-133.74	-475.7	-497.1	688.0	619.7	68.29	10.075	
4,500.0	4,500.0	4,504.6	4,504.6	10.0	59.9	-133.74	-475.7	-497.1	688.0	618.2	69.85	9.851	
4,600.0	4,600.0	4,604.6	4,604.6	10.2	61.2	-133.74	-475.7	-497.1	688.0	616.6	71.40	9.636	
4,700.0	4,700.0	4,704.6	4,704.6	10.4	62.5	-133.74	-475.7	-497.1	688.0	615.1	72.95	9.431	
4,800.0	4,800.0	4,804.6	4,804.6	10.7	63.9	-133.74	-475.7	-497.1	688.0	613.5	74.51	9.235	
4,900.0	4,900.0	4,904.6	4,904.6	10.9	65.2	-133.74	-475.7	-497.1	688.0	612.0	76.06	9.046	
5,000.0	5,000.0	5,004.6	5,004.6	11.1	66.5	-133.74	-475.7	-497.1	688.0	610.4	77.61	8.865	
5,100.0	5,100.0	5,104.6	5,104.6	11.3	67.8	-133.74	-475.7	-497.1	688.0	608.9	79.17	8.691	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 10000-INC													Offset Well Error:	0.0 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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
5,200.0	5,200.0	5,204.6	5,204.6	11.6	69.2	-133.74	-475.7	-497.1	688.0	607.3	80.72	8.524		
5,300.0	5,300.0	5,304.6	5,304.6	11.8	70.5	-133.74	-475.7	-497.1	688.0	605.8	82.28	8.363		
5,400.0	5,400.0	5,404.6	5,404.6	12.0	71.8	-133.74	-475.7	-497.1	688.0	604.2	83.83	8.208		
5,500.0	5,500.0	5,504.6	5,504.6	12.2	73.2	-133.74	-475.7	-497.1	688.0	602.7	85.38	8.058		
5,600.0	5,600.0	5,604.6	5,604.6	12.5	74.5	-133.74	-475.7	-497.1	688.0	601.1	86.94	7.914		
5,700.0	5,700.0	5,704.6	5,704.6	12.7	75.8	-133.74	-475.7	-497.1	688.0	599.5	88.49	7.775		
5,800.0	5,800.0	5,804.6	5,804.6	12.9	77.1	-133.74	-475.7	-497.1	688.0	598.0	90.04	7.641		
5,900.0	5,900.0	5,904.6	5,904.6	13.1	78.5	-133.74	-475.7	-497.1	688.0	596.4	91.60	7.511		
6,000.0	6,000.0	6,004.6	6,004.6	13.4	79.8	-133.74	-475.7	-497.1	688.0	594.9	93.15	7.386		
6,100.0	6,100.0	6,104.6	6,104.6	13.6	81.1	-133.74	-475.7	-497.1	688.0	593.3	94.71	7.265		
6,200.0	6,200.0	6,204.6	6,204.6	13.8	82.5	-133.74	-475.7	-497.1	688.0	591.8	96.26	7.148		
6,300.0	6,300.0	6,304.6	6,304.6	14.0	83.8	-133.74	-475.7	-497.1	688.0	590.2	97.81	7.034		
6,400.0	6,400.0	6,404.6	6,404.6	14.3	85.1	-133.74	-475.7	-497.1	688.0	588.7	99.37	6.924		
6,500.0	6,500.0	6,504.6	6,504.6	14.5	86.4	-133.74	-475.7	-497.1	688.0	587.1	100.92	6.818		
6,600.0	6,600.0	6,604.6	6,604.6	14.7	87.8	-133.74	-475.7	-497.1	688.0	585.6	102.47	6.714		
6,700.0	6,700.0	6,704.6	6,704.6	14.9	89.1	-133.74	-475.7	-497.1	688.0	584.0	104.03	6.614		
6,800.0	6,800.0	6,804.6	6,804.6	15.2	90.4	-133.74	-475.7	-497.1	688.0	582.5	105.58	6.517		
6,900.0	6,900.0	6,904.6	6,904.6	15.4	91.8	-133.74	-475.7	-497.1	688.0	580.9	107.14	6.422		
7,000.0	7,000.0	7,004.6	7,004.6	15.6	93.1	-133.74	-475.7	-497.1	688.0	579.3	108.69	6.330		
7,100.0	7,100.0	7,104.6	7,104.6	15.8	94.4	-133.74	-475.7	-497.1	688.0	577.8	110.24	6.241		
7,200.0	7,200.0	7,204.6	7,204.6	16.1	95.7	-133.74	-475.7	-497.1	688.0	576.2	111.80	6.154		
7,300.0	7,300.0	7,304.6	7,304.6	16.3	97.1	-133.74	-475.7	-497.1	688.0	574.7	113.35	6.070		
7,400.0	7,400.0	7,404.6	7,404.6	16.5	98.4	-133.74	-475.7	-497.1	688.0	573.1	114.90	5.988		
7,500.0	7,500.0	7,504.6	7,504.6	16.7	99.7	-133.74	-475.7	-497.1	688.0	571.6	116.46	5.908		
7,600.0	7,600.0	7,604.6	7,604.6	16.9	101.1	-133.74	-475.7	-497.1	688.0	570.0	118.01	5.830		
7,700.0	7,700.0	7,704.6	7,704.6	17.2	102.4	-133.74	-475.7	-497.1	688.0	568.5	119.57	5.754		
7,800.0	7,800.0	7,804.6	7,804.6	17.4	103.7	-133.74	-475.7	-497.1	688.0	566.9	121.12	5.681		
7,900.0	7,900.0	7,904.6	7,904.6	17.6	105.0	-133.74	-475.7	-497.1	688.0	565.4	122.67	5.609		
8,000.0	8,000.0	8,004.6	8,004.6	17.8	106.4	-133.74	-475.7	-497.1	688.0	563.8	124.23	5.539		
8,100.0	8,100.0	8,104.6	8,104.6	18.1	107.7	-133.74	-475.7	-497.1	688.0	562.3	125.78	5.470		
8,200.0	8,200.0	8,204.6	8,204.6	18.3	109.0	-133.74	-475.7	-497.1	688.0	560.7	127.33	5.403		
8,300.0	8,300.0	8,304.6	8,304.6	18.5	110.4	-133.74	-475.7	-497.1	688.0	559.2	128.89	5.338		
8,400.0	8,400.0	8,404.6	8,404.6	18.7	111.7	-133.74	-475.7	-497.1	688.0	557.6	130.44	5.275		
8,500.0	8,500.0	8,504.6	8,504.6	19.0	113.0	-133.74	-475.7	-497.1	688.0	556.0	132.00	5.213		
8,600.0	8,600.0	8,604.6	8,604.6	19.2	114.4	-133.74	-475.7	-497.1	688.0	554.5	133.55	5.152		
8,700.0	8,700.0	8,704.6	8,704.6	19.4	115.7	-133.74	-475.7	-497.1	688.0	552.9	135.10	5.093		
8,800.0	8,800.0	8,804.6	8,804.6	19.6	117.0	-133.74	-475.7	-497.1	688.0	551.4	136.66	5.035		
8,900.0	8,900.0	8,904.6	8,904.6	19.9	118.3	-133.74	-475.7	-497.1	688.0	549.8	138.21	4.978		
9,000.0	9,000.0	9,004.6	9,004.6	20.1	119.7	-133.74	-475.7	-497.1	688.0	548.3	139.76	4.923		
9,100.0	9,100.0	9,104.6	9,104.6	20.3	121.0	-133.74	-475.7	-497.1	688.0	546.7	141.32	4.869		
9,200.0	9,200.0	9,204.6	9,204.6	20.5	122.3	-133.74	-475.7	-497.1	688.0	545.2	142.87	4.816		
9,300.0	9,300.0	9,304.6	9,304.6	20.8	123.7	-133.74	-475.7	-497.1	688.0	543.6	144.43	4.764		
9,400.0	9,400.0	9,404.6	9,404.6	21.0	125.0	-133.74	-475.7	-497.1	688.0	542.1	145.98	4.713		
9,500.0	9,500.0	9,504.6	9,504.6	21.2	126.3	-133.74	-475.7	-497.1	688.0	540.5	147.53	4.664		
9,600.0	9,600.0	9,604.6	9,604.6	21.4	127.6	-133.74	-475.7	-497.1	688.0	539.0	149.09	4.615		
9,700.0	9,700.0	9,704.6	9,704.6	21.7	129.0	-133.74	-475.7	-497.1	688.0	537.4	150.64	4.567		
9,800.0	9,800.0	9,804.6	9,804.6	21.9	130.3	-133.74	-475.7	-497.1	688.0	535.8	152.19	4.521		
9,900.0	9,900.0	9,904.6	9,904.6	22.1	131.6	-133.74	-475.7	-497.1	688.0	534.3	153.75	4.475		
9,965.1	9,965.1	9,969.7	9,969.7	22.3	132.5	-133.74	-475.7	-497.1	688.0	533.3	154.76	4.446 CC		
10,000.0	10,000.0	10,000.0	10,000.0	22.3	132.9	-133.74	-475.7	-497.1	688.1	532.8	155.24	4.432 ES, SF		
10,100.0	10,100.0	10,000.0	10,000.0	22.6	132.9	-133.74	-475.7	-497.1	696.9	540.5	155.46	4.477		
10,200.0	10,200.0	10,000.0	10,000.0	22.8	132.9	-133.74	-475.7	-497.1	717.8	562.1	155.69	4.611		

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design Black Pearl 1 Federal - Texaco Federal #1 - OH - OH														Offset Site Error:	0.0 usft
Survey Program: 10000-INC														Offset Well Error:	0.0 usft
Reference		Offset		Semi Major Axis			Distance								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			
10,300.0	10,300.0	10,000.0	10,000.0	23.0	132.9	-133.74	-475.7	-497.1	752.4	596.5	155.91	4.826			
10,400.0	10,400.0	10,000.0	10,000.0	23.2	132.9	-133.74	-475.7	-497.1	799.2	642.0	156.14	5.112			
10,422.6	10,422.6	10,000.0	10,000.0	23.3	132.9	-133.74	-475.7	-497.1	809.9	653.7	156.19	5.185			
10,425.0	10,425.0	10,000.0	10,000.0	23.3	132.9	24.18	-475.7	-497.1	811.1	654.9	156.19	5.193			
10,450.0	10,450.0	10,000.0	10,000.0	23.3	132.9	23.45	-475.7	-497.1	824.1	668.0	156.03	5.281			
10,475.0	10,474.9	10,000.0	10,000.0	23.4	132.9	22.78	-475.7	-497.1	836.5	681.0	155.50	5.379			
10,500.0	10,499.7	10,000.0	10,000.0	23.4	132.9	22.15	-475.7	-497.1	848.4	693.8	154.62	5.487			
10,525.0	10,524.2	10,000.0	10,000.0	23.5	132.9	21.58	-475.7	-497.1	859.9	706.5	153.37	5.607			
10,550.0	10,548.5	10,000.0	10,000.0	23.5	132.9	21.05	-475.7	-497.1	870.9	719.1	151.75	5.739			
10,575.0	10,572.4	10,000.0	10,000.0	23.6	132.9	20.56	-475.7	-497.1	881.3	731.5	149.77	5.884			
10,600.0	10,595.9	10,000.0	10,000.0	23.6	132.9	20.11	-475.7	-497.1	891.2	743.8	147.42	6.045			
10,625.0	10,619.0	10,000.0	10,000.0	23.6	132.9	19.69	-475.7	-497.1	900.6	755.8	144.73	6.223			
10,650.0	10,641.5	10,000.0	10,000.0	23.7	132.9	19.32	-475.7	-497.1	909.4	767.7	141.69	6.418			
10,675.0	10,663.4	10,000.0	10,000.0	23.7	132.9	18.97	-475.7	-497.1	917.7	779.4	138.31	6.635			
10,700.0	10,684.7	10,000.0	10,000.0	23.8	132.9	18.66	-475.7	-497.1	925.4	790.8	134.62	6.874			
10,725.0	10,705.2	10,000.0	10,000.0	23.8	132.9	18.37	-475.7	-497.1	932.5	801.9	130.63	7.139			
10,750.0	10,724.9	10,000.0	10,000.0	23.9	132.9	18.12	-475.7	-497.1	939.1	812.7	126.35	7.432			
10,775.0	10,743.9	10,000.0	10,000.0	23.9	132.9	17.89	-475.7	-497.1	945.1	823.3	121.81	7.758			
10,800.0	10,761.9	10,000.0	10,000.0	24.0	132.9	17.69	-475.7	-497.1	950.5	833.4	117.03	8.121			
10,825.0	10,779.0	10,000.0	10,000.0	24.0	132.9	17.51	-475.7	-497.1	955.3	843.2	112.04	8.526			
10,850.0	10,795.2	10,000.0	10,000.0	24.1	132.9	17.35	-475.7	-497.1	959.5	852.6	106.87	8.978			
10,875.0	10,810.3	10,000.0	10,000.0	24.2	132.9	17.22	-475.7	-497.1	963.1	861.5	101.56	9.483			
10,900.0	10,824.3	10,000.0	10,000.0	24.2	132.9	17.12	-475.7	-497.1	966.1	870.0	96.14	10.049			
10,925.0	10,837.3	10,000.0	10,000.0	24.3	132.9	17.03	-475.7	-497.1	968.5	877.9	90.67	10.682			
10,950.0	10,849.1	10,000.0	10,000.0	24.4	132.9	16.97	-475.7	-497.1	970.3	885.1	85.21	11.388			
10,975.0	10,859.8	10,000.0	10,000.0	24.5	132.9	16.93	-475.7	-497.1	971.5	891.7	79.81	12.172			
11,000.0	10,869.2	10,000.0	10,000.0	24.6	132.9	16.91	-475.7	-497.1	972.1	897.5	74.58	13.034			
11,025.0	10,877.4	10,000.0	10,000.0	24.7	132.9	16.91	-475.7	-497.1	972.1	902.5	69.61	13.964			
11,050.0	10,884.4	10,000.0	10,000.0	24.8	132.9	16.93	-475.7	-497.1	971.5	906.4	65.03	14.938			
11,075.0	10,890.1	10,000.0	10,000.0	25.0	132.9	16.97	-475.7	-497.1	970.2	909.2	61.00	15.905			
11,100.0	10,894.6	10,000.0	10,000.0	25.1	132.9	17.04	-475.7	-497.1	968.4	910.7	57.69	16.786			
11,125.0	10,897.7	10,000.0	10,000.0	25.2	132.9	17.12	-475.7	-497.1	965.9	910.6	55.29	17.469			
11,150.0	10,899.5	10,000.0	10,000.0	25.4	132.9	17.23	-475.7	-497.1	962.8	908.9	53.98	17.837			
11,166.1	10,900.0	10,000.0	10,000.0	25.5	132.9	17.32	-475.7	-497.1	960.6	906.8	53.77	17.865			
11,200.0	10,900.5	10,000.0	10,000.0	25.7	132.9	17.50	-475.7	-497.1	956.2	901.9	54.29	17.612			
11,285.9	10,901.7	10,000.0	10,000.0	26.2	132.9	17.73	-475.7	-497.1	951.5	896.5	55.06	17.280			
11,300.0	10,901.9	10,000.0	10,000.0	26.3	132.9	17.73	-475.7	-497.1	951.7	896.5	55.11	17.268			
11,400.0	10,903.2	10,000.0	10,000.0	27.1	132.9	17.48	-475.7	-497.1	959.7	904.9	54.84	17.500			
11,500.0	10,904.6	10,000.0	10,000.0	27.9	132.9	16.74	-475.7	-497.1	980.0	926.6	53.46	18.333			
11,600.0	10,906.0	10,000.0	10,000.0	28.8	132.9	15.51	-475.7	-497.1	1,011.7	960.8	50.93	19.865			
11,691.1	10,907.3	10,000.0	10,000.0	29.6	132.9	13.94	-475.7	-497.1	1,049.6	1,001.9	47.62	22.042			
11,700.0	10,907.4	10,000.0	10,000.0	29.7	132.9	13.94	-475.7	-497.1	1,053.7	1,006.0	47.66	22.110			
11,800.0	10,908.7	10,000.0	10,000.0	30.7	132.9	13.94	-475.7	-497.1	1,103.7	1,055.6	48.11	22.941			
11,900.0	10,910.1	10,000.0	10,000.0	31.8	132.9	13.94	-475.7	-497.1	1,160.3	1,111.7	48.60	23.874			
12,000.0	10,911.5	10,000.0	10,000.0	32.9	132.9	13.94	-475.7	-497.1	1,222.4	1,173.3	49.12	24.887			
12,100.0	10,912.8	10,000.0	10,000.0	34.1	132.9	13.94	-475.7	-497.1	1,289.3	1,239.6	49.66	25.962			
12,200.0	10,914.2	10,000.0	10,000.0	35.3	132.9	13.94	-475.7	-497.1	1,360.2	1,310.0	50.23	27.081			
12,300.0	10,915.5	10,000.0	10,000.0	36.6	132.9	13.94	-475.7	-497.1	1,434.6	1,383.8	50.82	28.232			
12,400.0	10,916.9	10,000.0	10,000.0	37.9	132.9	13.94	-475.7	-497.1	1,512.0	1,460.6	51.42	29.402			
12,500.0	10,918.3	10,000.0	10,000.0	39.3	132.9	13.94	-475.7	-497.1	1,591.9	1,539.8	52.05	30.584			
12,600.0	10,919.6	10,000.0	10,000.0	40.7	132.9	13.94	-475.7	-497.1	1,673.9	1,621.3	52.69	31.769			
12,700.0	10,921.0	10,000.0	10,000.0	42.1	132.9	13.94	-475.7	-497.1	1,757.9	1,704.5	53.35	32.951			

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

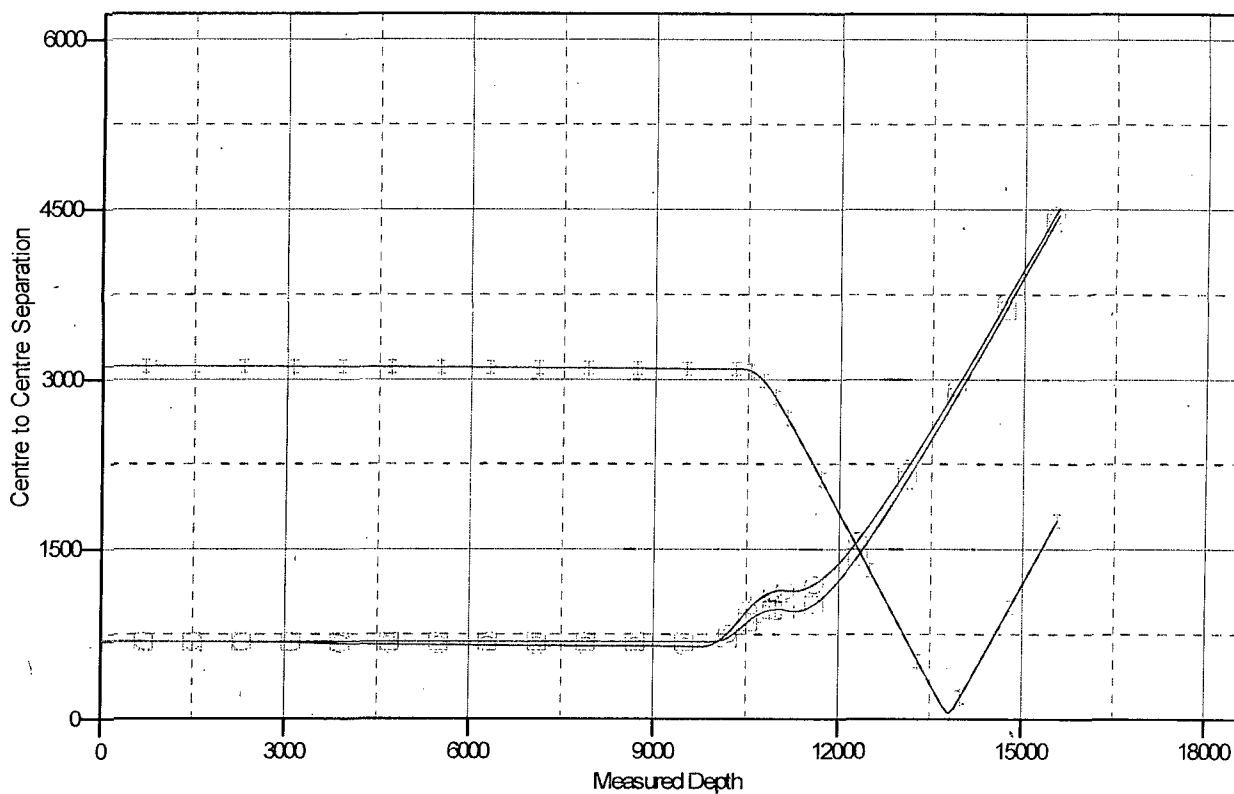
Offset Design Black Pearl 1 Federal - Texaco Federal #1 - OH - OH														Offset Site Error:	0.0 usft
Survey Program: 10000-INC														Offset Well Error:	0.0 usft
Reference		Offset		Semi Major Axis			Distance								Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	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			
12,800.0	10,922.4	10,000.0	10,000.0	43.6	132.9	13.94	-475.7	-497.1	1,843.4	1,789.4	54.02	34.126			
12,900.0	10,923.7	10,000.0	10,000.0	45.1	132.9	13.94	-475.7	-497.1	1,930.3	1,875.6	54.70	35.290			
13,000.0	10,925.1	10,000.0	10,000.0	46.6	132.9	13.94	-475.7	-497.1	2,018.4	1,963.0	55.39	36.441			
13,100.0	10,926.4	10,000.0	10,000.0	48.1	132.9	13.94	-475.7	-497.1	2,107.6	2,051.5	56.09	37.576			
13,200.0	10,927.8	10,000.0	10,000.0	49.7	132.9	13.94	-475.7	-497.1	2,197.7	2,140.9	56.80	38.692			
13,300.0	10,929.2	10,000.0	10,000.0	51.3	132.9	13.94	-475.7	-497.1	2,288.7	2,231.1	57.52	39.790			
13,400.0	10,930.5	10,000.0	10,000.0	52.9	132.9	13.94	-475.7	-497.1	2,380.3	2,322.1	58.24	40.869			
13,500.0	10,931.9	10,000.0	10,000.0	54.5	132.9	13.94	-475.7	-497.1	2,472.6	2,413.7	58.98	41.927			
13,600.0	10,933.3	10,000.0	10,000.0	56.1	132.9	13.94	-475.7	-497.1	2,565.5	2,505.8	59.71	42.964			
13,700.0	10,934.6	10,000.0	10,000.0	57.7	132.9	13.94	-475.7	-497.1	2,658.9	2,598.5	60.46	43.980			
13,800.0	10,936.0	10,000.0	10,000.0	59.4	132.9	13.94	-475.7	-497.1	2,752.8	2,691.6	61.21	44.975			
13,900.0	10,937.3	10,000.0	10,000.0	61.0	132.9	13.94	-475.7	-497.1	2,847.1	2,785.1	61.96	45.950			
14,000.0	10,938.7	10,000.0	10,000.0	62.7	132.9	13.94	-475.7	-497.1	2,941.7	2,879.0	62.72	46.903			
14,100.0	10,940.1	10,000.0	10,000.0	64.3	132.9	13.94	-475.7	-497.1	3,036.7	2,973.3	63.48	47.836			
14,200.0	10,941.4	10,000.0	10,000.0	66.0	132.9	13.94	-475.7	-497.1	3,132.1	3,067.8	64.25	48.749			
14,300.0	10,942.8	10,000.0	10,000.0	67.7	132.9	13.94	-475.7	-497.1	3,227.7	3,162.6	65.02	49.642			
14,400.0	10,944.2	10,000.0	10,000.0	69.4	132.9	13.94	-475.7	-497.1	3,323.5	3,257.7	65.79	50.516			
14,500.0	10,945.5	10,000.0	10,000.0	71.1	132.9	13.94	-475.7	-497.1	3,419.6	3,353.0	66.57	51.371			
14,600.0	10,946.9	10,000.0	10,000.0	72.8	132.9	13.94	-475.7	-497.1	3,515.9	3,448.6	67.35	52.206			
14,700.0	10,948.2	10,000.0	10,000.0	74.5	132.9	13.94	-475.7	-497.1	3,612.4	3,544.3	68.13	53.024			
14,800.0	10,949.6	10,000.0	10,000.0	76.2	132.9	13.94	-475.7	-497.1	3,709.1	3,640.2	68.91	53.824			
14,900.0	10,951.0	10,000.0	10,000.0	78.0	132.9	13.94	-475.7	-497.1	3,806.0	3,736.3	69.70	54.606			
15,000.0	10,952.3	10,000.0	10,000.0	79.7	132.9	13.94	-475.7	-497.1	3,903.0	3,832.5	70.49	55.372			
15,100.0	10,953.7	10,000.0	10,000.0	81.4	132.9	13.94	-475.7	-497.1	4,000.2	3,928.9	71.28	56.121			
15,200.0	10,955.1	10,000.0	10,000.0	83.1	132.9	13.94	-475.7	-497.1	4,097.5	4,025.4	72.07	56.854			
15,300.0	10,956.4	10,000.0	10,000.0	84.9	132.9	13.94	-475.7	-497.1	4,194.9	4,122.1	72.87	57.571			
15,400.0	10,957.8	10,000.0	10,000.0	86.6	132.9	13.94	-475.7	-497.1	4,292.5	4,218.8	73.66	58.274			
15,500.0	10,959.1	10,000.0	10,000.0	88.4	132.9	13.94	-475.7	-497.1	4,390.2	4,315.7	74.46	58.961			
15,663.2	10,960.0	10,000.0	10,000.0	89.5	132.9	13.94	-475.7	-497.1	4,451.9	4,377.0	74.96	59.388			

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB @ 3713.7usft (McVay 6)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: #4H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 3001
Grid Convergence at Surface is: 0.44°

Ladder Plot



LEGEND

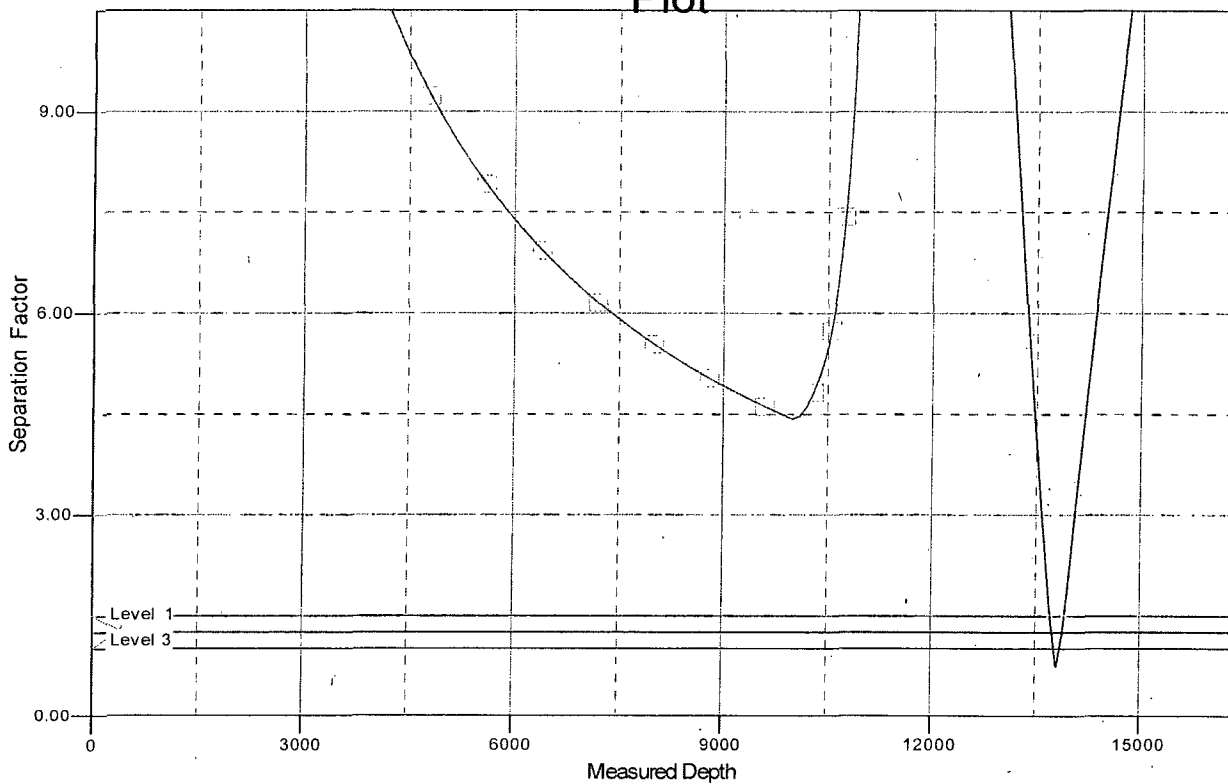
—●— Armstrong Quail Federal #1, OH, OH V0 —●— Armstrong Quail Federal #2, OH, OH V0 -■- Texaco Federal #1, OH, OH V0

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Reference Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	#4H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	EDM 5000.1 Single User Db
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB @ 3713.7usft (McVay 6)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: #4H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 3001
Grid Convergence at Surface is: 0.44°

Separation Factor Plot



LEGEND

 Armstrong Quail Federal#1, OH, OH V0
  Armstrong Quail Federal#2, OH, OH V0
  Texaco Federal#1, OH, OH V0