

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Carlsbad Field Office
NOTICE 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.

HOBBS OCD
JUL 19 2016
RECEIVED

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

5. Lease Serial No. NMNM120908
6. If Indian, Allottee or Tribe Name
7. If Unit or CA/Agreement, Name and/or No.
8. Well Name and No. AZORES FEDERAL 8H
9. API Well No. 30-025-43212-00-X1
10. Field and Pool, or Exploratory WC-025 G06 S253206M
11. County or Parish, and State LEA COUNTY, NM

SUBMIT IN TRIPLICATE - Other instructions on reverse side.

1. Type of Well ☒ Oil Well ☐ Gas Well ☐ Other	
2. Name of Operator COG PRODUCTION LLC	
Contact: MAYTE X REYES E-Mail: mreyes1@concho.com	
3a. Address 2208 W MAIN STREET ARTESIA, NM 88210	3b. Phone No. (include area code) Ph: 575-748-6945
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 29 T24S R32E SESW 210FSL 1780FWL	

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 recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

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

BHL Change
From: 330' FNL & 1440' FWL
To: 50' FNL & 1650' FWL
C102 Attached.

**SEE ATTACHED FOR
CONDITIONS OF APPROVAL**

Total depth to 14082? MD.
Final cement volumes for production string are

14. I hereby certify that the foregoing is true and correct. Electronic Submission #344252 verified by the BLM Well Information System For COG PRODUCTION LLC, sent to the Hobbs Committed to AFMSS for processing by MUSTAFA HAQUE on 07/12/2016 (16MH0010SE)	
Name (Printed/Typed) MAYTE X REYES	Title REGULATORY ANALYST
Signature (Electronic Submission)	Date 07/11/2016

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By <u>(BLM Approver Not Specified) Mustafa Haque</u>	Title PETROLEUM ENGINEER	Date 07/12/2016
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.		Office Hobbs KZ

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.

Additional data for EC transaction #344252 that would not fit on the form

32. Additional remarks, continued

740 sks 10.3 ppg (3.6 ft³/sk) lead.

TUNED LIGHT (TM) SYSTEM

0.50 lbm/sk Halad(R)-9

2 lbm/sk Kol-Seal

0.1250 lbm/sk Poly-E-Flake

0.25 lbm/sk D-AIR 5000

1350 sks 14.4 ppg (1.25 ft³/sk) tail

VERSACEM (TM) SYSTEM

0.0250 % SA-1015

0.50 % Halad(R)-9

1 % Salt

0.05 % HR-601

Attached:

Directional program

Anti-collision program

Wall Map

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**PECOS DISTRICT
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Operating, LLC
LEASE NO.:	NMNM-120908
WELL NAME & NO.:	Azores Federal 8H
SURFACE HOLE FOOTAGE:	0210' FSL & 1780' FWL
BOTTOM HOLE FOOTAGE	0050' FNL & 1654' FWL
LOCATION:	Section 29, T. 24 S., R 32 E., NMPM
COUNTY:	Lea County, New Mexico

All previous COAs still apply.

MHH 07122016

Company Name: COG Operating, LLC
 Azores Federal #8H
 Lea County, NM
 Rig: McVay 8
 Created By: Sam Hays
 Date: 6/30/2016

Azores Federal #8H
 Lea County, NM
 Q160339 & WT-160215
 Plan #1



Azimuths to Grid North

Correction: 6.78°

Magnetic Field
 Strength: 47997.9snT
 Dip Angle: 60.02°
 Date: 6/30/2016
 Model: IGRF2015

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

WELL DETAILS: Azores Federal #8H

+N-S	+E-W	Ground Level	North	East	Latitude	Longitude
0.0	0.0	430369.50	696255.50	32° 10' 53.884 N	103° 41' 56.373 W	

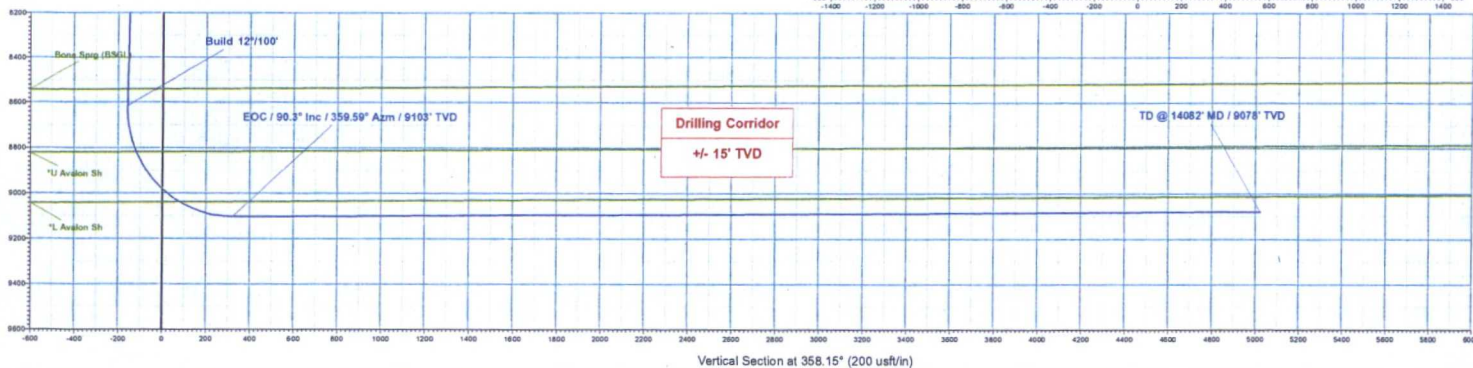
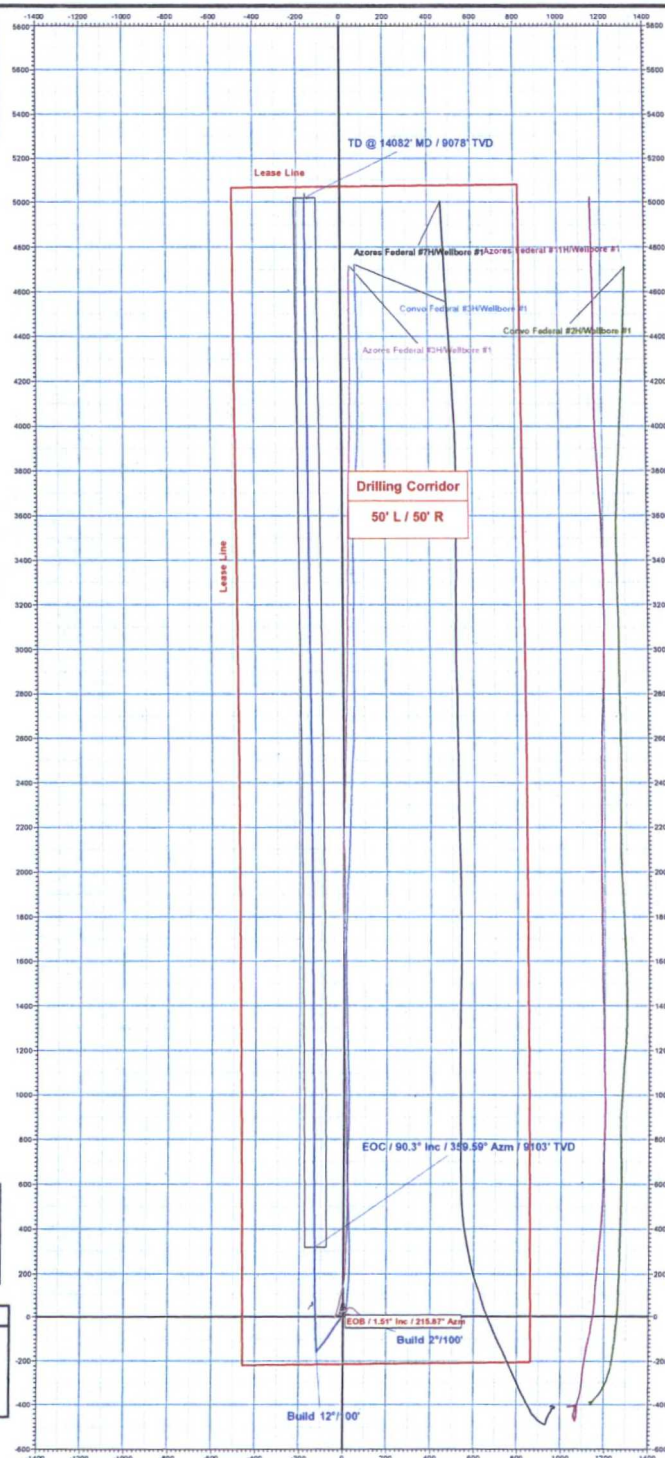
DESIGN TARGET DETAILS

Name	TVD	+N-S	+E-W	North	East	Latitude	Longitude
PBHL Azores Federal #8H	9078.4	5019.2	-162.1	435388.70	696093.40	32° 11' 43.482 N	103° 41' 57.914 W

- plan misses target center by 3000.0usft at 14082.2usft MD (9078.4 TVD, 5019.2 N, -162.1 E)

ANNOTATIONS

MD	Inc	Azi	TVD	+N-S	+E-W	V-Sect	Departure	Annotation
1000.0	0.00	0.00	1000.0	0.0	0.0	0.0	0.0	Build 2"/100'
1075.5	1.51	215.87	1075.5	-0.8	-0.8	1.0	EOB / 1.51" Inc / 215.87° Azm	
8618.1	1.51	215.87	8618.1	-161.9	-117.0	199.8	Build 12"/100'	
9380.7	90.30	359.59	9103.0	317.9	-129.2	321.9	EOC / 90.3° Inc / 359.59° Azm / 9103° TVD	
14082.2	90.30	359.59	9078.4	5019.2	-162.1	5021.8	TD @ 14082' MD / 9078' TVD	



Vertical Section at 358.15° (200 usft/in)



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COG Operating, LLC

Lea County, NM
Sec 32, T24-S, R32E
Azores Federal #8H

Wellbore #1

Plan: Plan #1

QES Well Planning Report

30 June, 2016



Database: EDM5002
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 32, T24-S, R32E
Well: Azores Federal #8H
Wellbore: Wellbore #1
Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

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	Sec 32, T24-S, R32E				
Site Position:		Northing:	429,960.20 usft	Latitude:	32° 10' 49.697 N
From:	Map	Easting:	697,210.20 usft	Longitude:	103° 41' 45.292 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.34 °

Well	Azores Federal #8H					
Well Position	+N/-S	409.3 usft	Northing:	430,369.50 usft	Latitude:	32° 10' 53.804 N
	+E/-W	-954.7 usft	Easting:	696,255.50 usft	Longitude:	103° 41' 56.373 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	3,521.0 usft	Ground Level:	3,495.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	6/30/2016	7.11	60.02	47,998

Design	Plan #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	358.15

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	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,075.5	1.51	215.87	1,075.5	-0.8	-0.6	2.00	2.00	0.00	215.87	
8,618.1	1.51	215.87	8,615.5	-161.9	-117.0	0.00	0.00	0.00	0.00	
9,380.7	90.30	359.59	9,103.0	317.9	-128.2	12.00	11.64	18.84	143.70	PBHL Azores Federal
14,082.2	90.30	359.59	9,078.4	5,019.2	-162.1	0.00	0.00	0.00	0.00	PBHL Azores Federal



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Wellbore: Wellbore #1
Design: Plan #1

Local Co-ordinate Reference:

TVD Reference:

MD Reference:

North Reference:

Survey Calculation Method:

Well Azores Federal #8H

Well @ 3521.0usft (McVay 8)

Well @ 3521.0usft (McVay 8)

Grid

Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
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
Rustler									
813.0	0.00	0.00	813.0	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
Build 2°/100'									
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
EOB / 1.51° Inc / 215.87° Azm									
1,075.5	1.51	215.87	1,075.5	-0.8	-0.6	-0.8	2.00	2.00	0.00
1,100.0	1.51	215.87	1,100.0	-1.3	-1.0	-1.3	0.00	0.00	0.00
TOS									
1,138.0	1.51	215.87	1,138.0	-2.1	-1.5	-2.1	0.00	0.00	0.00
1,200.0	1.51	215.87	1,199.9	-3.5	-2.5	-3.4	0.00	0.00	0.00
1,300.0	1.51	215.87	1,299.9	-5.6	-4.0	-5.5	0.00	0.00	0.00
1,400.0	1.51	215.87	1,399.9	-7.7	-5.6	-7.6	0.00	0.00	0.00
1,500.0	1.51	215.87	1,499.8	-9.9	-7.1	-9.6	0.00	0.00	0.00
1,600.0	1.51	215.87	1,599.8	-12.0	-8.7	-11.7	0.00	0.00	0.00
1,700.0	1.51	215.87	1,699.8	-14.1	-10.2	-13.8	0.00	0.00	0.00
1,800.0	1.51	215.87	1,799.7	-16.3	-11.8	-15.9	0.00	0.00	0.00
1,900.0	1.51	215.87	1,899.7	-18.4	-13.3	-18.0	0.00	0.00	0.00
2,000.0	1.51	215.87	1,999.7	-20.5	-14.9	-20.1	0.00	0.00	0.00
2,100.0	1.51	215.87	2,099.6	-22.7	-16.4	-22.1	0.00	0.00	0.00
2,200.0	1.51	215.87	2,199.6	-24.8	-17.9	-24.2	0.00	0.00	0.00
2,300.0	1.51	215.87	2,299.6	-27.0	-19.5	-26.3	0.00	0.00	0.00
2,400.0	1.51	215.87	2,399.5	-29.1	-21.0	-28.4	0.00	0.00	0.00
2,500.0	1.51	215.87	2,499.5	-31.2	-22.6	-30.5	0.00	0.00	0.00
2,600.0	1.51	215.87	2,599.5	-33.4	-24.1	-32.6	0.00	0.00	0.00
2,700.0	1.51	215.87	2,699.4	-35.5	-25.7	-34.6	0.00	0.00	0.00
2,800.0	1.51	215.87	2,799.4	-37.6	-27.2	-36.7	0.00	0.00	0.00
2,900.0	1.51	215.87	2,899.4	-39.8	-28.8	-38.8	0.00	0.00	0.00
3,000.0	1.51	215.87	2,999.3	-41.9	-30.3	-40.9	0.00	0.00	0.00
3,100.0	1.51	215.87	3,099.3	-44.0	-31.8	-43.0	0.00	0.00	0.00
3,200.0	1.51	215.87	3,199.3	-46.2	-33.4	-45.1	0.00	0.00	0.00
3,300.0	1.51	215.87	3,299.2	-48.3	-34.9	-47.2	0.00	0.00	0.00
3,400.0	1.51	215.87	3,399.2	-50.4	-36.5	-49.2	0.00	0.00	0.00
3,500.0	1.51	215.87	3,499.1	-52.6	-38.0	-51.3	0.00	0.00	0.00
3,600.0	1.51	215.87	3,599.1	-54.7	-39.6	-53.4	0.00	0.00	0.00
3,700.0	1.51	215.87	3,699.1	-56.8	-41.1	-55.5	0.00	0.00	0.00
3,800.0	1.51	215.87	3,799.0	-59.0	-42.7	-57.6	0.00	0.00	0.00
3,900.0	1.51	215.87	3,899.0	-61.1	-44.2	-59.7	0.00	0.00	0.00
4,000.0	1.51	215.87	3,999.0	-63.3	-45.7	-61.7	0.00	0.00	0.00
4,100.0	1.51	215.87	4,098.9	-65.4	-47.3	-63.8	0.00	0.00	0.00
4,200.0	1.51	215.87	4,198.9	-67.5	-48.8	-65.9	0.00	0.00	0.00
4,300.0	1.51	215.87	4,298.9	-69.7	-50.4	-68.0	0.00	0.00	0.00
BOS (Fletcher)									
4,398.5	1.51	215.87	4,397.4	-71.8	-51.9	-70.1	0.00	0.00	0.00
4,400.0	1.51	215.87	4,398.8	-71.8	-51.9	-70.1	0.00	0.00	0.00



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Wellbore: Wellbore #1
Design: Plan #1

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TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,500.0	1.51	215.87	4,498.8	-73.9	-53.5	-72.2	0.00	0.00	0.00
4,600.0	1.51	215.87	4,598.8	-76.1	-55.0	-74.3	0.00	0.00	0.00
LMAR (Top Delaware)									
4,625.6	1.51	215.87	4,624.4	-76.6	-55.4	-74.8	0.00	0.00	0.00
BLCN									
4,649.7	1.51	215.87	4,648.4	-77.1	-55.8	-75.3	0.00	0.00	0.00
4,700.0	1.51	215.87	4,698.7	-78.2	-56.5	-76.3	0.00	0.00	0.00
4,800.0	1.51	215.87	4,798.7	-80.3	-58.1	-78.4	0.00	0.00	0.00
4,900.0	1.51	215.87	4,898.7	-82.5	-59.6	-80.5	0.00	0.00	0.00
5,000.0	1.51	215.87	4,998.6	-84.6	-61.2	-82.6	0.00	0.00	0.00
5,100.0	1.51	215.87	5,098.6	-86.7	-62.7	-84.7	0.00	0.00	0.00
5,200.0	1.51	215.87	5,198.6	-88.9	-64.3	-86.8	0.00	0.00	0.00
5,300.0	1.51	215.87	5,298.5	-91.0	-65.8	-88.8	0.00	0.00	0.00
5,400.0	1.51	215.87	5,398.5	-93.2	-67.4	-90.9	0.00	0.00	0.00
5,500.0	1.51	215.87	5,498.5	-95.3	-68.9	-93.0	0.00	0.00	0.00
CYCN									
5,564.1	1.51	215.87	5,562.5	-96.7	-69.9	-94.3	0.00	0.00	0.00
5,600.0	1.51	215.87	5,598.4	-97.4	-70.4	-95.1	0.00	0.00	0.00
5,700.0	1.51	215.87	5,698.4	-99.6	-72.0	-97.2	0.00	0.00	0.00
5,800.0	1.51	215.87	5,798.4	-101.7	-73.5	-99.3	0.00	0.00	0.00
5,900.0	1.51	215.87	5,898.3	-103.8	-75.1	-101.4	0.00	0.00	0.00
6,000.0	1.51	215.87	5,998.3	-106.0	-76.6	-103.4	0.00	0.00	0.00
6,100.0	1.51	215.87	6,098.2	-108.1	-78.2	-105.5	0.00	0.00	0.00
6,200.0	1.51	215.87	6,198.2	-110.2	-79.7	-107.6	0.00	0.00	0.00
6,300.0	1.51	215.87	6,298.2	-112.4	-81.3	-109.7	0.00	0.00	0.00
6,400.0	1.51	215.87	6,398.1	-114.5	-82.8	-111.8	0.00	0.00	0.00
6,500.0	1.51	215.87	6,498.1	-116.6	-84.3	-113.9	0.00	0.00	0.00
6,600.0	1.51	215.87	6,598.1	-118.8	-85.9	-115.9	0.00	0.00	0.00
6,700.0	1.51	215.87	6,698.0	-120.9	-87.4	-118.0	0.00	0.00	0.00
BYCN									
6,798.6	1.51	215.87	6,796.6	-123.0	-89.0	-120.1	0.00	0.00	0.00
6,800.0	1.51	215.87	6,798.0	-123.0	-89.0	-120.1	0.00	0.00	0.00
6,900.0	1.51	215.87	6,898.0	-125.2	-90.5	-122.2	0.00	0.00	0.00
7,000.0	1.51	215.87	6,997.9	-127.3	-92.1	-124.3	0.00	0.00	0.00
7,100.0	1.51	215.87	7,097.9	-129.5	-93.6	-126.4	0.00	0.00	0.00
7,200.0	1.51	215.87	7,197.9	-131.6	-95.1	-128.4	0.00	0.00	0.00
7,300.0	1.51	215.87	7,297.8	-133.7	-96.7	-130.5	0.00	0.00	0.00
7,400.0	1.51	215.87	7,397.8	-135.9	-98.2	-132.6	0.00	0.00	0.00
7,500.0	1.51	215.87	7,497.8	-138.0	-99.8	-134.7	0.00	0.00	0.00
7,600.0	1.51	215.87	7,597.7	-140.1	-101.3	-136.8	0.00	0.00	0.00
7,700.0	1.51	215.87	7,697.7	-142.3	-102.9	-138.9	0.00	0.00	0.00
7,800.0	1.51	215.87	7,797.7	-144.4	-104.4	-141.0	0.00	0.00	0.00
7,900.0	1.51	215.87	7,897.6	-146.5	-106.0	-143.0	0.00	0.00	0.00
8,000.0	1.51	215.87	7,997.6	-148.7	-107.5	-145.1	0.00	0.00	0.00
8,100.0	1.51	215.87	8,097.6	-150.8	-109.0	-147.2	0.00	0.00	0.00
8,200.0	1.51	215.87	8,197.5	-152.9	-110.6	-149.3	0.00	0.00	0.00
8,300.0	1.51	215.87	8,297.5	-155.1	-112.1	-151.4	0.00	0.00	0.00
8,400.0	1.51	215.87	8,397.4	-157.2	-113.7	-153.5	0.00	0.00	0.00
8,500.0	1.51	215.87	8,497.4	-159.3	-115.2	-155.5	0.00	0.00	0.00
Bone Sprg (BSGL)									
8,542.4	1.51	215.87	8,539.8	-160.3	-115.9	-156.4	0.00	0.00	0.00
8,600.0	1.51	215.87	8,597.4	-161.5	-116.8	-157.6	0.00	0.00	0.00

Build 12°/100'



Database: EDM5002
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 32, T24-S, R32E
Well: Azores Federal #8H
Wellbore: Wellbore #1
Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,618.1	1.51	215.87	8,615.5	-161.9	-117.0	-158.0	0.00	0.00	0.00
8,625.0	0.97	246.06	8,622.4	-162.0	-117.2	-158.1	12.00	-7.76	437.49
8,650.0	2.76	340.70	8,647.4	-161.5	-117.5	-157.6	12.00	7.14	378.56
8,675.0	5.68	350.56	8,672.3	-159.7	-117.9	-155.8	12.00	11.69	39.45
8,700.0	8.66	353.70	8,697.1	-156.6	-118.4	-152.7	12.00	11.90	12.56
8,725.0	11.64	355.24	8,721.7	-152.2	-118.8	-148.3	12.00	11.95	6.16
8,750.0	14.64	356.16	8,746.0	-146.6	-119.2	-142.6	12.00	11.97	3.67
8,775.0	17.63	356.77	8,770.1	-139.6	-119.6	-135.7	12.00	11.98	2.44
8,800.0	20.63	357.21	8,793.7	-131.4	-120.0	-127.5	12.00	11.99	1.75
8,825.0	23.63	357.54	8,816.8	-122.0	-120.5	-118.1	12.00	11.99	1.33
*U Avalon Sh									
8,825.9	23.73	357.55	8,817.6	-121.7	-120.5	-117.7	12.00	11.99	1.16
8,850.0	26.62	357.80	8,839.5	-111.4	-120.9	-107.5	12.00	11.99	1.04
8,875.0	29.62	358.01	8,861.5	-99.7	-121.3	-95.7	12.00	11.99	0.84
8,900.0	32.62	358.18	8,882.9	-86.7	-121.8	-82.8	12.00	11.99	0.70
8,925.0	35.62	358.33	8,903.6	-72.7	-122.2	-68.7	12.00	12.00	0.60
8,950.0	38.62	358.46	8,923.5	-57.6	-122.6	-53.7	12.00	12.00	0.51
8,975.0	41.62	358.58	8,942.6	-41.5	-123.0	-37.5	12.00	12.00	0.45
9,000.0	44.62	358.68	8,960.9	-24.5	-123.4	-20.5	12.00	12.00	0.40
9,025.0	47.62	358.77	8,978.2	-6.4	-123.8	-2.4	12.00	12.00	0.36
9,050.0	50.62	358.85	8,994.6	12.4	-124.2	16.5	12.00	12.00	0.33
9,075.0	53.62	358.92	9,009.9	32.2	-124.6	36.2	12.00	12.00	0.30
9,100.0	56.62	358.99	9,024.2	52.7	-125.0	56.7	12.00	12.00	0.28
*L Avalon Sh									
9,123.4	59.42	359.05	9,036.6	72.5	-125.3	76.5	12.00	12.00	0.26
9,125.0	59.62	359.06	9,037.4	73.9	-125.3	77.9	12.00	12.00	0.25
9,150.0	62.61	359.12	9,049.5	95.8	-125.7	99.8	12.00	12.00	0.24
9,175.0	65.61	359.18	9,060.4	118.3	-126.0	122.3	12.00	12.00	0.23
9,200.0	68.61	359.23	9,070.1	141.3	-126.4	145.3	12.00	12.00	0.22
9,225.0	71.61	359.28	9,078.6	164.8	-126.7	168.8	12.00	12.00	0.21
9,250.0	74.61	359.34	9,085.9	188.7	-126.9	192.7	12.00	12.00	0.20
9,275.0	77.61	359.39	9,091.9	213.0	-127.2	217.0	12.00	12.00	0.20
9,300.0	80.61	359.43	9,096.6	237.5	-127.5	241.5	12.00	12.00	0.19
9,325.0	83.61	359.48	9,100.1	262.3	-127.7	266.3	12.00	12.00	0.19
9,350.0	86.61	359.53	9,102.2	287.2	-127.9	291.2	12.00	12.00	0.19
9,375.0	89.61	359.58	9,103.0	312.2	-128.1	316.1	12.00	12.00	0.19
EOC / 90.3° Inc / 359.59° Azm / 9103' TVD									
9,380.7	90.30	359.59	9,103.0	317.9	-128.2	321.9	12.00	12.00	0.19
9,400.0	90.30	359.59	9,102.9	337.2	-128.3	341.1	0.00	0.00	0.00
9,500.0	90.30	359.59	9,102.4	437.2	-129.0	441.1	0.00	0.00	0.00
9,600.0	90.30	359.59	9,101.9	537.2	-129.7	541.1	0.00	0.00	0.00
9,700.0	90.30	359.59	9,101.3	637.2	-130.5	641.0	0.00	0.00	0.00
9,800.0	90.30	359.59	9,100.8	737.2	-131.2	741.0	0.00	0.00	0.00
9,900.0	90.30	359.59	9,100.3	837.2	-131.9	841.0	0.00	0.00	0.00
10,000.0	90.30	359.59	9,099.8	937.2	-132.6	940.9	0.00	0.00	0.00
10,100.0	90.30	359.59	9,099.2	1,037.1	-133.3	1,040.9	0.00	0.00	0.00
10,200.0	90.30	359.59	9,098.7	1,137.1	-134.1	1,140.9	0.00	0.00	0.00
10,300.0	90.30	359.59	9,098.2	1,237.1	-134.8	1,240.8	0.00	0.00	0.00
10,400.0	90.30	359.59	9,097.7	1,337.1	-135.5	1,340.8	0.00	0.00	0.00
10,500.0	90.30	359.59	9,097.2	1,437.1	-136.2	1,440.8	0.00	0.00	0.00
10,600.0	90.30	359.59	9,096.6	1,537.1	-137.0	1,540.7	0.00	0.00	0.00
10,700.0	90.30	359.59	9,096.1	1,637.1	-137.7	1,640.7	0.00	0.00	0.00
10,800.0	90.30	359.59	9,095.6	1,737.1	-138.4	1,740.7	0.00	0.00	0.00



Database: EDM5002
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 32, T24-S, R32E
Well: Azores Federal #8H
Wellbore: Wellbore #1
Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,900.0	90.30	359.59	9,095.1	1,837.1	-139.1	1,840.6	0.00	0.00	0.00
11,000.0	90.30	359.59	9,094.5	1,937.1	-139.8	1,940.6	0.00	0.00	0.00
11,100.0	90.30	359.59	9,094.0	2,037.1	-140.6	2,040.6	0.00	0.00	0.00
11,200.0	90.30	359.59	9,093.5	2,137.1	-141.3	2,140.6	0.00	0.00	0.00
11,300.0	90.30	359.59	9,093.0	2,237.1	-142.0	2,240.5	0.00	0.00	0.00
11,400.0	90.30	359.59	9,092.4	2,337.1	-142.7	2,340.5	0.00	0.00	0.00
11,500.0	90.30	359.59	9,091.9	2,437.1	-143.5	2,440.5	0.00	0.00	0.00
11,600.0	90.30	359.59	9,091.4	2,537.1	-144.2	2,540.4	0.00	0.00	0.00
11,700.0	90.30	359.59	9,090.9	2,637.1	-144.9	2,640.4	0.00	0.00	0.00
11,800.0	90.30	359.59	9,090.3	2,737.1	-145.6	2,740.4	0.00	0.00	0.00
11,900.0	90.30	359.59	9,089.8	2,837.1	-146.3	2,840.3	0.00	0.00	0.00
12,000.0	90.30	359.59	9,089.3	2,937.1	-147.1	2,940.3	0.00	0.00	0.00
12,100.0	90.30	359.59	9,088.8	3,037.1	-147.8	3,040.3	0.00	0.00	0.00
12,200.0	90.30	359.59	9,088.3	3,137.1	-148.5	3,140.2	0.00	0.00	0.00
12,300.0	90.30	359.59	9,087.7	3,237.1	-149.2	3,240.2	0.00	0.00	0.00
12,400.0	90.30	359.59	9,087.2	3,337.1	-150.0	3,340.2	0.00	0.00	0.00
12,500.0	90.30	359.59	9,086.7	3,437.1	-150.7	3,440.1	0.00	0.00	0.00
12,600.0	90.30	359.59	9,086.2	3,537.0	-151.4	3,540.1	0.00	0.00	0.00
12,700.0	90.30	359.59	9,085.6	3,637.0	-152.1	3,640.1	0.00	0.00	0.00
12,800.0	90.30	359.59	9,085.1	3,737.0	-152.8	3,740.0	0.00	0.00	0.00
12,900.0	90.30	359.59	9,084.6	3,837.0	-153.6	3,840.0	0.00	0.00	0.00
13,000.0	90.30	359.59	9,084.1	3,937.0	-154.3	3,940.0	0.00	0.00	0.00
13,100.0	90.30	359.59	9,083.5	4,037.0	-155.0	4,039.9	0.00	0.00	0.00
13,200.0	90.30	359.59	9,083.0	4,137.0	-155.7	4,139.9	0.00	0.00	0.00
13,300.0	90.30	359.59	9,082.5	4,237.0	-156.5	4,239.9	0.00	0.00	0.00
13,400.0	90.30	359.59	9,082.0	4,337.0	-157.2	4,339.8	0.00	0.00	0.00
13,500.0	90.30	359.59	9,081.4	4,437.0	-157.9	4,439.8	0.00	0.00	0.00
13,600.0	90.30	359.59	9,080.9	4,537.0	-158.6	4,539.8	0.00	0.00	0.00
13,700.0	90.30	359.59	9,080.4	4,637.0	-159.3	4,639.7	0.00	0.00	0.00
13,800.0	90.30	359.59	9,079.9	4,737.0	-160.1	4,739.7	0.00	0.00	0.00
13,900.0	90.30	359.59	9,079.3	4,837.0	-160.8	4,839.7	0.00	0.00	0.00
14,000.0	90.30	359.59	9,078.8	4,937.0	-161.5	4,939.6	0.00	0.00	0.00
TD @ 14082' MD / 9078' TVD									
14,082.2	90.30	359.59	9,078.4	5,019.2	-162.1	5,021.8	0.00	0.00	0.00

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL Azores Federal #8	0.00	0.00	0.0	5,019.2	-162.1	435,388.70	696,093.40	32° 11' 43.482 N	103° 41' 57.914 W
- plan misses target center by 5021.8usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Point									

Database: EDM5002
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 32, T24-S, R32E
Well: Azores Federal #8H
Wellbore: Wellbore #1
Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
813.0	813.0	Rustler		-0.30	359.59	
1,138.0	1,138.0	TOS		-0.30	359.59	
4,398.5	4,397.4	BOS (Fletcher)		-0.30	359.59	
4,625.6	4,624.4	LMAR (Top Delaware)		-0.30	359.59	
4,649.7	4,648.4	BLCN		-0.30	359.59	
5,564.1	5,562.5	CYCN		-0.30	359.59	
6,798.6	6,796.6	BYCN		-0.30	359.59	
8,542.4	8,539.8	Bone Sprg (BSGL)		-0.30	359.59	
8,825.9	8,817.6	*U Avalon Sh		-0.30	359.59	
9,123.4	9,036.6	*L Avalon Sh		-0.30	359.59	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,000.0	1,000.0	0.0	0.0	Build 2°/100'	
1,075.5	1,075.5	-0.8	-0.6	EOB / 1.51° Inc / 215.87° Azm	
8,618.1	8,615.5	-161.9	-117.0	Build 12°/100'	
9,380.7	9,103.0	317.9	-128.2	EOC / 90.3° Inc / 359.59° Azm / 9103' TVD	
14,082.2	9,078.4	5,019.2	-162.1	TD @ 14082' MD / 9078' TVD	



COG Operating, LLC

Lea County, NM
Sec 32, T24-S, R32E
Azores Federal #8H

Wellbore #1
Plan #1

HOBBS OCD

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QES Anticollision Report

01 July, 2016





QES Directional Drilling, LLC
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Azores Federal #8H
Project:	Lea County, NM	TVD Reference:	Well @ 3521.0usft (McVay 8)
Reference Site:	Sec 32, T24-S, R32E	MD Reference:	Well @ 3521.0usft (McVay 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Azores Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
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		

Survey Tool Program	Date	7/1/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	14,082.2	Plan #1 (Wellbore #1)	MWD default	MWD - Standard

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Sec 32, T24-S, R32E						
Azores Federal #11H - Wellbore #1 - Wellbore #1	354.4	348.7	1,111.0	1,109.7	884.926	CC, ES
Azores Federal #11H - Wellbore #1 - Wellbore #1	14,082.7	14,396.0	1,317.7	1,128.1	6.951	SF
Azores Federal #3H - Wellbore #1 - Wellbore #1	1,255.3	1,248.6	93.0	89.7	28.462	CC
Azores Federal #3H - Wellbore #1 - Wellbore #1	9,050.0	8,990.2	112.0	87.6	4.588	ES
Azores Federal #3H - Wellbore #1 - Wellbore #1	9,075.0	9,005.4	113.7	88.9	4.572	SF
Azores Federal #7H - Wellbore #1 - Wellbore #1	14,063.6	14,450.0	623.0	430.2	3.232	CC
Azores Federal #7H - Wellbore #1 - Wellbore #1	14,082.2	14,450.0	623.2	430.2	3.228	ES
Azores Federal #7H - Wellbore #1 - Wellbore #1	14,082.7	14,450.0	623.3	430.2	3.228	SF
Convo Federal #2H - Wellbore #1 - Wellbore #1	0.0	0.0	1,198.7			
Convo Federal #2H - Wellbore #1 - Wellbore #1	200.0	181.3	1,199.2	1,198.6	2,056.467	ES
Convo Federal #2H - Wellbore #1 - Wellbore #1	14,000.0	13,321.0	1,607.3	1,436.4	9.405	SF
Convo Federal #3H - Wellbore #1 - Wellbore #1	1,067.8	1,060.5	84.9	80.5	19.496	CC
Convo Federal #3H - Wellbore #1 - Wellbore #1	1,100.0	1,092.6	84.9	80.5	18.966	ES
Convo Federal #3H - Wellbore #1 - Wellbore #1	7,900.0	7,890.7	186.8	153.2	5.550	SF

Offset Design												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default, 4730-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	111.54	-408.4	1,034.7	1,112.4				
100.0	100.0	100.0	100.0	0.1	0.1	111.52	-408.0	1,034.7	1,112.2	1,112.1	6.685463		
194.4	194.4	191.4	191.4	0.3	0.3	111.50	-407.5	1,034.7	1,112.1	1,111.5	1,960.236		
200.0	200.0	196.8	196.8	0.3	0.3	111.50	-407.5	1,034.7	1,112.1	1,111.5	1,881.471		
300.0	300.0	300.0	300.0	0.5	0.5	111.46	-406.5	1,034.3	1,111.3	1,110.3	1,077.985		
354.4	354.4	348.7	348.7	0.7	0.6	111.43	-406.0	1,034.1	1,111.0	1,109.7	884.926	CC, ES	
400.0	400.0	380.8	380.8	0.8	0.7	111.42	-405.8	1,034.5	1,111.4	1,109.9	779.718		
500.0	500.0	475.2	475.2	1.0	0.9	111.37	-405.6	1,036.6	1,113.4	1,111.5	601.888		
600.0	600.0	572.3	572.3	1.2	1.1	111.28	-404.6	1,039.1	1,115.4	1,113.1	489.068		
700.0	700.0	675.5	675.4	1.4	1.3	111.24	-404.8	1,041.5	1,117.6	1,114.9	410.829		
800.0	800.0	772.2	772.0	1.7	1.5	111.29	-406.4	1,042.9	1,119.6	1,116.4	355.787		
900.0	900.0	869.0	868.8	1.9	1.7	111.20	-405.6	1,045.7	1,122.0	1,118.4	313.618		
1,000.0	1,000.0	968.1	967.8	2.1	1.9	111.08	-404.3	1,048.9	1,124.5	1,120.5	280.294		
1,075.5	1,075.5	1,043.3	1,043.0	2.3	2.1	-104.88	-403.6	1,051.3	1,126.8	1,122.4	260.436		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #11H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default, 4730-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
1,100.0	1,100.0	1,067.8	1,067.5	2.3	2.1	-104.93	-403.3	1,052.1	1,127.6	1,123.1	255.073		
1,200.0	1,199.9	1,168.1	1,167.8	2.5	2.3	-105.16	-402.5	1,055.2	1,130.9	1,126.0	234.995		
1,300.0	1,299.9	1,269.5	1,269.1	2.7	2.6	-105.39	-401.6	1,058.3	1,134.1	1,128.9	217.492		
1,400.0	1,399.9	1,370.1	1,369.7	2.9	2.8	-105.61	-400.6	1,061.2	1,137.2	1,131.6	202.254		
1,500.0	1,499.8	1,470.1	1,469.6	3.1	3.0	-105.84	-399.6	1,064.2	1,140.3	1,134.3	188.905		
1,600.0	1,599.8	1,573.2	1,572.7	3.3	3.2	-106.07	-398.5	1,067.1	1,143.3	1,136.9	176.945		
1,700.0	1,699.8	1,674.8	1,674.2	3.5	3.4	-106.29	-397.4	1,069.6	1,146.1	1,139.2	166.479		
1,800.0	1,799.7	1,778.2	1,777.6	3.7	3.7	-106.51	-396.5	1,071.9	1,148.6	1,141.3	157.056		
1,900.0	1,899.7	1,908.1	1,907.5	3.9	3.9	-106.71	-395.9	1,072.8	1,149.9	1,142.1	147.404		
2,000.0	1,999.7	2,006.5	2,005.9	4.1	4.1	-106.80	-396.4	1,071.7	1,149.8	1,141.6	139.901		
2,012.5	2,012.2	2,018.5	2,017.8	4.1	4.2	-106.81	-396.4	1,071.6	1,149.8	1,141.5	139.029		
2,100.0	2,099.6	2,100.0	2,099.4	4.3	4.3	-106.87	-397.0	1,070.9	1,149.9	1,141.3	133.333		
2,200.0	2,199.6	2,197.5	2,196.9	4.5	4.5	-106.96	-397.6	1,070.5	1,150.5	1,141.5	127.254		
2,300.0	2,299.6	2,291.6	2,291.0	4.8	4.7	-107.06	-398.0	1,070.6	1,151.5	1,142.1	121.800		
2,400.0	2,399.5	2,387.1	2,386.4	5.0	4.9	-107.16	-398.5	1,071.1	1,153.0	1,143.1	116.792		
2,500.0	2,499.5	2,481.3	2,480.7	5.2	5.1	-107.26	-399.2	1,072.0	1,154.9	1,144.6	112.242		
2,600.0	2,599.5	2,584.0	2,583.4	5.4	5.3	-107.37	-400.1	1,073.1	1,157.0	1,146.2	107.882		
2,700.0	2,699.4	2,691.3	2,690.6	5.7	5.5	-107.46	-401.1	1,073.7	1,158.6	1,147.4	103.731		
2,800.0	2,799.4	2,783.4	2,782.7	5.9	5.7	-107.54	-402.1	1,074.1	1,160.2	1,148.6	100.156		
2,900.0	2,899.4	2,883.7	2,883.0	6.1	5.9	-107.63	-403.0	1,075.1	1,162.2	1,150.2	96.721		
3,000.0	2,999.3	2,990.8	2,990.2	6.3	6.2	-107.76	-403.5	1,076.0	1,163.9	1,151.4	93.379		
3,100.0	3,099.3	3,095.6	3,094.9	6.5	6.4	-107.88	-403.8	1,076.2	1,165.0	1,152.1	90.256		
3,200.0	3,199.3	3,188.9	3,188.2	6.8	6.6	-107.98	-404.0	1,076.5	1,166.2	1,152.9	87.507		
3,300.0	3,299.2	3,299.6	3,298.9	7.0	6.8	-108.11	-404.3	1,076.8	1,167.3	1,153.6	84.693		
3,400.0	3,399.2	3,403.0	3,402.3	7.2	7.0	-108.22	-404.6	1,076.3	1,167.8	1,153.6	82.089		
3,500.0	3,499.1	3,508.7	3,508.0	7.5	7.3	-108.35	-404.3	1,075.5	1,167.8	1,153.2	79.584		
3,600.0	3,599.1	3,616.9	3,616.2	7.7	7.5	-108.45	-404.4	1,073.9	1,167.2	1,152.1	77.161		
3,700.0	3,699.1	3,714.0	3,713.3	7.9	7.7	-108.51	-405.2	1,072.0	1,166.5	1,150.9	74.990		
3,800.0	3,799.0	3,811.9	3,811.1	8.1	7.9	-108.55	-406.3	1,070.2	1,165.9	1,149.9	72.944		
3,900.0	3,899.0	3,907.4	3,906.6	8.4	8.1	-108.65	-406.4	1,069.1	1,165.7	1,149.3	71.038		
4,000.0	3,999.0	4,007.5	4,006.7	8.6	8.3	-108.77	-406.0	1,068.2	1,165.6	1,148.7	69.194		
4,013.7	4,012.7	4,020.3	4,019.5	8.6	8.3	-108.79	-406.0	1,068.1	1,165.6	1,148.7	68.956		
4,100.0	4,098.9	4,101.5	4,100.8	8.8	8.5	-108.87	-406.2	1,067.6	1,165.8	1,148.5	67.509		
4,200.0	4,198.9	4,203.2	4,202.4	9.0	8.7	-108.99	-406.2	1,067.0	1,166.1	1,148.4	65.855		
4,300.0	4,298.9	4,304.6	4,303.9	9.3	8.9	-109.11	-406.1	1,066.4	1,166.4	1,148.2	64.272		
4,400.0	4,398.8	4,400.0	4,399.2	9.5	9.1	-109.24	-405.5	1,066.0	1,166.7	1,148.1	62.810		
4,500.0	4,498.8	4,490.7	4,489.9	9.7	9.3	-109.36	-405.4	1,066.0	1,167.6	1,148.6	61.479		
4,600.0	4,598.8	4,589.6	4,588.8	10.0	9.5	-109.43	-406.7	1,066.3	1,169.0	1,149.6	60.262		
4,700.0	4,698.7	4,690.8	4,690.0	10.2	9.6	-109.50	-407.8	1,066.5	1,170.5	1,150.7	59.315		
4,800.0	4,798.7	4,791.2	4,790.3	10.4	9.6	-109.56	-409.1	1,066.6	1,171.8	1,151.8	58.570		
4,900.0	4,898.7	4,891.0	4,890.2	10.6	9.6	-109.62	-410.5	1,066.7	1,173.2	1,152.9	57.953		
5,000.0	4,998.6	4,992.2	4,991.4	10.9	9.6	-109.67	-412.1	1,066.7	1,174.5	1,154.0	57.330		
5,100.0	5,098.6	5,094.1	5,093.3	11.1	9.7	-109.73	-413.4	1,066.6	1,175.6	1,154.9	56.707		
5,200.0	5,198.6	5,194.7	5,193.9	11.3	9.7	-109.79	-414.7	1,066.4	1,176.7	1,155.7	56.072		
5,300.0	5,298.5	5,295.2	5,294.4	11.6	9.7	-109.84	-416.2	1,066.1	1,177.7	1,156.5	55.447		
5,400.0	5,398.5	5,396.4	5,395.5	11.8	9.8	-109.88	-417.8	1,065.7	1,178.7	1,157.1	54.806		
5,500.0	5,498.5	5,497.4	5,496.5	12.0	9.8	-109.91	-419.6	1,065.1	1,179.5	1,157.7	54.175		
5,600.0	5,598.4	5,597.4	5,596.5	12.2	9.8	-109.94	-421.3	1,064.6	1,180.3	1,158.3	53.545		
5,700.0	5,698.4	5,697.1	5,696.2	12.5	9.9	-109.98	-422.8	1,064.0	1,181.1	1,158.8	52.928		
5,800.0	5,798.4	5,796.3	5,795.3	12.7	9.9	-110.03	-424.2	1,063.6	1,182.0	1,159.4	52.321		
5,900.0	5,898.3	5,895.5	5,894.6	12.9	10.0	-110.09	-425.4	1,063.3	1,182.9	1,160.1	51.723		
6,000.0	5,998.3	5,994.9	5,993.9	13.2	10.0	-110.14	-426.7	1,063.0	1,183.9	1,160.8	51.128		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #11H - Wellbore #1 - Wellbore #1													Offset Site Error: 0.0 usft
Survey Program: 100-MWD default, 4730-MWD default													Offset Well Error: 0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	Centre +E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
6,100.0	6,098.2	6,096.2	6,095.3	13.4	10.1	-110.19	-428.3	1,062.7	1,184.9	1,161.5	50.535		
6,200.0	6,198.2	6,200.0	6,199.0	13.6	10.2	-110.22	-430.0	1,062.0	1,185.7	1,161.9	49.929		
6,300.0	6,298.2	6,299.1	6,298.1	13.8	10.2	-110.24	-431.9	1,061.1	1,186.2	1,162.2	49.329		
6,400.0	6,398.1	6,395.4	6,394.4	14.1	10.3	-110.27	-433.7	1,060.5	1,187.0	1,162.7	48.755		
6,500.0	6,498.1	6,493.0	6,492.0	14.3	10.4	-110.29	-435.5	1,060.2	1,188.1	1,163.5	48.199		
6,600.0	6,598.1	6,591.5	6,590.4	14.5	10.5	-110.33	-437.1	1,060.1	1,189.4	1,164.4	47.659		
6,700.0	6,698.0	6,693.5	6,692.4	14.8	10.5	-110.38	-438.7	1,060.0	1,190.6	1,165.4	47.114		
6,800.0	6,798.0	6,796.8	6,795.8	15.0	10.6	-110.42	-440.3	1,059.7	1,191.6	1,166.1	46.567		
6,900.0	6,898.0	6,895.4	6,894.3	15.2	10.7	-110.47	-441.7	1,059.3	1,192.5	1,166.6	46.026		
7,000.0	6,997.9	6,995.0	6,993.9	15.5	10.8	-110.53	-443.0	1,059.0	1,193.6	1,167.4	45.501		
7,100.0	7,097.9	7,092.7	7,091.6	15.7	10.9	-110.59	-444.2	1,059.0	1,194.8	1,168.2	44.988		
7,200.0	7,197.9	7,191.8	7,190.7	15.9	11.0	-110.65	-445.4	1,058.9	1,196.0	1,169.1	44.488		
7,300.0	7,297.8	7,291.0	7,289.9	16.1	11.1	-110.71	-446.6	1,059.0	1,197.3	1,170.1	43.991		
7,400.0	7,397.8	7,390.0	7,388.9	16.4	11.2	-110.77	-447.8	1,059.1	1,198.7	1,171.1	43.507		
7,500.0	7,497.8	7,488.4	7,487.2	16.6	11.3	-110.84	-449.0	1,059.4	1,200.2	1,172.3	43.032		
7,600.0	7,597.7	7,586.4	7,585.3	16.8	11.4	-110.91	-450.1	1,059.8	1,201.8	1,173.6	42.572		
7,700.0	7,697.7	7,683.8	7,682.7	17.1	11.6	-110.97	-451.3	1,060.4	1,203.7	1,175.1	42.124		
7,800.0	7,797.7	7,781.5	7,780.3	17.3	11.7	-111.04	-452.6	1,061.2	1,205.7	1,176.8	41.691		
7,900.0	7,897.6	7,879.8	7,878.7	17.5	11.8	-111.09	-454.1	1,062.0	1,207.9	1,178.6	41.267		
8,000.0	7,997.6	7,978.5	7,977.4	17.8	11.9	-111.14	-455.9	1,063.0	1,210.2	1,180.6	40.855		
8,100.0	8,097.6	8,077.8	8,076.6	18.0	12.0	-111.17	-457.9	1,063.9	1,212.6	1,182.7	40.449		
8,200.0	8,197.5	8,178.5	8,177.3	18.2	12.2	-111.20	-460.2	1,064.9	1,215.1	1,184.7	40.049		
8,300.0	8,297.5	8,280.7	8,279.4	18.4	12.3	-111.22	-462.5	1,065.7	1,217.3	1,186.6	39.649		
8,400.0	8,397.4	8,382.2	8,380.9	18.7	12.4	-111.23	-464.9	1,066.2	1,219.5	1,188.4	39.253		
8,500.0	8,497.4	8,483.2	8,481.9	18.9	12.6	-111.24	-467.4	1,066.7	1,221.5	1,190.1	38.861		
8,600.0	8,597.4	8,586.1	8,584.8	19.1	12.7	-111.29	-469.0	1,067.3	1,223.4	1,191.6	38.471		
8,618.1	8,615.5	8,604.8	8,603.5	19.2	12.7	-111.32	-469.0	1,067.4	1,223.7	1,191.8	38.400		
8,625.0	8,622.4	8,611.5	8,610.2	19.2	12.8	-141.52	-469.0	1,067.5	1,223.8	1,191.9	38.377		
8,650.0	8,647.4	8,634.5	8,633.2	19.2	12.8	123.76	-468.2	1,067.9	1,224.5	1,192.6	38.321		
8,675.0	8,672.3	8,658.4	8,657.0	19.3	12.8	113.77	-466.4	1,068.6	1,225.6	1,193.6	38.285		
8,700.0	8,697.1	8,689.9	8,688.2	19.3	12.9	110.46	-462.1	1,069.9	1,227.0	1,194.9	38.258		
8,725.0	8,721.7	8,818.7	8,811.1	19.4	13.0	108.14	-425.3	1,074.7	1,227.8	1,195.6	38.087		
8,750.0	8,746.0	8,844.0	8,833.9	19.4	13.0	107.01	-414.4	1,075.3	1,227.6	1,195.3	38.031		
8,750.1	8,746.1	8,844.0	8,833.9	19.4	13.0	107.01	-414.4	1,075.3	1,227.6	1,195.3	38.031		
8,775.0	8,770.1	8,844.0	8,833.9	19.4	13.0	106.37	-414.4	1,075.3	1,228.0	1,195.7	38.041		
8,800.0	8,793.7	8,866.3	8,853.6	19.4	13.0	105.67	-404.0	1,076.4	1,228.7	1,196.4	38.025		
8,825.0	8,816.8	8,876.0	8,862.0	19.5	13.1	105.13	-399.3	1,077.1	1,230.2	1,197.8	38.056		
8,850.0	8,839.5	8,891.0	8,874.9	19.5	13.1	104.57	-391.6	1,078.5	1,232.3	1,199.9	38.097		
8,875.0	8,861.5	8,891.0	8,874.9	19.5	13.1	104.07	-391.6	1,078.5	1,234.9	1,202.6	38.181		
8,900.0	8,882.9	8,910.9	8,891.5	19.5	13.1	103.49	-381.0	1,080.8	1,238.1	1,205.7	38.233		
8,925.0	8,903.6	8,924.6	8,902.7	19.6	13.1	102.91	-373.3	1,082.6	1,241.7	1,209.3	38.308		
8,950.0	8,923.5	9,093.3	9,017.5	19.6	13.6	101.07	-252.7	1,102.1	1,243.9	1,211.0	37.748		
8,975.0	8,942.6	9,114.8	9,028.7	19.6	13.7	100.48	-234.4	1,104.1	1,245.4	1,212.3	37.659		
9,000.0	8,960.9	9,127.0	9,034.6	19.6	13.8	100.01	-223.8	1,105.4	1,247.2	1,214.1	37.623		
9,025.0	8,978.2	9,146.4	9,043.5	19.7	13.9	99.41	-206.7	1,107.5	1,249.4	1,216.1	37.531		
9,050.0	8,994.6	9,160.1	9,049.5	19.7	13.9	98.87	-194.6	1,109.2	1,252.1	1,218.7	37.479		
9,075.0	9,009.9	9,175.0	9,055.8	19.7	14.0	98.30	-181.2	1,111.3	1,255.1	1,221.6	37.421		
9,100.0	9,024.2	9,175.0	9,055.8	19.8	14.0	97.83	-181.2	1,111.3	1,258.6	1,225.0	37.458		
9,125.0	9,037.4	9,198.9	9,065.2	19.9	14.2	97.14	-159.5	1,114.9	1,262.4	1,228.6	37.323		
9,150.0	9,049.5	9,222.0	9,073.7	19.9	14.3	96.47	-138.4	1,118.9	1,266.7	1,232.5	37.203		
9,175.0	9,060.4	9,222.0	9,073.7	20.0	14.3	95.90	-138.4	1,118.9	1,271.2	1,237.0	37.233		
9,200.0	9,070.1	9,240.3	9,079.8	20.1	14.4	95.22	-121.5	1,122.3	1,276.0	1,241.7	37.131		

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores-Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #11H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default, 4730-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
9,225.0	9,078.6	9,257.6	9,085.1	20.2	14.6	94.54	-105.4	1,125.7	1,281.2	1,246.6	37.030		
9,250.0	9,085.9	9,484.0	9,118.2	20.3	16.6	92.57	115.1	1,156.8	1,286.3	1,249.6	35.057		
9,275.0	9,091.9	9,503.0	9,118.7	20.4	16.7	92.19	134.0	1,157.9	1,287.9	1,250.9	34.806		
9,300.0	9,096.6	9,520.0	9,119.2	20.5	16.9	91.85	151.0	1,159.0	1,289.6	1,252.3	34.576		
9,325.0	9,100.1	9,537.1	9,119.6	20.6	17.1	91.52	168.0	1,160.2	1,291.5	1,253.9	34.347		
9,350.0	9,102.2	9,554.2	9,120.0	20.8	17.3	91.22	185.1	1,161.5	1,293.6	1,255.7	34.120		
9,375.0	9,103.0	9,579.0	9,120.6	20.9	17.5	90.95	209.8	1,163.5	1,295.8	1,257.5	33.825		
9,380.7	9,103.0	9,579.0	9,120.6	21.0	17.5	90.89	209.8	1,163.5	1,296.3	1,258.0	33.809		
9,400.0	9,102.9	9,590.4	9,120.8	21.1	17.7	90.90	221.2	1,164.5	1,298.2	1,259.6	33.644		
9,500.0	9,102.4	9,673.0	9,122.1	21.8	18.6	90.97	303.4	1,172.4	1,308.5	1,268.3	32.562		
9,600.0	9,101.9	9,762.8	9,122.9	22.6	19.7	91.02	392.6	1,182.0	1,319.9	1,277.8	31.349		
9,700.0	9,101.3	9,973.0	9,127.9	23.5	22.4	91.27	602.4	1,194.1	1,325.3	1,279.7	29.022		
9,800.0	9,100.8	10,076.5	9,129.2	24.5	23.8	91.35	705.9	1,196.6	1,328.5	1,280.3	27.596		
9,900.0	9,100.3	10,170.9	9,128.3	25.6	25.2	91.32	800.3	1,199.0	1,331.7	1,281.1	26.284		
10,000.0	9,099.8	10,324.3	9,126.0	26.8	27.5	91.26	953.5	1,202.0	1,335.0	1,280.9	24.651		
10,100.0	9,099.2	10,429.0	9,125.7	28.1	29.1	91.27	1,058.2	1,199.9	1,333.8	1,276.8	23.408		
10,200.0	9,098.7	10,523.0	9,124.2	29.4	30.5	91.23	1,152.2	1,198.5	1,333.0	1,273.2	22.298		
10,222.2	9,098.6	10,539.4	9,123.8	29.7	30.8	91.21	1,168.6	1,198.4	1,333.0	1,272.6	22.086		
10,300.0	9,098.2	10,613.9	9,121.1	30.8	32.0	91.11	1,243.1	1,198.0	1,333.1	1,270.5	21.286		
10,400.0	9,097.7	10,745.2	9,117.0	32.2	34.1	90.97	1,374.2	1,195.7	1,331.9	1,265.8	20.150		
10,500.0	9,097.2	10,842.6	9,114.3	33.6	35.6	90.87	1,471.6	1,193.0	1,329.8	1,260.7	19.250		
10,600.0	9,096.6	10,930.0	9,113.8	35.1	36.9	90.87	1,558.9	1,191.2	1,328.5	1,256.6	18.476		
10,700.0	9,096.1	11,023.3	9,114.4	36.7	38.3	90.92	1,652.3	1,190.0	1,327.9	1,253.1	17.748		
10,800.0	9,095.6	11,124.8	9,115.3	38.2	39.9	90.98	1,753.7	1,188.7	1,327.4	1,249.4	17.027		
10,900.0	9,095.1	11,222.1	9,115.7	39.8	41.5	91.02	1,851.0	1,187.6	1,327.0	1,245.9	16.355		
11,000.0	9,094.5	11,327.4	9,114.7	41.4	43.3	91.00	1,956.3	1,186.4	1,326.6	1,242.1	15.697		
11,100.0	9,094.0	11,421.0	9,112.3	43.0	44.8	90.92	2,049.9	1,185.0	1,325.8	1,238.2	15.124		
11,116.8	9,093.9	11,434.7	9,112.1	43.2	45.0	90.92	2,063.6	1,184.9	1,325.8	1,237.6	15.039		
11,200.0	9,093.5	11,501.4	9,111.5	44.6	46.1	90.91	2,130.3	1,184.8	1,326.3	1,235.7	14.642		
11,300.0	9,093.0	11,592.0	9,110.4	46.2	47.6	90.88	2,220.9	1,186.0	1,328.2	1,234.6	14.177		
11,400.0	9,092.4	11,703.2	9,111.2	47.9	49.4	90.93	2,332.1	1,186.5	1,329.5	1,232.3	13.688		
11,500.0	9,091.9	11,803.4	9,113.3	49.5	51.0	91.05	2,432.3	1,187.0	1,330.7	1,230.3	13.255		
11,600.0	9,091.4	11,894.5	9,114.9	51.2	52.5	91.13	2,523.3	1,187.4	1,331.9	1,228.3	12.859		
11,700.0	9,090.9	11,973.2	9,115.3	52.9	53.8	91.17	2,602.0	1,188.7	1,334.4	1,227.8	12.517		
11,800.0	9,090.3	12,052.9	9,114.4	54.6	55.2	91.14	2,681.6	1,191.6	1,338.7	1,229.0	12.207		
11,900.0	9,089.8	12,164.6	9,111.1	56.3	57.1	91.03	2,793.2	1,196.1	1,343.4	1,230.1	11.861		
12,000.0	9,089.3	12,290.8	9,111.8	58.0	59.1	91.08	2,919.4	1,198.7	1,346.1	1,229.1	11.502		
12,100.0	9,088.8	12,390.5	9,113.5	59.7	60.8	91.17	3,019.0	1,199.9	1,348.1	1,227.7	11.196		
12,200.0	9,088.3	12,486.0	9,113.9	61.5	62.4	91.21	3,114.5	1,201.3	1,350.3	1,226.5	10.909		
12,300.0	9,087.7	12,638.0	9,116.7	63.2	65.0	91.36	3,266.5	1,200.5	1,350.5	1,222.4	10.545		
12,400.0	9,087.2	12,737.8	9,120.7	64.9	66.6	91.56	3,366.2	1,198.3	1,349.0	1,217.6	10.264		
12,500.0	9,086.7	12,843.1	9,124.9	66.7	68.4	91.76	3,471.3	1,195.8	1,347.5	1,212.6	9.986		
12,600.0	9,086.2	12,990.4	9,128.5	68.4	70.9	91.95	3,618.5	1,189.7	1,344.3	1,205.1	9.659		
12,700.0	9,085.6	13,098.2	9,125.8	70.1	72.8	91.87	3,726.0	1,182.8	1,338.6	1,195.8	9.374		
12,800.0	9,085.1	13,195.2	9,121.5	71.9	74.5	91.71	3,822.7	1,176.6	1,332.8	1,186.6	9.113		
12,900.0	9,084.6	13,287.7	9,116.3	73.6	76.1	91.52	3,914.8	1,170.9	1,327.2	1,177.6	8.870		
13,000.0	9,084.1	13,355.0	9,113.1	75.4	77.2	91.40	3,982.0	1,167.5	1,323.0	1,170.4	8.674		
13,100.0	9,083.5	13,429.6	9,111.3	77.2	78.4	91.34	4,056.5	1,165.3	1,320.9	1,165.4	8.495		
13,134.0	9,083.4	13,453.1	9,111.2	77.8	78.8	91.34	4,080.1	1,165.1	1,320.8	1,164.3	8.441		
13,200.0	9,083.0	13,516.3	9,110.9	78.9	79.9	91.34	4,143.2	1,164.7	1,320.9	1,162.2	8.323		
13,300.0	9,082.5	13,607.5	9,109.6	80.7	81.4	91.30	4,234.5	1,164.6	1,321.4	1,159.3	8.154		
13,400.0	9,082.0	13,710.2	9,108.1	82.5	83.2	91.26	4,337.1	1,164.9	1,322.4	1,156.8	7.986		

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Sec 32, T24-S, R32E - Azores Federal #11H - Wellbore #1 - Wellbore #1												Offset Well Error:	0.0 usft
Survey Program: 100-MWD default, 4730-MWD default													
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
13,500.0	9,081.4	13,823.1	9,109.3	84.2	85.1	91.34	4,450.0	1,164.3	1,322.7	1,153.4	7.816		
13,600.0	9,080.9	13,921.0	9,110.2	86.0	86.8	91.40	4,547.9	1,163.5	1,322.5	1,149.9	7.659		
13,700.0	9,080.4	14,038.4	9,111.0	87.8	88.8	91.46	4,665.3	1,161.6	1,321.6	1,145.2	7.489		
13,800.0	9,079.9	14,133.7	9,110.2	89.6	90.4	91.45	4,760.5	1,159.8	1,320.5	1,140.6	7.340		
13,900.0	9,079.3	14,233.6	9,108.8	91.3	92.2	91.41	4,860.5	1,158.0	1,319.4	1,136.0	7.192		
14,000.0	9,078.8	14,333.6	9,107.4	93.1	94.0	91.38	4,960.4	1,156.3	1,318.4	1,131.4	7.050		
14,076.1	9,078.4	14,396.0	9,106.6	94.5	95.1	91.35	5,022.8	1,155.2	1,317.7	1,128.2	6.955		
14,082.2	9,078.4	14,396.0	9,106.6	94.6	95.1	91.35	5,022.8	1,155.2	1,317.7	1,128.1	6.951		
14,082.7	9,078.4	14,396.0	9,106.6	94.6	95.1	91.35	5,022.8	1,155.2	1,317.7	1,128.1	6.951 SF		

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Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 10100-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	100.58	-18.7	100.1	102.2				
100.0	100.0	91.5	91.5	0.1	0.0	100.68	-18.9	100.0	101.8	101.7	830.745		
200.0	200.0	191.7	191.7	0.3	0.1	100.82	-19.1	99.8	101.6	101.2	254.700		
300.0	300.0	292.5	292.5	0.5	0.1	100.58	-18.5	99.3	101.0	100.3	149.173		
400.0	400.0	392.5	392.5	0.8	0.2	99.95	-17.2	98.3	99.9	98.9	104.517		
500.0	500.0	492.4	492.4	1.0	0.3	99.10	-15.6	97.5	98.8	97.5	80.005		
600.0	600.0	592.5	592.4	1.2	0.3	98.04	-13.7	96.8	97.7	96.2	64.532		
700.0	700.0	692.7	692.6	1.4	0.4	96.85	-11.5	95.9	96.6	94.8	53.811		
800.0	800.0	792.5	792.4	1.7	0.4	95.41	-9.0	95.0	95.5	93.4	45.967		
900.0	900.0	892.1	891.9	1.9	0.5	93.62	-6.0	94.5	94.7	92.3	40.133		
1,000.0	1,000.0	992.9	992.6	2.1	0.5	91.63	-2.7	93.7	93.8	91.1	35.483		
1,075.5	1,075.5	1,068.6	1,068.4	2.3	0.6	-126.28	-0.2	92.7	93.2	90.4	32.887		
1,100.0	1,100.0	1,093.2	1,092.9	2.3	0.6	-127.09	0.6	92.2	93.2	90.3	32.228		
1,200.0	1,199.9	1,193.6	1,193.2	2.5	0.7	-130.15	3.5	90.3	93.1	89.9	29.717		
1,255.3	1,255.2	1,248.6	1,248.2	2.6	0.7	-131.60	4.6	89.1	93.0	89.7	28.462 CC		
1,300.0	1,299.9	1,293.1	1,292.7	2.7	0.7	-132.67	5.4	88.3	93.0	89.7	27.562		
1,400.0	1,399.9	1,393.1	1,392.7	2.9	0.8	-134.89	6.9	86.6	93.3	89.7	25.753		
1,500.0	1,499.8	1,493.6	1,493.2	3.1	0.8	-137.08	8.3	84.5	93.4	89.6	24.088		
1,541.1	1,540.9	1,534.6	1,534.1	3.1	0.8	-137.99	8.8	83.5	93.4	89.4	23.435		
1,600.0	1,599.8	1,593.3	1,592.8	3.3	0.9	-139.37	9.8	82.2	93.5	89.4	22.592		
1,700.0	1,699.8	1,693.9	1,693.3	3.5	0.9	-141.79	11.5	79.7	93.6	89.2	21.258		
1,739.5	1,739.2	1,733.1	1,732.6	3.6	1.0	-142.74	12.1	78.6	93.5	89.0	20.749		
1,800.0	1,799.7	1,793.2	1,792.6	3.7	1.0	-144.26	13.3	77.1	93.7	89.0	20.067		
1,900.0	1,899.7	1,892.9	1,892.3	3.9	1.1	-146.76	15.2	74.9	94.4	89.5	19.133		
2,000.0	1,999.7	1,992.7	1,992.1	4.1	1.1	-149.12	17.1	72.9	95.5	90.3	18.349		
2,100.0	2,099.6	2,092.9	2,092.2	4.3	1.2	-151.55	19.2	70.7	96.7	91.2	17.651		
2,200.0	2,199.6	2,192.7	2,192.0	4.5	1.2	-154.06	21.4	68.3	97.9	92.1	17.026		
2,300.0	2,299.6	2,291.9	2,291.1	4.8	1.3	-156.34	23.6	66.4	99.7	93.7	16.559		
2,400.0	2,399.5	2,391.6	2,390.8	5.0	1.3	-158.23	25.6	65.2	102.1	95.8	16.230		
2,500.0	2,499.5	2,492.0	2,491.2	5.2	1.4	-159.98	27.4	64.0	104.5	98.0	15.923		
2,600.0	2,599.5	2,592.1	2,591.2	5.4	1.5	-161.55	28.9	62.5	106.7	99.9	15.605		
2,700.0	2,699.4	2,692.4	2,691.5	5.7	1.5	-162.84	29.9	61.2	108.7	101.6	15.295		
2,800.0	2,799.4	2,792.7	2,791.8	5.9	1.6	-163.67	30.1	60.1	110.5	103.1	14.980		
2,900.0	2,899.4	2,892.3	2,891.4	6.1	1.6	-164.22	29.9	59.3	112.3	104.7	14.686		
3,000.0	2,999.3	2,992.6	2,991.7	6.3	1.7	-165.25	30.5	57.9	114.2	106.2	14.411		
3,100.0	3,099.3	3,091.3	3,090.3	6.5	1.7	-166.88	32.3	56.0	116.4	108.2	14.196		
3,200.0	3,199.3	3,191.5	3,190.5	6.8	1.8	-168.68	34.9	54.1	119.2	110.8	14.066		
3,300.0	3,299.2	3,291.4	3,290.4	7.0	1.8	-170.45	37.3	51.9	122.0	113.2	13.930		
3,400.0	3,399.2	3,391.7	3,390.6	7.2	1.9	-172.06	39.5	49.8	124.7	115.6	13.799		
3,500.0	3,499.1	3,491.8	3,490.7	7.5	2.0	-173.46	41.3	47.8	127.2	117.9	13.660		
3,600.0	3,599.1	3,593.2	3,592.0	7.7	2.0	-174.86	42.8	45.2	129.2	119.6	13.473		
3,700.0	3,699.1	3,694.4	3,693.2	7.9	2.1	-176.36	43.6	41.7	130.2	120.3	13.191		
3,800.0	3,799.0	3,794.5	3,793.2	8.1	2.1	-177.84	44.0	37.9	130.7	120.6	12.877		
3,900.0	3,899.0	3,894.7	3,893.4	8.4	2.2	-179.03	43.8	34.4	131.2	120.7	12.579		
4,000.0	3,999.0	3,994.6	3,993.2	8.6	2.2	-179.97	43.3	31.4	131.6	120.9	12.295		
4,100.0	4,098.9	4,094.5	4,093.1	8.8	2.3	-179.08	42.9	28.4	132.2	121.2	12.035		
4,200.0	4,198.9	4,194.4	4,192.9	9.0	2.4	-178.32	42.3	25.8	132.8	121.6	11.797		
4,300.0	4,298.9	4,295.3	4,293.8	9.3	2.4	-178.03	40.8	23.9	133.2	121.6	11.550		
4,400.0	4,398.8	4,395.7	4,394.1	9.5	2.4	-178.14	38.4	22.4	133.0	121.2	11.271		
4,471.6	4,470.4	4,466.9	4,465.3	9.7	2.5	-178.26	36.6	21.5	132.9	120.9	11.079		
4,500.0	4,498.8	4,495.1	4,493.5	9.7	2.5	-178.32	36.0	21.2	132.9	120.8	11.010		
4,600.0	4,598.8	4,594.4	4,592.7	10.0	2.5	-178.52	33.9	20.3	133.3	121.0	10.802		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design													Sec 32, T24-S, R32E - Azores Federal #3H - Wellbore #1 - Wellbore #1		Offset Site Error: 0.0 usft	
Survey Program: 100-Good_gyro, 10100-MWD default													Offset Well Error: 0.0 usft			
Reference	Vertical	Offset	Vertical	Semi Major Axis		Highside	Offset Wellbore Centre		Distance		Separation	Warning				
Measured	Depth	Measured	Depth	Reference	Offset		+N-S	+E-W	Between	Between						
Depth	Depth	Depth	Depth			Toolface	(usft)	(usft)	Centres	Ellipses	Factor					
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)			(usft)	(usft)						
4,700.0	4,698.7	4,693.5	4,691.8	10.2	2.6	178.73	32.4	19.8	134.4	121.8	10.653					
4,800.0	4,798.7	4,794.0	4,792.4	10.4	2.6	178.96	30.9	19.3	135.6	122.7	10.523					
4,900.0	4,898.7	4,893.6	4,891.9	10.6	2.7	179.22	29.3	18.9	136.7	123.5	10.389					
5,000.0	4,998.6	4,993.2	4,991.5	10.9	2.7	179.47	28.0	18.7	138.1	124.7	10.285					
5,100.0	5,098.6	5,092.6	5,090.9	11.1	2.8	179.66	27.1	18.6	139.9	126.2	10.211					
5,200.0	5,198.6	5,192.4	5,190.7	11.3	2.8	179.77	26.5	18.4	142.0	128.0	10.159					
5,300.0	5,298.5	5,292.2	5,290.5	11.6	2.9	179.85	26.0	18.3	144.1	129.9	10.116					
5,400.0	5,398.5	5,392.6	5,390.9	11.8	2.9	179.97	25.4	18.3	146.2	131.7	10.071					
5,500.0	5,498.5	5,492.7	5,491.0	12.0	3.0	-179.90	24.6	18.1	148.1	133.3	10.013					
5,600.0	5,598.4	5,592.3	5,590.6	12.2	3.0	-179.85	24.0	17.8	150.1	135.1	9.963					
5,700.0	5,698.4	5,692.1	5,690.4	12.5	3.1	-179.86	23.7	17.6	152.3	137.0	9.928					
5,800.0	5,798.4	5,792.0	5,790.3	12.7	3.1	-179.91	23.4	17.2	154.6	139.0	9.898					
5,900.0	5,898.3	5,892.1	5,890.4	12.9	3.2	179.98	23.3	16.8	156.8	140.9	9.868					
6,000.0	5,998.3	5,992.0	5,990.3	13.2	3.2	179.80	23.2	16.1	159.0	142.9	9.836					
6,100.0	6,098.2	6,091.8	6,090.1	13.4	3.3	179.64	23.2	15.6	161.3	144.9	9.812					
6,200.0	6,198.2	6,191.8	6,190.1	13.6	3.3	179.48	23.3	15.0	163.7	147.0	9.790					
6,300.0	6,298.2	6,292.1	6,290.4	13.8	3.4	179.23	23.4	14.2	165.9	148.9	9.763					
6,400.0	6,398.1	6,391.3	6,389.6	14.1	3.4	178.90	23.7	13.2	168.3	151.0	9.742					
6,500.0	6,498.1	6,491.5	6,489.8	14.3	3.5	178.59	24.2	12.3	170.8	153.3	9.733					
6,600.0	6,598.1	6,591.8	6,590.1	14.5	3.6	178.27	24.6	11.3	173.2	155.4	9.714					
6,700.0	6,698.0	6,692.1	6,690.4	14.8	3.6	177.97	24.8	10.2	175.4	157.3	9.686					
6,800.0	6,798.0	6,792.0	6,790.3	15.0	3.7	177.73	24.8	9.2	177.5	159.1	9.655					
6,900.0	6,898.0	6,892.1	6,890.4	15.2	3.7	177.46	24.9	8.2	179.6	160.9	9.624					
7,000.0	6,997.9	6,991.7	6,990.0	15.5	3.8	177.09	25.2	6.8	181.8	162.8	9.596					
7,100.0	7,097.9	7,092.1	7,090.3	15.7	3.8	176.71	25.6	5.4	184.0	164.7	9.571					
7,200.0	7,197.9	7,193.1	7,191.3	15.9	3.9	176.31	25.6	3.8	185.8	166.3	9.528					
7,300.0	7,297.8	7,293.4	7,291.6	16.1	3.9	175.92	25.4	1.9	187.2	167.4	9.466					
7,400.0	7,397.8	7,392.8	7,391.0	16.4	4.0	175.49	25.3	0.0	188.7	168.7	9.409					
7,500.0	7,497.8	7,493.6	7,491.8	16.6	4.0	175.17	24.9	-1.7	190.2	169.9	9.353					
7,600.0	7,597.7	7,592.3	7,590.5	16.8	4.1	175.06	24.3	-2.8	191.7	171.1	9.302					
7,700.0	7,697.7	7,691.9	7,690.1	17.1	4.1	175.04	24.0	-3.3	193.8	172.9	9.277					
7,800.0	7,797.7	7,792.1	7,790.2	17.3	4.2	175.05	23.6	-3.8	195.9	174.7	9.255					
7,900.0	7,897.6	7,892.8	7,891.0	17.5	4.2	175.07	23.0	-4.3	197.7	176.3	9.221					
8,000.0	7,997.6	7,993.2	7,991.4	17.8	4.3	175.13	22.1	-4.9	199.2	177.5	9.174					
8,100.0	8,097.6	8,093.9	8,092.0	18.0	4.3	175.18	20.9	-5.7	200.5	178.5	9.116					
8,200.0	8,197.5	8,192.9	8,191.0	18.2	4.4	175.26	19.8	-6.3	201.8	179.5	9.064					
8,300.0	8,297.5	8,292.9	8,291.0	18.4	4.4	175.40	18.8	-6.6	203.4	180.9	9.024					
8,400.0	8,397.4	8,393.2	8,391.3	18.7	4.5	175.58	17.6	-6.8	204.9	182.1	8.981					
8,500.0	8,497.4	8,493.0	8,491.1	18.9	4.5	175.78	16.3	-6.9	206.4	183.3	8.938					
8,600.0	8,597.4	8,593.1	8,591.2	19.1	4.6	175.88	15.3	-7.4	207.9	184.5	8.896					
8,618.1	8,615.5	8,611.1	8,609.2	19.2	4.6	175.88	15.1	-7.5	208.1	184.7	8.888					
8,625.0	8,622.4	8,618.0	8,616.1	19.2	4.6	145.70	15.0	-7.6	208.2	184.8	8.884					
8,650.0	8,647.4	8,642.7	8,640.8	19.2	4.6	51.26	14.8	-7.8	207.7	184.3	8.852					
8,675.0	8,672.3	8,667.4	8,665.5	19.3	4.6	41.86	14.7	-7.9	206.2	182.7	8.789					
8,700.0	8,697.1	8,692.0	8,690.1	19.3	4.7	39.46	14.5	-8.1	203.6	180.2	8.693					
8,725.0	8,721.7	8,716.6	8,714.7	19.4	4.7	38.96	14.4	-8.3	200.0	176.6	8.564					
8,750.0	8,746.0	8,741.1	8,739.2	19.4	4.7	39.40	14.3	-8.4	195.3	172.0	8.398					
8,775.0	8,770.1	8,765.2	8,763.3	19.4	4.7	40.51	14.2	-8.7	189.6	166.5	8.194					
8,800.0	8,793.7	8,789.0	8,787.1	19.4	4.7	42.20	14.0	-8.9	183.1	160.0	7.948					
8,825.0	8,816.8	8,812.3	8,810.4	19.5	4.7	44.47	13.9	-9.2	175.7	152.8	7.660					
8,850.0	8,839.5	8,835.0	8,833.1	19.5	4.7	47.34	13.8	-9.5	167.6	144.7	7.327					
8,875.0	8,861.5	8,857.2	8,855.3	19.5	4.7	50.86	13.7	-9.8	159.0	136.1	6.950					

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 10100-MWD default												Offset Well Error:	0.0 usft
Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
8,900.0	8,882.9	8,878.7	8,878.8	19.5	4.8	55.08	13.5	-10.2	150.0	127.1	6.536		
8,925.0	8,903.6	8,899.5	8,897.6	19.6	4.8	60.02	13.4	-10.5	141.0	117.9	6.097		
8,950.0	8,923.5	8,919.4	8,917.5	19.6	4.8	65.64	13.3	-10.9	132.3	108.9	5.657		
8,975.0	8,942.6	8,938.5	8,936.6	19.6	4.8	71.85	13.1	-11.3	124.4	100.7	5.248		
9,000.0	8,960.9	8,956.7	8,954.8	19.6	4.8	78.44	13.0	-11.6	117.9	93.9	4.909		
9,025.0	8,978.2	8,974.0	8,972.0	19.7	4.8	85.12	12.8	-12.0	113.5	89.3	4.678		
9,049.8	8,994.5	8,990.1	8,988.2	19.7	4.8	91.52	12.7	-12.3	112.0	87.6	4.588		
9,050.0	8,994.6	8,990.2	8,988.3	19.7	4.8	91.56	12.7	-12.3	112.0	87.6	4.588 ES		
9,075.0	9,009.9	9,005.4	9,003.5	19.7	4.8	97.47	12.5	-12.6	113.7	88.9	4.572 SF		
9,100.0	9,024.2	9,019.7	9,017.7	19.8	4.8	102.64	12.4	-12.9	119.1	93.9	4.720		
9,125.0	9,037.4	9,032.7	9,030.8	19.9	4.8	106.91	12.3	-13.2	128.0	102.5	5.026		
9,150.0	9,049.5	9,044.7	9,042.7	19.9	4.8	110.22	12.1	-13.5	140.0	114.4	5.470		
9,175.0	9,060.4	9,055.4	9,053.4	20.0	4.8	112.56	12.0	-13.8	154.6	128.9	6.025		
9,200.0	9,070.1	9,064.9	9,062.9	20.1	4.9	113.90	11.9	-14.0	171.4	145.6	6.665		
9,225.0	9,078.6	9,073.2	9,071.2	20.2	4.9	114.25	11.8	-14.2	189.9	164.1	7.364		
9,250.0	9,085.9	9,080.2	9,078.2	20.3	4.9	113.56	11.7	-14.4	209.7	183.8	8.102		
9,275.0	9,091.9	9,085.9	9,083.9	20.4	4.9	111.74	11.7	-14.6	230.7	204.7	8.867		
9,300.0	9,096.6	9,090.3	9,088.4	20.5	4.9	108.67	11.6	-14.7	252.5	226.4	9.660		
9,325.0	9,100.1	9,093.5	9,091.5	20.6	4.9	104.22	11.6	-14.8	275.0	248.8	10.506		
9,350.0	9,102.2	9,095.3	9,093.3	20.8	4.9	98.26	11.6	-14.8	297.9	272.0	11.465		
9,375.0	9,103.0	9,095.8	9,093.8	20.9	4.9	90.76	11.6	-14.8	321.3	295.6	12.504		
9,380.7	9,103.0	9,095.8	9,093.8	21.0	4.9	88.84	11.6	-14.8	326.7	300.9	12.705		
9,400.0	9,102.9	9,095.4	9,093.4	21.1	4.9	88.67	11.6	-14.8	344.8	319.0	13.354		
9,500.0	9,102.4	9,093.7	9,091.7	21.8	4.9	87.77	11.6	-14.8	440.7	414.2	16.638		
9,600.0	9,101.9	9,091.9	9,090.0	22.6	4.9	86.89	11.6	-14.7	538.0	510.7	19.729		
9,700.0	9,101.3	9,090.2	9,088.2	23.5	4.9	86.01	11.6	-14.7	636.2	608.0	22.590		
9,800.0	9,100.8	9,088.5	9,086.5	24.5	4.9	85.13	11.6	-14.6	734.8	705.7	25.211		
9,900.0	9,100.3	9,086.8	9,084.8	25.6	4.9	84.27	11.7	-14.6	833.8	803.6	27.595		
10,000.0	9,099.8	9,085.1	9,083.2	26.8	4.9	83.42	11.7	-14.5	933.0	901.7	29.757		
10,100.0	9,099.2	9,083.5	9,081.5	28.1	4.9	82.57	11.7	-14.5	1,032.4	999.8	31.714		
10,200.0	9,098.7	9,081.8	9,079.8	29.4	4.9	81.73	11.7	-14.4	1,131.8	1,098.0	33.485		
10,300.0	9,098.2	9,080.1	9,078.2	30.8	4.9	80.90	11.7	-14.4	1,231.4	1,196.3	35.090		
10,400.0	9,097.7	9,078.5	9,076.5	32.2	4.9	80.09	11.8	-14.4	1,331.0	1,294.5	36.548		
10,500.0	9,097.2	9,076.9	9,074.9	33.6	4.9	79.28	11.8	-14.3	1,430.6	1,392.9	37.877		
10,600.0	9,096.6	11,931.2	10,573.1	35.1	27.6	174.65	1,551.9	2.0	1,491.6	1,466.4	59.275		
10,700.0	9,096.1	12,032.1	10,572.1	36.7	29.4	174.66	1,652.8	0.9	1,491.1	1,464.6	56.164		
10,800.0	9,095.6	12,137.8	10,571.0	38.2	31.2	174.69	1,758.5	-0.7	1,490.5	1,462.6	53.283		
10,900.0	9,095.1	12,230.0	10,569.9	39.8	32.7	174.71	1,850.6	-1.8	1,489.9	1,460.5	50.814		
10,925.8	9,094.9	12,251.0	10,569.8	40.2	33.1	174.71	1,871.7	-1.9	1,489.8	1,460.2	50.245		
11,000.0	9,094.5	12,309.5	10,569.7	41.4	34.0	174.70	1,930.2	-2.1	1,490.2	1,459.6	48.709		
11,100.0	9,094.0	12,393.4	10,570.7	43.0	35.4	174.68	2,014.0	-2.1	1,491.9	1,460.0	46.762		
11,200.0	9,093.5	12,491.8	10,572.2	44.6	37.0	174.60	2,112.4	-0.6	1,494.2	1,460.9	44.819		
11,300.0	9,093.0	12,605.9	10,573.4	46.2	39.0	174.47	2,226.4	2.3	1,496.1	1,461.1	42.856		
11,400.0	9,092.4	12,700.8	10,573.8	47.9	40.6	174.35	2,321.4	4.9	1,497.4	1,461.0	41.192		
11,500.0	9,091.9	12,825.1	10,574.1	49.5	42.7	174.20	2,445.6	8.0	1,498.5	1,460.5	39.416		
11,600.0	9,091.4	12,924.8	10,573.2	51.2	44.4	174.06	2,545.2	10.9	1,498.5	1,459.0	37.921		
11,700.0	9,090.9	13,022.8	10,572.5	52.9	46.1	173.92	2,643.3	13.8	1,498.7	1,457.6	36.543		
11,800.0	9,090.3	13,124.1	10,571.7	54.6	47.8	173.79	2,744.5	16.5	1,498.7	1,456.2	35.238		
11,900.0	9,089.8	13,214.1	10,571.2	56.3	49.3	173.68	2,834.4	18.7	1,499.1	1,455.1	34.094		
12,000.0	9,089.3	13,294.0	10,571.7	58.0	50.6	173.61	2,914.3	20.0	1,500.6	1,455.2	33.109		
12,100.0	9,088.8	13,398.8	10,573.1	59.7	52.4	173.54	3,019.1	21.3	1,502.6	1,455.7	32.065		
12,200.0	9,088.3	13,518.2	10,573.3	61.5	54.5	173.44	3,138.5	23.2	1,503.5	1,455.0	30.983		

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 10100-MWD default												Offset Well Error:	0.0 usft
Measured Depth (usft)	Reference Vertical Depth (usft)	Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
12,300.0	9,087.7	13,616.5	10,573.1	63.2	56.2	173.36	3,236.8	24.8	1,504.1	1,454.0	30.060		
12,400.0	9,087.2	13,715.0	10,573.0	64.9	57.8	173.27	3,335.3	26.4	1,504.7	1,453.2	29.190		
12,500.0	9,086.7	13,806.8	10,573.1	66.7	59.4	173.22	3,427.0	27.1	1,505.6	1,452.6	28.409		
12,600.0	9,086.2	13,893.8	10,574.0	68.4	60.8	173.18	3,514.1	27.8	1,507.4	1,452.9	27.702		
12,700.0	9,085.6	13,992.4	10,575.6	70.1	62.5	173.09	3,612.6	29.6	1,509.7	1,453.8	26.989		
12,800.0	9,085.1	14,103.5	10,576.5	71.9	64.4	172.98	3,723.7	32.0	1,511.4	1,453.9	26.250		
12,900.0	9,084.6	14,228.5	10,576.6	73.6	66.6	172.83	3,848.7	35.0	1,512.4	1,453.1	25.485		
13,000.0	9,084.1	14,353.5	10,573.8	75.4	68.8	172.68	3,973.6	38.0	1,511.1	1,450.0	24.719		
13,100.0	9,083.5	14,434.0	10,572.5	77.2	70.1	172.59	4,054.1	39.8	1,510.3	1,447.7	24.147		
13,117.9	9,083.4	14,439.4	10,572.5	77.5	70.2	172.58	4,059.4	39.9	1,510.3	1,447.5	24.078		
13,200.0	9,083.0	14,529.0	10,571.8	78.9	71.7	172.52	4,149.1	40.9	1,510.3	1,446.3	23.577		
13,300.0	9,082.5	14,640.2	10,570.3	80.7	73.7	172.48	4,260.3	41.0	1,509.6	1,443.9	22.986		
13,377.6	9,082.1	14,703.8	10,569.7	82.1	74.8	172.47	4,323.8	40.7	1,509.2	1,442.5	22.611		
13,400.0	9,082.0	14,719.0	10,569.6	82.5	75.0	172.47	4,339.0	40.7	1,509.3	1,442.2	22.516		
13,500.0	9,081.4	14,797.5	10,570.0	84.2	76.3	172.46	4,417.6	40.3	1,510.3	1,442.0	22.088		
13,600.0	9,080.9	14,875.4	10,571.6	86.0	77.6	172.46	4,495.4	40.0	1,513.0	1,443.3	21.700		
13,700.0	9,080.4	14,980.2	10,574.7	87.8	79.4	172.44	4,600.1	40.4	1,516.6	1,445.3	21.274		
13,800.0	9,079.9	15,094.3	10,576.6	89.6	81.4	172.39	4,714.2	41.2	1,518.9	1,446.0	20.825		
13,900.0	9,079.3	15,098.0	10,576.7	91.3	81.5	172.39	4,717.9	41.2	1,524.1	1,450.4	20.671		
14,000.0	9,078.8	15,098.0	10,576.7	93.1	81.5	172.39	4,717.9	41.2	1,535.8	1,461.3	20.617		
14,082.2	9,078.4	15,098.0	10,576.7	94.6	81.5	172.39	4,717.9	41.2	1,550.1	1,475.0	20.636		
14,082.7	9,078.4	15,098.0	10,576.7	94.6	81.5	172.39	4,717.9	41.2	1,550.2	1,475.1	20.637		

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #7H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 8513-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	113.21	-409.3	954.7	1,038.7				
100.0	100.0	97.0	97.0	0.1	0.0	113.19	-409.0	954.8	1,038.7	1,038.6	8,590.851		
200.0	200.0	196.9	196.9	0.3	0.1	113.16	-408.5	954.9	1,038.6	1,038.2	2,610.910		
300.0	300.0	297.7	297.7	0.5	0.1	113.13	-408.0	955.0	1,038.5	1,037.8	1,537.506		
400.0	400.0	396.9	396.9	0.8	0.2	113.11	-407.6	955.0	1,038.3	1,037.4	1,090.354		
430.8	430.8	426.8	426.8	0.8	0.2	113.10	-407.4	955.1	1,038.3	1,037.3	1,001.207		
500.0	500.0	493.8	493.8	1.0	0.2	113.08	-407.1	955.3	1,038.4	1,037.2	845.676		
600.0	600.0	592.0	592.0	1.2	0.3	113.05	-406.7	955.8	1,038.7	1,037.2	690.534		
700.0	700.0	695.0	695.0	1.4	0.4	113.01	-406.2	956.3	1,039.0	1,037.2	582.722		
800.0	800.0	795.3	795.3	1.7	0.4	113.00	-406.0	956.4	1,039.0	1,037.0	504.346		
900.0	900.0	894.5	894.5	1.9	0.5	112.98	-405.8	956.6	1,039.1	1,036.8	444.657		
1,000.0	1,000.0	991.7	991.7	2.1	0.5	112.96	-405.4	957.1	1,039.4	1,036.8	397.841		
1,075.5	1,075.5	1,064.8	1,064.8	2.3	0.5	-102.97	-405.3	957.5	1,040.0	1,037.2	371.237		
1,100.0	1,100.0	1,088.5	1,088.5	2.3	0.6	-103.00	-405.3	957.7	1,040.3	1,037.5	364.144		
1,200.0	1,199.9	1,187.4	1,187.3	2.5	0.6	-103.17	-405.2	958.6	1,041.7	1,038.6	337.111		
1,300.0	1,299.9	1,286.7	1,286.7	2.7	0.7	-103.34	-405.1	959.6	1,043.2	1,039.9	313.163		
1,400.0	1,399.9	1,390.6	1,390.5	2.9	0.7	-103.49	-405.2	960.3	1,044.5	1,040.9	291.737		
1,500.0	1,499.8	1,486.0	1,485.9	3.1	0.8	-103.63	-405.3	961.0	1,045.8	1,042.0	273.042		
1,600.0	1,599.8	1,590.4	1,590.4	3.3	0.8	-103.79	-405.5	961.8	1,047.3	1,043.2	256.122		
1,700.0	1,699.8	1,692.4	1,692.4	3.5	0.9	-103.93	-405.6	962.2	1,048.3	1,043.9	241.013		
1,800.0	1,799.7	1,790.5	1,790.5	3.7	0.9	-104.07	-405.8	962.6	1,049.3	1,044.7	227.576		
1,900.0	1,899.7	1,888.4	1,888.4	3.9	1.0	-104.20	-406.1	963.1	1,050.6	1,045.7	215.525		
2,000.0	1,999.7	1,991.2	1,991.1	4.1	1.0	-104.33	-406.5	963.6	1,051.8	1,046.7	204.533		
2,100.0	2,099.6	2,090.7	2,090.7	4.3	1.1	-104.46	-406.8	963.9	1,052.9	1,047.5	194.601		
2,200.0	2,199.6	2,189.6	2,189.6	4.5	1.1	-104.59	-407.2	964.3	1,054.1	1,048.4	185.586		
2,300.0	2,299.6	2,289.6	2,289.5	4.8	1.2	-104.72	-407.5	964.8	1,055.3	1,049.4	177.339		
2,400.0	2,399.5	2,385.7	2,385.7	5.0	1.2	-104.85	-407.8	965.5	1,056.7	1,050.5	169.860		
2,500.0	2,499.5	2,483.5	2,483.5	5.2	1.3	-104.99	-408.1	966.5	1,058.5	1,052.0	163.006		
2,600.0	2,599.5	2,585.7	2,585.7	5.4	1.3	-105.14	-408.4	967.5	1,060.2	1,053.5	156.635		
2,700.0	2,699.4	2,682.0	2,681.9	5.7	1.4	-105.27	-408.7	968.5	1,062.0	1,054.9	150.814		
2,800.0	2,799.4	2,777.8	2,777.8	5.9	1.4	-105.38	-409.5	969.7	1,064.1	1,056.8	145.475		
2,900.0	2,899.4	2,875.4	2,875.3	6.1	1.5	-105.50	-410.4	971.2	1,066.6	1,059.0	140.535		
3,000.0	2,999.3	2,978.4	2,978.3	6.3	1.6	-105.62	-411.4	972.8	1,069.1	1,061.3	135.885		
3,100.0	3,099.3	3,084.4	3,084.3	6.5	1.6	-105.73	-412.4	973.9	1,071.2	1,063.0	131.464		
3,200.0	3,199.3	3,194.8	3,194.7	6.8	1.7	-105.83	-413.6	974.2	1,072.4	1,064.0	127.209		
3,300.0	3,299.2	3,296.2	3,296.0	7.0	1.7	-105.91	-414.6	973.8	1,073.1	1,064.4	123.222		
3,400.0	3,399.2	3,400.4	3,400.3	7.2	1.8	-106.00	-415.4	973.2	1,073.6	1,064.6	119.432		
3,500.0	3,499.1	3,504.5	3,504.4	7.5	1.8	-106.08	-416.1	972.2	1,073.6	1,064.4	115.825		
3,600.0	3,599.1	3,604.4	3,604.3	7.7	1.9	-106.16	-416.8	971.0	1,073.5	1,064.0	112.433		
3,700.0	3,699.1	3,710.4	3,710.2	7.9	1.9	-106.25	-417.5	969.5	1,073.2	1,063.3	109.170		
3,800.0	3,799.0	3,821.7	3,821.5	8.1	2.0	-106.33	-417.9	967.0	1,071.9	1,061.8	105.970		
3,900.0	3,899.0	3,922.0	3,921.8	8.4	2.0	-106.41	-417.9	964.2	1,070.0	1,059.6	102.938		
4,000.0	3,999.0	4,010.5	4,010.2	8.6	2.1	-106.49	-418.1	962.3	1,068.8	1,058.2	100.188		
4,100.0	4,098.9	4,105.9	4,105.7	8.8	2.1	-106.57	-418.6	960.9	1,068.4	1,057.4	97.604		
4,155.7	4,154.6	4,159.0	4,158.7	8.9	2.2	-106.61	-419.0	960.3	1,068.3	1,057.2	96.237		
4,200.0	4,198.9	4,200.0	4,199.7	9.0	2.2	-106.64	-419.4	959.9	1,068.3	1,057.1	95.192		
4,300.0	4,298.9	4,295.9	4,295.7	9.3	2.2	-106.68	-420.8	959.1	1,068.8	1,057.3	92.924		
4,400.0	4,398.8	4,389.7	4,389.4	9.5	2.3	-106.70	-422.9	958.6	1,069.7	1,058.0	90.814		
4,500.0	4,498.8	4,494.5	4,494.1	9.7	2.3	-106.70	-425.4	958.1	1,070.8	1,058.8	88.767		
4,600.0	4,598.8	4,594.7	4,594.3	10.0	2.4	-106.71	-427.7	957.3	1,071.6	1,059.3	86.805		
4,700.0	4,698.7	4,698.4	4,698.0	10.2	2.5	-106.72	-429.9	956.4	1,072.3	1,059.6	84.903		
4,800.0	4,798.7	4,797.5	4,797.0	10.4	2.5	-106.73	-432.1	955.4	1,072.8	1,059.9	83.089		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #7H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 8513-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
4,900.0	4,898.7	4,903.8	4,903.3	10.6	2.6	-106.75	-434.1	954.1	1,073.0	1,059.8	81.309		
4,909.5	4,908.1	4,912.7	4,912.3	10.7	2.6	-106.75	-434.2	954.0	1,073.0	1,059.8	81.145		
5,000.0	4,998.6	5,000.0	4,999.5	10.9	2.6	-106.76	-435.9	952.9	1,073.2	1,059.7	79.631		
5,100.0	5,098.6	5,105.5	5,105.0	11.1	2.7	-106.78	-438.0	951.4	1,073.3	1,059.6	77.987		
5,200.0	5,198.6	5,207.0	5,206.4	11.3	2.7	-106.79	-439.9	949.7	1,073.0	1,059.0	76.390		
5,300.0	5,298.5	5,303.7	5,303.1	11.6	2.8	-106.79	-441.8	948.0	1,072.8	1,058.5	74.877		
5,370.7	5,369.2	5,374.4	5,373.8	11.7	2.8	-106.79	-443.2	946.9	1,072.8	1,058.3	73.842		
5,400.0	5,398.5	5,400.0	5,399.4	11.8	2.8	-106.80	-443.8	946.5	1,072.8	1,058.2	73.432		
5,500.0	5,498.5	5,492.2	5,491.6	12.0	2.9	-106.79	-446.0	945.5	1,073.3	1,058.4	72.086		
5,600.0	5,598.4	5,597.8	5,597.1	12.2	2.9	-106.78	-448.7	944.7	1,074.2	1,059.0	70.779		
5,700.0	5,698.4	5,698.2	5,697.5	12.5	3.0	-106.79	-450.8	943.6	1,074.6	1,059.2	69.510		
5,800.0	5,798.4	5,796.1	5,795.4	12.7	3.0	-106.80	-452.9	942.7	1,075.2	1,059.5	68.299		
5,900.0	5,898.3	5,896.3	5,895.5	12.9	3.1	-106.83	-454.8	942.0	1,075.9	1,059.8	67.132		
6,000.0	5,998.3	5,995.1	5,994.3	13.2	3.2	-106.86	-456.5	941.3	1,076.6	1,060.3	66.011		
6,100.0	6,098.2	6,097.8	6,097.0	13.4	3.2	-106.90	-458.3	940.5	1,077.2	1,060.6	64.916		
6,200.0	6,198.2	6,198.3	6,197.5	13.6	3.3	-106.92	-460.1	939.6	1,077.7	1,060.8	63.852		
6,300.0	6,298.2	6,299.8	6,298.9	13.8	3.3	-106.95	-461.9	938.6	1,078.1	1,060.9	62.816		
6,400.0	6,398.1	6,396.2	6,395.4	14.1	3.4	-106.99	-463.5	937.8	1,078.6	1,061.1	61.830		
6,500.0	6,498.1	6,497.6	6,496.8	14.3	3.4	-107.04	-465.0	937.1	1,079.2	1,061.5	60.874		
6,600.0	6,598.1	6,593.5	6,592.7	14.5	3.5	-107.10	-466.2	936.6	1,079.9	1,061.9	59.965		
6,700.0	6,698.0	6,694.0	6,693.1	14.8	3.5	-107.16	-467.5	936.3	1,080.8	1,062.5	59.084		
6,800.0	6,798.0	6,793.7	6,792.8	15.0	3.6	-107.21	-469.1	935.9	1,081.7	1,063.1	58.230		
6,900.0	6,898.0	6,890.1	6,889.2	15.2	3.6	-107.26	-470.5	935.7	1,082.7	1,063.9	57.417		
7,000.0	6,997.9	6,995.6	6,994.7	15.5	3.7	-107.33	-471.9	935.4	1,083.7	1,064.6	56.612		
7,100.0	7,097.9	7,094.2	7,093.3	15.7	3.7	-107.39	-473.1	935.0	1,084.5	1,065.1	55.829		
7,200.0	7,197.9	7,194.6	7,193.7	15.9	3.8	-107.46	-474.2	934.7	1,085.3	1,065.6	55.069		
7,300.0	7,297.8	7,291.4	7,290.5	16.1	3.9	-107.52	-475.5	934.4	1,086.3	1,066.3	54.340		
7,400.0	7,397.8	7,393.8	7,392.9	16.4	3.9	-107.59	-476.8	934.2	1,087.3	1,067.0	53.628		
7,500.0	7,497.8	7,495.5	7,494.6	16.6	4.0	-107.65	-478.1	933.8	1,088.1	1,067.5	52.926		
7,600.0	7,597.7	7,596.8	7,595.8	16.8	4.0	-107.71	-479.3	933.2	1,088.8	1,067.9	52.237		
7,700.0	7,697.7	7,695.9	7,694.9	17.1	4.1	-107.79	-480.4	932.7	1,089.4	1,068.3	51.569		
7,800.0	7,797.7	7,794.0	7,793.0	17.3	4.1	-107.87	-481.1	932.5	1,090.2	1,068.8	50.928		
7,900.0	7,897.6	7,894.0	7,893.0	17.5	4.2	-107.97	-481.8	932.3	1,091.1	1,069.4	50.305		
8,000.0	7,997.6	7,991.8	7,990.8	17.8	4.2	-108.06	-482.4	932.3	1,092.0	1,070.0	49.705		
8,100.0	8,097.6	8,091.5	8,090.5	18.0	4.3	-108.16	-483.2	932.3	1,093.1	1,070.9	49.124		
8,200.0	8,197.5	8,193.8	8,192.8	18.2	4.3	-108.26	-483.8	932.3	1,094.1	1,071.6	48.551		
8,300.0	8,297.5	8,294.1	8,293.1	18.4	4.4	-108.37	-484.3	932.2	1,095.0	1,072.2	47.989		
8,400.0	8,397.4	8,393.5	8,392.6	18.7	13.9	-145.95	101.2	622.9	1,049.2	1,015.2	30.860		
8,500.0	8,497.4	8,530.7	9,094.7	18.9	13.8	-145.75	98.5	623.7	986.9	952.8	28.884		
8,600.0	8,597.4	9,528.0	9,094.8	19.1	13.8	-145.55	95.9	624.6	931.2	896.9	27.118		
8,618.1	8,615.5	9,527.5	9,094.8	19.2	13.8	-145.52	95.5	624.7	922.0	887.6	26.823		
8,625.0	8,622.4	9,527.3	9,094.8	19.2	13.8	-175.23	95.3	624.8	918.5	884.1	26.713		
8,650.0	8,647.4	9,527.3	9,094.8	19.2	13.8	91.81	95.3	624.8	906.0	871.5	26.325		
8,675.0	8,672.3	9,528.1	9,094.8	19.3	13.8	83.55	96.0	624.5	893.6	859.2	25.946		
8,700.0	8,697.1	9,529.7	9,094.7	19.3	13.8	81.92	97.5	624.0	881.5	847.0	25.574		
8,725.0	8,721.7	9,532.1	9,094.6	19.4	13.8	81.80	99.8	623.3	869.6	835.1	25.207		
8,750.0	8,746.0	9,535.3	9,094.6	19.4	13.9	82.20	102.8	622.3	858.1	823.5	24.844		
8,775.0	8,770.1	9,539.3	9,094.5	19.4	14.0	82.81	106.6	621.1	846.8	812.3	24.484		
8,800.0	8,793.7	9,544.0	9,094.3	19.4	14.0	83.49	111.2	619.6	836.0	801.3	24.126		
8,825.0	8,816.8	9,549.6	9,094.2	19.5	14.1	84.16	116.5	618.0	825.5	790.7	23.771		
8,850.0	8,839.5	9,555.9	9,094.0	19.5	14.3	84.80	122.5	616.1	815.3	780.5	23.417		
8,875.0	8,861.5	9,562.9	9,093.8	19.5	14.4	85.39	129.3	614.1	805.6	770.7	23.066		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Azores Federal #7H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro. 8513-MWD default												Offset Well Error:	0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
8,900.0	8,882.9	9,580.0	9,093.3	19.5	14.7	85.31	145.6	609.2	796.4	761.2	22.584		
8,925.0	8,903.6	9,580.0	9,093.3	19.6	14.7	86.33	145.6	609.2	787.5	752.3	22.361		
8,950.0	8,923.5	9,580.0	9,093.3	19.6	14.7	87.29	145.6	609.2	779.2	744.0	22.151		
8,975.0	8,942.6	9,601.5	9,092.8	19.6	15.0	86.91	166.3	603.3	771.1	735.5	21.660		
9,000.0	8,960.9	9,614.1	9,092.6	19.6	15.2	87.08	178.4	599.9	763.4	727.6	21.304		
9,025.0	8,978.2	9,627.6	9,092.4	19.7	15.5	87.19	191.4	596.4	756.2	720.1	20.951		
9,050.0	8,994.6	9,642.0	9,092.4	19.7	15.7	87.26	205.3	592.6	749.3	712.9	20.600		
9,075.0	9,009.9	9,657.2	9,092.4	19.7	15.9	87.30	220.0	588.7	742.7	706.0	20.251		
9,100.0	9,024.2	9,675.0	9,092.6	19.8	16.2	87.25	237.2	584.2	736.3	699.3	19.886		
9,125.0	9,037.4	9,675.0	9,092.6	19.9	16.2	87.94	237.2	584.2	730.5	693.4	19.720		
9,150.0	9,049.5	9,702.2	9,093.1	19.9	16.7	87.57	263.6	577.6	724.6	687.0	19.277		
9,175.0	9,060.4	9,717.2	9,093.4	20.0	16.9	87.70	278.2	574.2	719.2	681.3	18.971		
9,200.0	9,070.1	9,732.7	9,093.7	20.1	17.2	87.84	293.4	570.8	714.0	675.8	18.671		
9,225.0	9,078.6	9,748.6	9,094.1	20.2	17.4	88.00	308.9	567.5	709.2	670.6	18.375		
9,250.0	9,085.9	9,769.0	9,094.5	20.3	17.8	88.11	328.9	563.4	704.6	665.5	18.048		
9,275.0	9,091.9	9,769.0	9,094.5	20.4	17.8	88.61	328.9	563.4	700.3	661.2	17.905		
9,300.0	9,096.6	9,796.5	9,095.1	20.5	18.2	88.68	356.0	558.5	696.1	656.4	17.526		
9,325.0	9,100.1	9,812.6	9,095.2	20.6	18.5	88.97	371.8	555.8	692.2	652.1	17.256		
9,350.0	9,102.2	9,828.7	9,095.3	20.8	18.8	89.29	387.7	553.4	688.7	648.2	16.993		
9,375.0	9,103.0	9,845.0	9,095.3	20.9	19.0	89.64	403.8	551.1	685.4	644.4	16.737		
9,380.7	9,103.0	9,863.0	9,095.2	21.0	19.3	89.72	421.7	548.8	684.9	643.6	16.577		
9,400.0	9,102.9	9,863.0	9,095.2	21.1	19.3	89.72	421.7	548.8	682.4	641.0	16.476		
9,500.0	9,102.4	9,934.9	9,094.5	21.8	20.5	89.69	493.2	541.5	672.9	629.5	15.524		
9,600.0	9,101.9	10,006.8	9,094.3	22.6	21.7	89.70	565.0	536.9	667.3	621.9	14.710		
9,700.0	9,101.3	10,087.5	9,095.0	23.5	22.9	89.80	645.6	535.2	665.7	618.1	13.977		
9,800.0	9,100.8	10,184.2	9,095.6	24.5	24.5	89.89	742.3	534.2	665.4	615.1	13.229		
9,807.1	9,100.8	10,190.9	9,095.6	24.6	24.6	89.89	749.1	534.1	665.4	615.0	13.195		
9,900.0	9,100.3	10,283.4	9,095.1	25.6	26.1	89.90	841.5	533.7	665.6	612.5	12.532		
9,995.5	9,099.8	10,379.4	9,093.8	26.8	27.7	89.83	937.5	532.8	665.4	609.6	11.913		
10,000.0	9,099.8	10,383.6	9,093.7	26.8	27.8	89.82	941.7	532.8	665.4	609.5	11.886		
10,100.0	9,099.2	10,479.5	9,092.5	28.1	29.3	89.76	1,037.6	532.5	665.8	607.0	11.317		
10,200.0	9,098.7	10,579.2	9,092.6	29.4	30.9	89.81	1,137.3	532.5	666.6	604.8	10.789		
10,300.0	9,098.2	10,676.6	9,091.1	30.8	32.4	89.73	1,234.7	532.5	667.3	602.6	10.306		
10,400.0	9,097.7	10,770.2	9,092.2	32.2	33.9	89.87	1,328.3	533.3	668.9	601.2	9.881		
10,500.0	9,097.2	10,868.9	9,093.4	33.6	35.5	90.02	1,426.9	534.9	671.2	600.4	9.484		
10,600.0	9,096.6	10,962.9	9,091.3	35.1	37.1	89.88	1,520.9	536.5	673.7	599.9	9.126		
10,700.0	9,096.1	11,072.3	9,091.0	36.7	38.8	89.90	1,630.3	538.9	676.6	599.5	8.774		
10,800.0	9,095.6	11,196.2	9,092.1	38.2	40.8	90.05	1,754.1	537.8	676.4	595.7	8.382		
10,900.0	9,095.1	11,290.4	9,092.1	39.8	42.4	90.09	1,848.4	535.8	675.1	591.2	8.049		
11,000.0	9,094.5	11,387.4	9,091.4	41.4	44.0	90.08	1,945.3	534.5	674.4	587.3	7.742		
11,100.0	9,094.0	11,495.6	9,095.1	43.0	45.8	90.44	2,053.5	532.5	673.3	582.7	7.435		
11,200.0	9,093.5	11,599.0	9,099.2	44.6	47.5	90.84	2,156.7	529.6	671.2	577.3	7.144		
11,300.0	9,093.0	11,694.1	9,101.0	46.2	49.2	91.03	2,251.8	526.9	669.2	571.9	6.881		
11,400.0	9,092.4	11,786.2	9,103.2	47.9	50.8	91.27	2,343.8	525.6	668.5	568.0	6.653		
11,500.0	9,091.9	11,884.5	9,104.1	49.5	52.4	91.39	2,442.1	524.6	668.3	564.5	6.436		
11,501.8	9,091.9	11,886.1	9,104.1	49.6	52.5	91.39	2,443.8	524.6	668.3	564.5	6.436		
11,600.0	9,091.4	11,984.8	9,105.3	51.2	54.1	91.53	2,542.4	524.1	668.5	561.3	6.235		
11,700.0	9,090.9	12,087.1	9,107.2	52.9	55.8	91.75	2,644.7	522.8	668.1	557.4	6.039		
11,800.0	9,090.3	12,189.4	9,108.9	54.6	57.6	91.94	2,747.0	521.6	667.7	553.6	5.853		
11,900.0	9,089.8	12,293.7	9,108.5	56.3	59.3	91.95	2,851.3	519.7	666.5	549.0	5.670		
12,000.0	9,089.3	12,387.6	9,107.8	58.0	60.9	91.94	2,945.1	518.0	665.5	544.6	5.506		
12,033.4	9,089.1	12,417.8	9,106.9	58.6	61.4	91.87	2,975.3	517.7	665.4	543.5	5.458		

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Sec 32, T24-S, R32E - Azores Federal #7H - Wellbore #1 - Wellbore #1												Offset Well Error:	0.0 usft
Survey Program: 100-Good_gyro. 8513-MWD default													
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
12,100.0	9,088.8	12,478.1	9,105.4	59.7	62.5	91.77	3,035.6	517.6	665.7	541.6	5.363		
12,200.0	9,088.3	12,574.7	9,105.2	61.5	64.1	91.79	3,132.2	518.2	667.1	539.6	5.232		
12,300.0	9,087.7	12,674.8	9,106.2	63.2	65.8	91.93	3,232.3	518.9	668.5	537.6	5.107		
12,400.0	9,087.2	12,773.5	9,105.4	64.9	67.5	91.90	3,331.0	519.7	670.0	535.7	4.989		
12,500.0	9,086.7	12,872.4	9,104.2	66.7	69.1	91.83	3,429.8	520.7	671.8	534.1	4.878		
12,600.0	9,086.2	12,970.4	9,105.2	68.4	70.8	91.95	3,527.8	521.9	673.7	532.6	4.774		
12,700.0	9,085.6	13,080.5	9,106.6	70.1	72.7	92.12	3,637.9	522.6	675.2	530.4	4.665		
12,800.0	9,085.1	13,184.2	9,107.8	71.9	74.4	92.26	3,741.6	522.1	675.4	527.2	4.557		
12,900.0	9,084.6	13,285.8	9,108.6	73.6	76.1	92.38	3,843.2	521.3	675.5	523.8	4.453		
13,000.0	9,084.1	13,399.9	9,110.1	75.4	78.1	92.56	3,957.3	519.3	674.6	519.2	4.341		
13,100.0	9,083.5	13,513.9	9,113.8	77.2	80.0	92.94	4,071.1	514.2	670.9	511.8	4.217		
13,200.0	9,083.0	13,613.8	9,117.5	78.9	81.7	93.32	4,170.8	508.8	666.5	503.9	4.100		
13,300.0	9,082.5	13,723.1	9,119.3	80.7	83.6	93.56	4,279.8	502.6	661.7	495.5	3.981		
13,400.0	9,082.0	13,823.7	9,120.5	82.5	85.3	93.75	4,380.3	495.8	655.8	486.1	3.864		
13,500.0	9,081.4	13,924.3	9,120.0	84.2	87.1	93.78	4,480.6	489.2	649.9	476.6	3.750		
13,600.0	9,080.9	14,023.9	9,117.9	86.0	88.9	93.67	4,579.9	482.6	643.9	467.1	3.641		
13,700.0	9,080.4	14,113.5	9,116.4	87.8	90.4	93.61	4,669.4	477.4	638.8	458.6	3.544		
13,800.0	9,079.9	14,210.3	9,114.9	89.6	92.1	93.54	4,766.1	472.9	634.8	451.1	3.455		
13,900.0	9,079.3	14,316.9	9,111.0	91.3	94.0	93.26	4,872.5	467.4	630.2	442.8	3.362		
14,000.0	9,078.8	14,416.7	9,107.0	93.1	95.7	92.97	4,972.1	462.0	625.3	434.3	3.273		
14,063.6	9,078.5	14,450.0	9,105.7	94.3	96.3	92.87	5,005.3	460.2	623.0	430.2	3.232 CC		
14,082.2	9,078.4	14,450.0	9,105.7	94.6	96.3	92.87	5,005.3	460.2	623.2	430.2	3.228 ES		
14,082.7	9,078.4	14,450.0	9,105.7	94.6	96.3	92.87	5,005.3	460.2	623.3	430.2	3.228 SF		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default, 7793-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	108.85	-387.3	1,134.4	1,198.7				
100.0	100.0	85.9	85.9	0.1	0.1	108.85	-387.3	1,134.5	1,198.8	1,198.6	7,379.850		
200.0	200.0	181.3	181.3	0.3	0.3	108.85	-387.5	1,134.8	1,199.2	1,198.6	2,056.467	ES	
300.0	300.0	275.7	275.7	0.5	0.5	108.86	-387.9	1,135.6	1,200.0	1,199.0	1,177.318		
400.0	400.0	374.4	374.4	0.8	0.7	108.85	-388.2	1,136.7	1,201.2	1,199.8	826.424		
500.0	500.0	476.1	476.1	1.0	0.9	108.84	-388.3	1,137.8	1,202.3	1,200.5	637.579		
600.0	600.0	578.8	578.8	1.2	1.1	108.81	-388.0	1,139.0	1,203.3	1,201.0	518.870		
700.0	700.0	685.0	685.0	1.4	1.3	108.79	-387.7	1,139.7	1,203.9	1,201.1	436.733		
800.0	800.0	787.2	787.2	1.7	1.5	108.77	-387.5	1,140.0	1,204.0	1,200.9	377.762		
900.0	900.0	887.0	887.0	1.9	1.7	108.76	-387.3	1,140.2	1,204.2	1,200.5	332.618		
1,000.0	1,000.0	986.7	986.7	2.1	2.0	108.75	-387.1	1,140.4	1,204.3	1,200.2	296.707		
1,075.5	1,075.5	1,060.2	1,060.2	2.3	2.1	-107.18	-386.8	1,140.7	1,204.8	1,200.4	275.711		
1,100.0	1,100.0	1,083.9	1,083.9	2.3	2.2	-107.21	-386.6	1,140.8	1,205.0	1,200.6	269.938		
1,200.0	1,199.9	1,184.2	1,184.2	2.5	2.4	-107.37	-386.0	1,141.4	1,206.2	1,201.4	248.399		
1,300.0	1,299.9	1,285.9	1,285.9	2.7	2.6	-107.52	-385.6	1,141.9	1,207.3	1,202.1	229.909		
1,400.0	1,399.9	1,385.5	1,385.5	2.9	2.8	-107.65	-385.4	1,142.2	1,208.3	1,202.7	213.845		
1,500.0	1,499.8	1,485.8	1,485.7	3.1	3.0	-107.78	-385.3	1,142.5	1,209.4	1,203.3	199.612		
1,600.0	1,599.8	1,585.3	1,585.3	3.3	3.2	-107.90	-385.2	1,142.8	1,210.4	1,203.9	187.069		
1,700.0	1,699.8	1,683.8	1,683.7	3.5	3.4	-108.03	-385.0	1,143.1	1,211.5	1,204.7	175.959		
1,800.0	1,799.7	1,782.6	1,782.6	3.7	3.6	-108.16	-384.9	1,143.6	1,212.8	1,205.5	166.004		
1,900.0	1,899.7	1,883.4	1,883.4	3.9	3.8	-108.29	-384.8	1,144.1	1,214.1	1,206.3	157.071		
2,000.0	1,999.7	1,984.3	1,984.3	4.1	4.0	-108.42	-384.8	1,144.5	1,215.3	1,207.1	149.078		
2,100.0	2,099.6	2,078.5	2,078.4	4.3	4.2	-108.53	-384.8	1,145.0	1,216.6	1,208.1	142.056		
2,200.0	2,199.6	2,168.1	2,168.1	4.5	4.4	-108.65	-385.0	1,146.1	1,218.7	1,209.7	135.834		
2,300.0	2,299.6	2,268.9	2,268.8	4.8	4.6	-108.78	-385.2	1,148.0	1,221.3	1,211.9	129.896		
2,400.0	2,399.5	2,385.1	2,385.1	5.0	4.9	-108.93	-385.3	1,149.1	1,223.2	1,213.3	124.025		
2,500.0	2,499.5	2,486.5	2,486.4	5.2	5.1	-109.06	-385.0	1,149.3	1,224.1	1,213.8	118.914		
2,600.0	2,599.5	2,597.8	2,597.8	5.4	5.3	-109.23	-384.1	1,149.3	1,224.7	1,214.0	113.943		
2,700.0	2,699.4	2,692.1	2,692.0	5.7	5.5	-109.35	-383.8	1,148.8	1,225.0	1,213.9	109.697		
2,800.0	2,799.4	2,791.3	2,791.2	5.9	5.7	-109.44	-384.2	1,148.4	1,225.6	1,214.0	105.680		
2,900.0	2,899.4	2,889.0	2,888.9	6.1	5.9	-109.53	-384.6	1,148.1	1,226.3	1,214.3	101.978		
3,000.0	2,999.3	2,988.0	2,987.9	6.3	6.1	-109.63	-384.9	1,148.0	1,227.2	1,214.7	98.513		
3,100.0	3,099.3	3,087.1	3,087.0	6.5	6.3	-109.73	-385.2	1,147.9	1,228.1	1,215.2	95.282		
3,200.0	3,199.3	3,187.5	3,187.4	6.8	6.6	-109.83	-385.6	1,147.9	1,229.1	1,215.8	92.244		
3,300.0	3,299.2	3,287.6	3,287.5	7.0	6.8	-109.94	-385.7	1,147.9	1,230.0	1,216.2	89.395		
3,400.0	3,399.2	3,386.9	3,386.8	7.2	7.0	-110.05	-385.8	1,147.9	1,231.0	1,216.8	86.728		
3,500.0	3,499.1	3,487.2	3,487.1	7.5	7.2	-110.17	-385.9	1,148.0	1,231.9	1,217.3	84.217		
3,600.0	3,599.1	3,587.3	3,587.2	7.7	7.4	-110.28	-386.0	1,148.0	1,232.9	1,217.8	81.856		
3,700.0	3,699.1	3,687.5	3,687.4	7.9	7.6	-110.39	-386.1	1,148.0	1,233.8	1,218.3	79.621		
3,800.0	3,799.0	3,787.5	3,787.4	8.1	7.8	-110.49	-386.3	1,147.9	1,234.8	1,218.8	77.507		
3,900.0	3,899.0	3,887.5	3,887.4	8.4	8.0	-110.59	-386.6	1,147.9	1,235.7	1,219.3	75.502		
4,000.0	3,999.0	3,987.4	3,987.3	8.6	8.2	-110.70	-386.8	1,147.9	1,236.7	1,219.9	73.599		
4,100.0	4,098.9	4,087.2	4,087.1	8.8	8.4	-110.80	-387.0	1,147.8	1,237.6	1,220.4	71.795		
4,200.0	4,198.9	4,187.4	4,187.3	9.0	8.7	-110.91	-387.2	1,147.8	1,238.6	1,220.9	70.077		
4,300.0	4,298.9	4,287.5	4,287.4	9.3	8.9	-111.01	-387.4	1,147.8	1,239.5	1,221.4	68.442		
4,400.0	4,398.8	4,387.9	4,387.8	9.5	9.1	-111.12	-387.5	1,147.7	1,240.5	1,221.9	66.879		
4,500.0	4,498.8	4,489.2	4,489.1	9.7	9.3	-111.22	-387.7	1,147.6	1,241.4	1,222.4	65.377		
4,600.0	4,598.8	4,590.5	4,590.4	10.0	9.5	-111.33	-387.9	1,147.3	1,242.1	1,222.7	63.936		
4,700.0	4,698.7	4,692.4	4,692.3	10.2	9.7	-111.42	-388.2	1,146.9	1,242.8	1,222.9	62.547		
4,800.0	4,798.7	4,792.5	4,792.4	10.4	9.9	-111.52	-388.5	1,146.4	1,243.3	1,223.0	61.226		
4,900.0	4,898.7	4,892.3	4,892.2	10.6	10.1	-111.62	-388.6	1,146.0	1,243.9	1,223.1	59.963		
5,000.0	4,998.6	4,991.2	4,991.1	10.9	10.3	-111.72	-388.7	1,145.6	1,244.5	1,223.3	58.759		

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default, 7793-MWD default												Offset Well Error:	0.0 usft
Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Reference Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
5,100.0	5,098.6	5,091.1	5,091.0	11.1	10.5	-111.83	-388.8	1,145.3	1,245.2	1,223.5	57.599		
5,200.0	5,198.6	5,191.3	5,191.3	11.3	10.8	-111.94	-388.7	1,144.9	1,245.8	1,223.8	56.480		
5,300.0	5,298.5	5,288.8	5,288.7	11.6	11.0	-112.05	-388.7	1,144.7	1,246.6	1,224.1	55.425		
5,400.0	5,398.5	5,388.4	5,388.3	11.8	11.2	-112.16	-388.7	1,144.6	1,247.5	1,224.5	54.404		
5,500.0	5,498.5	5,490.4	5,490.3	12.0	11.4	-112.28	-388.6	1,144.5	1,248.3	1,224.9	53.408		
5,600.0	5,598.4	5,590.6	5,590.5	12.2	11.6	-112.39	-388.5	1,144.2	1,249.0	1,225.2	52.457		
5,700.0	5,698.4	5,691.1	5,691.0	12.5	11.8	-112.51	-388.4	1,143.9	1,249.7	1,225.5	51.537		
5,800.0	5,798.4	5,791.4	5,791.4	12.7	12.0	-112.62	-388.2	1,143.6	1,250.4	1,225.7	50.644		
5,900.0	5,898.3	5,888.9	5,888.8	12.9	12.2	-112.74	-387.9	1,143.4	1,251.2	1,226.0	49.800		
6,000.0	5,998.3	5,986.5	5,986.4	13.2	12.4	-112.86	-387.7	1,143.4	1,252.1	1,226.6	48.997		
6,100.0	6,098.2	6,083.9	6,083.8	13.4	12.6	-112.96	-387.8	1,143.5	1,253.3	1,227.3	48.231		
6,200.0	6,198.2	6,186.3	6,186.2	13.6	12.8	-113.07	-388.0	1,143.6	1,254.5	1,228.1	47.470		
6,300.0	6,298.2	6,287.1	6,287.0	13.8	13.1	-113.17	-388.2	1,143.6	1,255.5	1,228.7	46.729		
6,400.0	6,398.1	6,389.3	6,389.2	14.1	13.3	-113.27	-388.4	1,143.5	1,256.5	1,229.2	46.005		
6,500.0	6,498.1	6,489.1	6,489.0	14.3	13.5	-113.37	-388.7	1,143.2	1,257.3	1,229.6	45.310		
6,600.0	6,598.1	6,589.3	6,589.2	14.5	13.7	-113.47	-388.9	1,143.0	1,258.2	1,230.0	44.632		
6,700.0	6,698.0	6,692.0	6,691.9	14.8	13.9	-113.57	-389.1	1,142.6	1,258.9	1,230.3	43.964		
6,800.0	6,798.0	6,790.3	6,790.2	15.0	14.1	-113.66	-389.3	1,142.2	1,259.6	1,230.6	43.332		
6,900.0	6,898.0	6,890.3	6,890.2	15.2	14.3	-113.74	-389.9	1,141.8	1,260.4	1,230.9	42.718		
7,000.0	6,997.9	6,988.3	6,988.2	15.5	14.5	-113.81	-390.7	1,141.4	1,261.3	1,231.3	42.127		
7,100.0	7,097.9	7,086.6	7,086.4	15.7	14.7	-113.89	-391.4	1,141.2	1,262.3	1,231.9	41.557		
7,200.0	7,197.9	7,185.4	7,185.3	15.9	14.9	-113.96	-392.1	1,141.1	1,263.4	1,232.6	41.007		
7,300.0	7,297.8	7,284.3	7,284.2	16.1	15.1	-114.03	-392.9	1,141.0	1,264.6	1,233.3	40.473		
7,400.0	7,397.8	7,383.5	7,383.4	16.4	15.3	-114.11	-393.6	1,141.1	1,265.9	1,234.2	39.954		
7,500.0	7,497.8	7,483.8	7,483.7	16.6	15.6	-114.19	-394.2	1,141.2	1,267.2	1,235.1	39.446		
7,600.0	7,597.7	7,581.9	7,581.8	16.8	15.8	-114.27	-394.9	1,141.4	1,268.5	1,236.0	38.961		
7,700.0	7,697.7	7,680.5	7,680.4	17.1	16.0	-114.35	-395.7	1,141.6	1,270.0	1,237.0	38.493		
7,800.0	7,797.7	7,778.6	7,778.4	17.3	16.1	-114.41	-396.7	1,142.0	1,271.7	1,238.4	38.108		
7,900.0	7,897.6	7,875.1	7,874.9	17.5	16.1	-114.52	-396.7	1,142.4	1,273.3	1,239.7	37.775		
8,000.0	7,997.6	7,928.3	7,927.9	17.8	16.1	-114.79	-392.4	1,144.7	1,277.0	1,243.1	37.728		
8,100.0	8,097.6	7,982.0	7,980.6	18.0	16.1	-115.26	-383.8	1,149.9	1,284.7	1,250.6	37.697		
8,200.0	8,197.5	8,014.0	8,011.5	18.2	16.1	-115.63	-377.1	1,154.8	1,296.9	1,262.6	37.799		
8,300.0	8,297.5	8,045.0	8,040.9	18.4	16.2	-116.05	-369.5	1,161.2	1,314.3	1,279.7	38.047		
8,400.0	8,397.4	8,086.4	8,079.1	18.7	16.2	-116.69	-357.4	1,171.6	1,336.5	1,301.7	38.423		
8,500.0	8,497.4	8,178.0	8,159.1	18.9	16.2	-118.52	-320.7	1,196.6	1,361.6	1,326.5	38.835		
8,600.0	8,597.4	8,403.4	8,321.2	19.1	16.8	-125.13	-173.1	1,239.1	1,381.5	1,345.8	38.703		
8,618.1	8,615.5	8,411.3	8,325.7	19.2	16.8	-125.41	-166.6	1,240.0	1,385.3	1,349.6	38.738		
8,625.0	8,622.4	8,414.2	8,327.3	19.2	16.8	-155.88	-164.2	1,240.4	1,386.8	1,351.0	38.758		
8,650.0	8,647.4	8,424.0	8,332.7	19.2	16.8	-156.1	-156.1	1,241.5	1,392.5	1,356.6	38.845		
8,675.0	8,672.3	8,435.0	8,338.6	19.3	16.9	97.53	-146.9	1,242.8	1,398.4	1,362.5	38.934		
8,700.0	8,697.1	8,445.3	8,344.0	19.3	16.9	93.30	-138.2	1,244.0	1,404.7	1,368.7	39.037		
8,725.0	8,721.7	8,455.0	8,348.9	19.4	17.0	90.68	-129.9	1,245.1	1,411.2	1,375.1	39.153		
8,750.0	8,746.0	8,470.8	8,356.7	19.4	17.0	88.48	-116.3	1,247.0	1,417.8	1,381.7	39.249		
8,775.0	8,770.1	8,486.0	8,363.9	19.4	17.1	86.62	-103.0	1,248.7	1,424.6	1,388.4	39.358		
8,800.0	8,793.7	8,503.8	8,372.1	19.4	17.2	84.86	-87.3	1,250.6	1,431.4	1,395.1	39.457		
8,825.0	8,816.8	8,521.1	8,379.7	19.5	17.3	83.25	-71.9	1,252.4	1,438.3	1,401.9	39.570		
8,850.0	8,839.5	8,536.4	8,386.1	19.5	17.4	81.79	-58.1	1,253.9	1,445.1	1,408.7	39.699		
8,875.0	8,861.5	8,551.9	8,392.4	19.5	17.5	80.40	-44.0	1,255.4	1,451.9	1,415.5	39.839		
8,900.0	8,882.9	8,567.5	8,398.5	19.5	17.6	79.08	-29.7	1,256.9	1,458.7	1,422.2	39.987		
8,925.0	8,903.6	8,583.8	8,404.5	19.6	17.7	77.80	-14.7	1,258.4	1,465.3	1,428.8	40.145		
8,950.0	8,923.5	8,602.4	8,410.9	19.6	17.8	76.55	2.7	1,259.9	1,471.8	1,435.3	40.298		
8,975.0	8,942.6	8,626.2	8,418.4	19.6	18.0	75.25	25.3	1,261.6	1,478.1	1,441.5	40.430		

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #2H - Wellbore #1 - Wellbore #1													Offset Site Error: 0.0 usft
Survey Program: 100-MWD default, 7793-MWD default													Offset Well Error: 0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
9,000.0	8,960.9	8,650.5	8,425.0	19.6	18.2	74.01	48.6	1,262.9	1,484.0	1,447.5	40.562		
9,025.0	8,978.2	8,667.6	8,429.2	19.7	18.3	72.98	65.1	1,263.7	1,489.7	1,453.2	40.734		
9,050.0	8,994.6	8,685.4	8,433.2	19.7	18.4	71.99	82.5	1,264.3	1,495.2	1,458.6	40.900		
9,075.0	9,009.9	8,706.0	8,437.6	19.7	18.6	71.04	102.6	1,265.1	1,500.3	1,463.8	41.046		
9,100.0	9,024.2	8,717.9	8,439.9	19.8	18.7	70.28	114.3	1,265.5	1,505.2	1,468.6	41.231		
9,125.0	9,037.4	8,737.0	8,443.4	19.9	18.9	69.48	133.1	1,266.2	1,509.8	1,473.3	41.361		
9,150.0	9,049.5	8,737.0	8,443.4	19.9	18.9	68.97	133.1	1,266.2	1,514.1	1,477.7	41.601		
9,175.0	9,060.4	8,755.0	8,446.1	20.0	19.0	68.31	150.8	1,266.8	1,518.1	1,481.7	41.695		
9,200.0	9,070.1	8,768.0	8,447.7	20.1	19.2	67.75	163.7	1,267.3	1,521.9	1,485.5	41.800		
9,225.0	9,078.6	8,781.5	8,449.1	20.2	19.3	67.24	177.1	1,267.7	1,525.3	1,488.9	41.865		
9,250.0	9,085.9	8,799.0	8,450.3	20.3	19.5	66.76	194.6	1,268.2	1,528.4	1,491.9	41.861		
9,275.0	9,091.9	8,815.2	8,451.1	20.4	19.6	66.35	210.8	1,268.5	1,531.1	1,494.5	41.810		
9,300.0	9,096.6	8,833.3	8,451.8	20.5	19.8	66.01	228.8	1,268.9	1,533.4	1,496.6	41.690		
9,325.0	9,100.1	8,851.4	8,452.4	20.6	20.0	65.75	247.0	1,269.4	1,535.2	1,498.2	41.514		
9,350.0	9,102.2	8,869.7	8,452.9	20.8	20.2	65.57	265.2	1,269.8	1,536.6	1,499.4	41.280		
9,375.0	9,103.0	8,894.0	8,453.2	20.9	20.4	65.47	289.5	1,270.4	1,537.5	1,500.0	40.923		
9,380.7	9,103.0	8,894.0	8,453.2	21.0	20.4	65.45	289.5	1,270.4	1,537.7	1,500.1	40.893		
9,400.0	9,102.9	8,912.2	8,453.4	21.1	20.6	65.47	307.7	1,270.9	1,538.1	1,500.2	40.595		
9,500.0	9,102.4	9,012.2	8,454.6	21.8	21.7	65.58	407.6	1,273.3	1,540.3	1,500.7	38.966		
9,600.0	9,101.9	9,098.9	8,455.0	22.6	22.6	65.66	494.3	1,276.0	1,543.3	1,502.1	37.453		
9,700.0	9,101.3	9,250.5	8,456.5	23.5	24.4	65.79	645.9	1,278.3	1,544.6	1,500.8	35.249		
9,800.0	9,100.8	9,381.0	8,458.1	24.5	26.1	65.85	776.4	1,276.4	1,543.2	1,496.8	33.257		
9,900.0	9,100.3	9,462.0	8,458.0	25.6	27.3	65.85	857.3	1,275.0	1,542.1	1,493.6	31.807		
9,913.3	9,100.2	9,462.0	8,458.0	25.8	27.3	65.85	857.3	1,275.0	1,542.0	1,493.4	31.709		
10,000.0	9,099.8	9,499.3	8,457.5	26.8	27.8	65.85	894.7	1,275.3	1,543.4	1,493.3	30.823		
10,100.0	9,099.2	9,556.0	8,456.4	28.1	28.5	65.87	951.3	1,278.0	1,548.6	1,496.6	29.790		
10,200.0	9,098.7	9,651.0	8,455.9	29.4	29.8	65.97	1,046.0	1,284.2	1,555.2	1,500.7	28.557		
10,300.0	9,098.2	9,720.0	8,455.7	30.8	30.8	66.06	1,114.9	1,288.9	1,562.1	1,505.4	27.554		
10,400.0	9,097.7	9,874.4	8,454.4	32.2	33.1	66.21	1,268.9	1,299.5	1,569.4	1,509.3	26.076		
10,500.0	9,097.2	10,087.5	8,456.1	33.6	36.3	66.36	1,481.9	1,301.6	1,570.3	1,505.6	24.293		
10,600.0	9,096.6	10,202.4	8,457.7	35.1	38.1	66.39	1,596.7	1,298.1	1,567.4	1,499.7	23.151		
10,700.0	9,096.1	10,320.4	8,460.6	36.7	39.9	66.46	1,714.6	1,293.7	1,563.5	1,492.6	22.062		
10,800.0	9,095.6	10,420.8	8,462.2	38.2	41.5	66.47	1,814.9	1,289.0	1,558.9	1,485.1	21.116		
10,900.0	9,095.1	10,519.5	8,460.5	39.8	43.1	66.36	1,913.4	1,282.9	1,554.4	1,477.7	20.258		
11,000.0	9,094.5	10,595.0	8,459.5	41.4	44.3	66.28	1,988.7	1,278.5	1,550.3	1,471.0	19.552		
11,100.0	9,094.0	10,661.2	8,459.2	43.0	45.3	66.25	2,054.9	1,276.3	1,548.0	1,466.3	18.940		
11,127.0	9,093.9	10,689.0	8,458.8	43.4	45.7	66.24	2,082.7	1,276.0	1,548.1	1,465.5	18.755		
11,200.0	9,093.5	10,740.8	8,458.1	44.6	46.5	66.23	2,134.5	1,275.8	1,548.4	1,464.0	18.347		
11,300.0	9,093.0	10,829.3	8,457.3	46.2	47.9	66.23	2,223.0	1,275.8	1,549.2	1,461.9	17.759		
11,400.0	9,092.4	10,918.8	8,455.5	47.9	49.4	66.21	2,312.5	1,276.5	1,551.1	1,461.0	17.216		
11,500.0	9,091.9	11,051.5	8,456.1	49.5	51.5	66.29	2,445.1	1,277.9	1,552.4	1,458.8	16.572		
11,600.0	9,091.4	11,181.2	8,458.4	51.2	53.6	66.38	2,574.9	1,276.5	1,551.1	1,453.8	15.942		
11,700.0	9,090.9	11,273.9	8,458.3	52.9	55.2	66.37	2,667.3	1,274.2	1,549.4	1,449.1	15.447		
11,800.0	9,090.3	11,365.1	8,458.4	54.6	56.7	66.37	2,758.7	1,272.6	1,548.2	1,444.9	14.990		
11,900.0	9,089.8	11,459.0	8,458.2	56.3	58.2	66.37	2,852.6	1,271.3	1,547.5	1,441.2	14.557		
12,000.0	9,089.3	11,565.2	8,460.0	58.0	59.9	66.45	2,958.8	1,270.6	1,546.6	1,437.0	14.114		
12,100.0	9,088.8	11,667.9	8,461.9	59.7	61.6	66.54	3,061.4	1,270.0	1,545.8	1,433.0	13.699		
12,200.0	9,088.3	11,788.0	8,463.1	61.5	63.7	66.58	3,181.5	1,267.4	1,543.9	1,427.5	13.266		
12,300.0	9,087.7	11,894.9	8,463.6	63.2	65.5	66.57	3,288.3	1,264.0	1,541.2	1,421.5	12.879		
12,400.0	9,087.2	11,972.9	8,465.0	64.9	66.8	66.62	3,386.3	1,262.2	1,538.8	1,416.3	12.560		
12,488.5	9,086.7	12,039.1	8,465.9	66.5	67.9	66.66	3,432.5	1,261.8	1,538.3	1,413.3	12.306		
12,500.0	9,086.7	12,049.0	8,466.0	66.7	68.0	66.66	3,442.4	1,261.8	1,538.3	1,412.9	12.272		

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



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #2H - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 usft
Survey Program: 100-MWD default, 7793-MWD default													Offset Well Error:	0.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Separation Factor	Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore +N/-S (usft)	Centre +E/-W (usft)			Between Centres (usft)	Between Ellipses (usft)		
12,600.0	9,086.2	12,142.8	8,465.4	68.4	69.6	66.67	3,536.2	1,261.6	1,538.8	1,410.3	11.980			
12,700.0	9,085.6	12,204.0	8,467.2	70.1	70.6	66.76	3,597.3	1,262.2	1,539.6	1,408.5	11,744			
12,800.0	9,085.1	12,299.0	8,468.2	71.9	72.2	66.87	3,692.2	1,265.6	1,542.9	1,408.6	11,489			
12,900.0	9,084.6	12,390.9	8,468.9	73.6	73.7	66.99	3,784.0	1,270.5	1,547.9	1,410.5	11,262			
13,000.0	9,084.1	12,480.4	8,471.4	75.4	75.2	67.17	3,873.3	1,275.2	1,552.1	1,411.5	11,036			
13,100.0	9,083.5	12,567.4	8,471.3	77.2	76.7	67.25	3,960.2	1,279.4	1,557.1	1,413.3	10,832			
13,200.0	9,083.0	12,650.3	8,469.0	78.9	78.1	67.25	4,043.0	1,283.4	1,563.0	1,416.3	10,653			
13,300.0	9,082.5	12,747.3	8,464.6	80.7	79.7	67.20	4,139.8	1,288.1	1,569.7	1,419.9	10,476			
13,400.0	9,082.0	12,882.2	8,462.2	82.5	81.9	67.24	4,274.5	1,294.4	1,575.1	1,421.5	10,253			
13,500.0	9,081.4	12,961.0	8,461.3	84.2	83.2	67.29	4,353.2	1,298.1	1,580.4	1,423.8	10,095			
13,600.0	9,080.9	13,080.8	8,459.5	86.0	85.2	67.34	4,472.9	1,303.8	1,585.8	1,425.7	9,902			
13,700.0	9,080.4	13,221.1	8,460.5	87.8	87.6	67.47	4,613.1	1,308.4	1,589.0	1,424.9	9,681			
13,800.0	9,079.9	13,321.0	8,463.9	89.6	89.3	67.65	4,712.9	1,311.2	1,590.8	1,423.3	9,495			
13,900.0	9,079.3	13,321.0	8,463.9	91.3	89.3	67.65	4,712.9	1,311.2	1,596.0	1,426.7	9,431			
14,000.0	9,078.8	13,321.0	8,463.9	93.1	89.3	67.65	4,712.9	1,311.2	1,607.3	1,436.4	9,405	SF		
14,082.2	9,078.4	13,321.0	8,463.9	94.6	89.3	67.65	4,712.9	1,311.2	1,621.2	1,448.9	9,411			
14,082.7	9,078.4	13,321.0	8,463.9	94.6	89.3	67.65	4,712.9	1,311.2	1,621.3	1,449.0	9,411			



QES Directional Drilling, LLC
Anticollision Report



Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	100.58	-18.7	100.1	102.2				
100.0	100.0	92.1	92.1	0.1	0.1	100.61	-18.7	99.8	101.5	101.4	601.489		
200.0	200.0	191.8	191.8	0.3	0.3	100.60	-18.6	99.2	101.0	100.4	171.068		
300.0	300.0	292.5	292.5	0.5	0.5	100.28	-17.9	98.6	100.2	99.2	97.462		
400.0	400.0	393.2	393.2	0.8	0.7	99.77	-16.8	97.3	98.8	97.3	67.243		
500.0	500.0	493.2	493.2	1.0	0.9	99.38	-15.8	95.6	96.9	95.0	50.830		
600.0	600.0	593.9	593.8	1.2	1.1	98.83	-14.6	93.6	94.8	92.4	40.292		
700.0	700.0	694.0	693.9	1.4	1.4	97.88	-12.6	91.2	92.1	89.3	32.895		
800.0	800.0	793.8	793.6	1.7	1.6	96.68	-10.4	88.9	89.5	86.3	27.665		
900.0	900.0	893.4	893.2	1.9	1.8	95.71	-8.7	86.8	87.2	83.6	23.831		
1,000.0	1,000.0	993.0	992.7	2.1	2.0	94.85	-7.2	85.1	85.4	81.3	20.882		
1,067.8	1,067.8	1,060.5	1,060.3	2.2	2.1	-122.06	-6.3	84.2	84.9	80.5	19.496 CC		
1,075.5	1,075.5	1,068.2	1,067.9	2.3	2.1	-122.23	-6.2	84.1	84.9	80.5	19.358		
1,100.0	1,100.0	1,092.6	1,092.3	2.3	2.2	-122.80	-5.9	83.8	84.9	80.5	18.966 ES		
1,200.0	1,199.9	1,192.5	1,192.2	2.5	2.4	-125.09	-4.6	82.8	85.4	80.5	17.529		
1,300.0	1,299.9	1,292.2	1,291.9	2.7	2.6	-127.26	-3.5	82.0	86.0	80.8	16.333		
1,400.0	1,399.9	1,392.2	1,391.9	2.9	2.8	-129.23	-2.6	81.2	86.9	81.3	15.326		
1,500.0	1,499.8	1,492.2	1,491.9	3.1	3.0	-131.21	-1.7	80.4	87.9	81.8	14.447		
1,600.0	1,599.8	1,592.2	1,591.9	3.3	3.2	-133.26	-0.6	79.5	88.9	82.4	13.683		
1,700.0	1,699.8	1,692.0	1,691.7	3.5	3.5	-135.17	0.4	78.6	90.1	83.1	13.026		
1,800.0	1,799.7	1,792.1	1,791.8	3.7	3.7	-136.89	1.2	77.9	91.3	84.0	12.450		
1,900.0	1,899.7	1,892.0	1,891.7	3.9	3.9	-138.40	1.7	77.1	92.6	84.8	11.931		
2,000.0	1,999.7	1,992.1	1,991.8	4.1	4.1	-139.81	2.1	76.3	93.9	85.7	11.471		
2,100.0	2,099.6	2,092.2	2,091.9	4.3	4.3	-141.10	2.3	75.4	95.1	86.5	11.047		
2,200.0	2,199.6	2,192.2	2,191.8	4.5	4.5	-142.14	2.2	74.5	96.3	87.3	10.654		
2,300.0	2,299.6	2,292.3	2,292.0	4.8	4.7	-142.96	1.7	73.6	97.4	88.0	10.287		
2,400.0	2,399.5	2,392.6	2,392.2	5.0	5.0	-143.74	1.1	72.6	98.3	88.4	9.934		
2,500.0	2,499.5	2,492.8	2,492.5	5.2	5.2	-144.53	0.5	71.2	99.0	88.7	9.587		
2,600.0	2,599.5	2,593.1	2,592.7	5.4	5.4	-145.32	-0.2	69.7	99.5	88.7	9.245		
2,700.0	2,699.4	2,693.4	2,693.0	5.7	5.6	-146.06	-1.1	67.8	99.6	88.5	8.902		
2,800.0	2,799.4	2,793.6	2,793.2	5.9	5.8	-146.86	-2.0	65.7	99.6	87.9	8.565		
2,900.0	2,899.4	2,893.8	2,893.3	6.1	6.0	-147.94	-2.5	63.2	99.3	87.2	8.237		
3,000.0	2,999.3	2,993.9	2,993.4	6.3	6.2	-149.13	-2.9	60.5	98.9	86.4	7.919		
3,100.0	3,099.3	3,094.1	3,093.6	6.5	6.4	-150.67	-2.8	57.4	98.3	85.4	7.611		
3,200.0	3,199.3	3,194.2	3,193.6	6.8	6.7	-152.72	-2.1	53.7	97.6	84.3	7.314		
3,300.0	3,299.2	3,294.2	3,293.5	7.0	6.9	-154.94	-1.2	49.8	97.0	83.2	7.037		
3,400.0	3,399.2	3,394.0	3,393.3	7.2	7.1	-157.08	-0.5	46.1	96.5	82.3	6.791		
3,494.4	3,493.5	3,488.1	3,487.3	7.4	7.3	-159.06	0.3	42.7	96.4	81.8	6.592		
3,500.0	3,499.1	3,493.7	3,492.9	7.5	7.3	-159.18	0.3	42.5	96.4	81.7	6.581		
3,600.0	3,599.1	3,593.2	3,592.3	7.7	7.5	-161.03	1.0	39.5	96.7	81.6	6.414		
3,700.0	3,699.1	3,693.2	3,692.3	7.9	7.7	-162.39	1.1	37.1	97.3	81.8	6.276		
3,800.0	3,799.0	3,793.7	3,792.8	8.1	7.9	-163.39	0.5	34.8	97.7	81.7	6.127		
3,900.0	3,899.0	3,893.0	3,892.0	8.4	8.1	-164.06	-0.4	32.9	98.2	81.8	5.994		
4,000.0	3,999.0	3,992.8	3,991.8	8.6	8.4	-164.18	-1.8	32.1	99.2	82.4	5.900		
4,100.0	4,098.9	4,091.8	4,090.8	8.8	8.6	-163.95	-3.3	32.0	100.7	83.5	5.843		
4,200.0	4,198.9	4,191.9	4,190.9	9.0	8.8	-163.69	-4.5	32.3	102.7	85.1	5.818		
4,300.0	4,298.9	4,291.8	4,290.8	9.3	9.0	-163.57	-5.6	32.5	104.7	86.6	5.790		
4,400.0	4,398.8	4,391.4	4,390.4	9.5	9.2	-163.61	-6.3	32.6	106.9	88.4	5.776		
4,500.0	4,498.8	4,491.1	4,490.1	9.7	9.4	-163.66	-6.9	33.0	109.4	90.5	5.778		
4,600.0	4,598.8	4,592.0	4,591.0	10.0	9.6	-163.95	-7.2	32.9	111.7	92.3	5.767		
4,700.0	4,698.7	4,692.0	4,691.0	10.2	9.8	-164.40	-7.5	32.2	113.5	93.7	5.731		
4,800.0	4,798.7	4,792.1	4,791.1	10.4	10.0	-164.88	-7.8	31.4	115.2	95.0	5.694		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
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Local Co-ordinate Reference: Well Azores Federal #8H
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore +N/-S (usft)	Centre +E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
4,900.0	4,898.7	4,892.2	4,891.2	10.6	10.2	-165.37	-8.2	30.5	116.8	96.2	5.654		
5,000.0	4,998.6	4,991.7	4,990.7	10.9	10.4	-165.91	-8.3	29.6	118.6	97.6	5.624		
5,100.0	5,098.6	5,091.1	5,090.1	11.1	10.6	-166.60	-7.9	28.9	120.9	99.4	5.616		
5,200.0	5,198.6	5,190.6	5,189.6	11.3	10.8	-167.35	-7.0	28.3	123.6	101.6	5.629		
5,300.0	5,298.5	5,290.6	5,289.5	11.6	11.0	-168.00	-6.2	28.0	126.5	104.1	5.650		
5,400.0	5,398.5	5,390.4	5,389.3	11.8	11.2	-168.56	-5.4	27.8	129.4	106.6	5.671		
5,500.0	5,498.5	5,490.4	5,489.4	12.0	11.4	-169.16	-4.5	27.5	132.4	109.2	5.695		
5,600.0	5,598.4	5,590.4	5,589.3	12.2	11.7	-169.84	-3.4	27.0	135.4	111.7	5.715		
5,700.0	5,698.4	5,690.2	5,689.1	12.5	11.9	-170.57	-2.2	26.4	138.4	114.3	5.737		
5,800.0	5,798.4	5,790.7	5,789.7	12.7	12.1	-171.28	-1.1	25.6	141.3	116.7	5.753		
5,900.0	5,898.3	5,890.4	5,889.3	12.9	12.3	-171.97	-0.1	24.8	144.0	119.0	5.763		
6,000.0	5,998.3	5,990.5	5,989.5	13.2	12.5	-172.58	0.9	24.1	146.9	121.4	5.777		
6,100.0	6,098.2	6,090.2	6,089.1	13.4	12.7	-173.17	1.9	23.3	149.7	123.8	5.790		
6,200.0	6,198.2	6,190.0	6,188.9	13.6	12.9	-173.88	3.3	22.5	152.7	126.4	5.810		
6,300.0	6,298.2	6,290.1	6,289.0	13.8	13.1	-174.61	4.7	21.5	155.7	129.0	5.828		
6,400.0	6,398.1	6,390.3	6,389.2	14.1	13.3	-175.18	5.8	20.6	158.7	131.5	5.842		
6,500.0	6,498.1	6,490.6	6,489.5	14.3	13.6	-175.76	6.8	19.7	161.4	133.8	5.849		
6,600.0	6,598.1	6,591.5	6,590.3	14.5	13.8	-176.35	7.6	18.4	163.8	135.8	5.844		
6,700.0	6,698.0	6,691.2	6,690.1	14.8	14.0	-176.83	8.0	17.1	166.0	137.5	5.830		
6,800.0	6,798.0	6,789.9	6,788.8	15.0	14.2	-177.16	8.5	16.5	168.6	139.7	5.833		
6,900.0	6,898.0	6,891.1	6,890.0	15.2	14.4	-177.45	9.0	15.9	171.3	142.0	5.839		
7,000.0	6,997.9	6,991.6	6,990.5	15.5	14.6	-177.70	9.0	15.1	173.4	143.6	5.824		
7,100.0	7,097.9	7,091.2	7,090.1	15.7	14.8	-177.83	8.7	14.5	175.5	145.3	5.809		
7,200.0	7,197.9	7,192.6	7,191.4	15.9	15.0	-177.93	8.3	13.9	177.3	146.7	5.787		
7,300.0	7,297.8	7,294.4	7,293.2	16.1	15.2	-178.01	7.0	12.7	178.2	147.2	5.735		
7,400.0	7,397.8	7,393.8	7,392.6	16.4	15.5	-177.97	5.2	11.6	178.8	147.3	5.673		
7,500.0	7,497.8	7,492.6	7,491.4	16.6	15.7	-177.83	3.7	11.0	179.9	147.9	5.630		
7,600.0	7,597.7	7,591.6	7,590.4	16.8	15.9	-177.67	2.5	10.9	181.5	149.2	5.608		
7,700.0	7,697.7	7,691.9	7,690.6	17.1	16.1	-177.40	1.3	11.2	183.4	150.6	5.591		
7,800.0	7,797.7	7,792.0	7,790.8	17.3	16.3	-177.01	-0.1	11.8	185.3	152.1	5.576		
7,900.0	7,897.6	7,890.7	7,889.4	17.5	16.5	-176.66	-1.8	12.1	186.8	153.2	5.550 SF		
8,000.0	7,997.6	7,966.3	7,964.8	17.8	16.6	-177.27	2.6	13.2	195.0	161.0	5.729		
8,100.0	8,097.6	8,032.1	8,028.9	18.0	16.8	-179.24	17.0	15.7	217.5	183.1	6.323		
8,200.0	8,197.5	8,094.5	8,086.3	18.2	16.9	-177.67	41.0	18.1	254.4	219.7	7.319		
8,300.0	8,297.5	8,153.7	8,137.9	18.4	17.0	-174.67	70.1	21.2	302.1	267.0	8.605		
8,400.0	8,397.4	8,207.5	8,182.0	18.7	17.2	-172.12	100.7	24.3	358.3	322.8	10.112		
8,500.0	8,497.4	8,254.6	8,218.2	18.9	17.3	-169.99	130.6	26.7	421.3	385.5	11.788		
8,600.0	8,597.4	8,293.0	8,245.7	19.1	17.5	-168.28	157.4	28.2	490.3	454.3	13.609		
8,618.1	8,615.5	8,293.0	8,245.7	19.2	17.5	-168.28	157.4	28.2	503.4	467.4	13.958		
8,625.0	8,622.4	8,302.5	8,252.2	19.2	17.5	-137.33	164.3	28.5	508.3	472.2	14.080		
8,650.0	8,647.4	8,310.6	8,257.6	19.2	17.5	-41.21	170.3	28.7	526.1	489.9	14.561		
8,675.0	8,672.3	8,325.0	8,267.0	19.3	17.6	-29.85	181.3	29.0	543.4	507.3	15.059		
8,700.0	8,697.1	8,325.0	8,267.0	19.3	17.6	-25.81	181.3	29.0	560.0	524.0	15.589		
8,725.0	8,721.7	8,335.4	8,273.5	19.4	17.6	-23.19	189.4	29.1	576.1	540.4	16.142		
8,750.0	8,746.0	8,343.8	8,278.6	19.4	17.7	-21.37	196.1	29.2	591.6	556.2	16.731		
8,775.0	8,770.1	8,356.0	8,285.8	19.4	17.7	-19.90	205.9	29.4	606.5	571.6	17.357		
8,800.0	8,793.7	8,356.0	8,285.8	19.4	17.7	-18.89	205.9	29.4	620.8	586.4	18.036		
8,825.0	8,816.8	8,372.4	8,295.1	19.5	17.8	-17.82	219.4	29.7	634.4	600.5	18.750		
8,850.0	8,839.5	8,388.0	8,303.7	19.5	17.9	-16.95	232.4	30.0	647.3	614.1	19.522		
8,875.0	8,861.5	8,388.0	8,303.7	19.5	17.9	-16.34	232.4	30.0	659.4	627.1	20.371		
8,900.0	8,882.9	8,404.0	8,312.0	19.5	18.0	-15.68	246.0	30.3	670.8	639.3	21.275		
8,925.0	8,903.6	8,417.0	8,318.6	19.6	18.0	-15.12	257.3	30.4	681.5	650.9	22.267		

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error: 0.0 usft
Survey Program: 100-MWD default												Offset Well Error: 0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning
8,950.0	8,923.5	8,426.4	8,323.1	19.6	18.1	14.65	265.5	30.5	691.4	661.8	23.358	
8,975.0	8,942.6	8,438.8	8,329.0	19.6	18.1	14.23	276.5	30.6	700.6	672.0	24.552	
9,000.0	8,960.9	8,448.0	8,333.2	19.6	18.2	13.88	284.6	30.6	708.9	681.5	25.876	
9,025.0	8,978.2	8,469.4	8,342.8	19.7	18.3	13.52	303.7	30.6	716.2	689.9	27.314	
9,050.0	8,994.6	8,479.0	8,347.1	19.7	18.4	13.26	312.4	30.5	722.6	697.6	28.936	
9,075.0	9,009.9	8,498.5	8,355.4	19.7	18.5	13.00	330.0	30.2	728.0	704.3	30.719	
9,100.0	9,024.2	8,511.0	8,360.5	19.8	18.6	12.80	341.4	30.0	732.5	710.2	32.740	
9,125.0	9,037.4	8,522.1	8,364.8	19.9	18.7	12.63	351.7	29.6	736.3	715.2	35.025	
9,150.0	9,049.5	8,532.4	8,368.6	19.9	18.7	12.49	361.2	29.3	739.2	719.6	37.616	
9,175.0	9,060.4	8,542.0	8,372.0	20.0	18.8	12.38	370.2	28.9	741.4	723.1	40.556	
9,200.0	9,070.1	8,556.3	8,376.8	20.1	18.9	12.29	383.7	28.4	742.7	725.8	43.838	
9,225.0	9,078.6	8,574.0	8,382.3	20.2	19.0	12.22	400.4	27.7	743.2	727.5	47.460	
9,250.0	9,085.9	8,583.9	8,385.3	20.3	19.1	12.20	409.9	27.4	742.7	728.2	51.474	
9,275.0	9,091.9	8,598.5	8,389.6	20.4	19.2	12.21	423.8	26.8	741.3	727.9	55.622	
9,300.0	9,096.6	8,614.5	8,394.0	20.5	19.4	12.25	439.1	26.3	738.9	726.5	59.614	
9,325.0	9,100.1	8,636.0	8,399.7	20.6	19.5	12.33	459.9	25.5	735.6	723.9	62.823	
9,350.0	9,102.2	8,649.9	8,403.2	20.8	19.6	12.44	473.3	25.1	731.2	719.9	64.940	
9,375.0	9,103.0	8,668.0	8,407.8	20.9	19.8	12.61	490.8	24.4	725.7	714.6	65.134	
9,380.7	9,103.0	8,668.0	8,407.8	21.0	19.8	12.64	490.8	24.4	724.3	713.2	65.040	
9,400.0	9,102.9	8,684.6	8,411.7	21.1	19.9	12.68	506.9	23.8	719.6	708.3	63.573	
9,500.0	9,102.4	8,731.0	8,421.5	21.8	20.4	12.77	552.3	22.4	698.7	686.6	57.836	
9,600.0	9,101.9	8,794.0	8,430.8	22.6	21.0	12.88	614.6	21.1	683.8	670.8	52.486	
9,700.0	9,101.3	8,863.7	8,437.3	23.5	21.7	13.05	683.9	21.1	674.3	660.2	47.777	
9,800.0	9,100.8	8,937.7	8,441.5	24.5	22.5	13.36	757.8	23.2	669.1	653.8	43.562	
9,900.0	9,100.3	9,015.9	8,443.3	25.6	23.4	13.61	836.0	25.1	667.1	650.5	40.049	
9,904.4	9,100.3	9,019.2	8,443.3	25.7	23.4	13.62	839.3	25.1	667.1	650.4	39.913	
10,000.0	9,099.8	9,108.0	8,441.9	26.8	24.5	13.77	928.0	26.6	668.6	650.5	37.030	
10,100.0	9,099.2	9,220.7	8,442.7	28.1	25.8	13.77	1,040.7	25.4	667.1	647.6	34.138	
10,123.2	9,099.1	9,239.0	8,442.6	28.4	26.1	13.75	1,059.0	25.0	667.0	647.2	33.637	
10,200.0	9,098.7	9,322.6	8,441.8	29.4	27.1	13.63	1,142.6	23.1	667.1	646.2	31.886	
10,300.0	9,098.2	9,420.7	8,442.6	30.8	28.4	13.48	1,240.6	20.3	665.3	643.0	29.838	
10,400.0	9,097.7	9,523.7	8,442.4	32.2	29.8	13.43	1,343.6	18.8	664.8	641.1	27.955	
10,500.0	9,097.2	9,623.8	8,443.1	33.6	31.2	13.29	1,443.6	16.2	663.2	638.0	26.300	
10,600.0	9,096.6	9,718.0	8,443.2	35.1	32.6	13.22	1,537.8	14.5	662.3	635.7	24.840	
10,670.5	9,096.3	9,785.5	8,443.0	36.2	33.6	13.21	1,605.3	13.8	662.2	634.5	23.888	
10,700.0	9,096.1	9,814.0	8,442.8	36.7	34.0	13.21	1,633.8	13.7	662.2	634.1	23.507	
10,800.0	9,095.6	9,929.0	8,443.9	38.2	35.7	13.40	1,748.8	14.7	661.1	631.2	22.078	
10,900.0	9,095.1	10,023.0	8,445.7	39.8	37.1	13.73	1,842.8	17.4	659.6	627.9	20.830	
10,944.2	9,094.8	10,060.3	8,445.9	40.5	37.6	13.86	1,880.1	18.6	659.5	627.1	20.358	
11,000.0	9,094.5	10,116.5	8,446.4	41.4	38.5	14.09	1,936.2	20.7	659.4	626.0	19.726	
11,014.2	9,094.5	10,129.7	8,446.5	41.6	38.7	14.15	1,949.4	21.3	659.4	625.7	19.576	
11,100.0	9,094.0	10,212.0	8,447.0	43.0	39.9	14.61	2,031.6	25.9	659.8	624.5	18.672	
11,200.0	9,093.5	10,306.1	8,446.7	44.6	41.4	15.09	2,125.5	30.9	661.1	623.8	17.752	
11,300.0	9,093.0	10,389.5	8,444.8	46.2	42.7	15.31	2,208.8	33.4	663.8	624.9	17.064	
11,400.0	9,092.4	10,488.5	8,440.9	47.9	44.2	15.51	2,307.7	36.0	668.0	627.3	16.421	
11,500.0	9,091.9	10,614.7	8,439.3	49.5	46.1	15.90	2,433.9	40.0	669.7	626.9	15.634	
11,600.0	9,091.4	10,727.1	8,440.6	51.2	47.8	16.49	2,546.1	45.9	669.8	624.7	14.854	
11,700.0	9,090.9	10,841.0	8,445.8	52.9	49.6	17.07	2,659.8	50.3	666.1	618.7	14.055	
11,800.0	9,090.3	10,926.8	8,448.8	54.6	51.0	17.38	2,745.5	52.4	663.3	614.0	13.465	
11,852.5	9,090.1	10,969.0	8,449.2	55.5	51.7	17.47	2,787.7	53.0	662.9	612.7	13.216	
11,900.0	9,089.8	11,009.2	8,449.0	56.3	52.4	17.52	2,827.9	53.3	663.1	612.1	13.013	
12,000.0	9,089.3	11,098.9	8,446.6	58.0	53.8	17.52	2,917.6	53.2	665.3	612.7	12.652	

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

Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Offset Design Sec 32, T24-S, R32E - Convo Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-MWD default												Offset Well Error:	0.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore +N/-S (usft)	Centre +E/-W (usft)	Distance		Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)				Between Centres (usft)	Between Ellipses (usft)			
12,100.0	9,088.8	11,209.3	8,443.7	59.7	55.6	17.52	3,027.9	53.3	667.5	613.1	12.273		
12,200.0	9,088.3	11,329.1	8,444.0	61.5	57.5	17.64	3,147.7	53.5	667.1	610.7	11.831		
12,300.0	9,087.7	11,425.9	8,445.9	63.2	59.0	17.83	3,244.4	54.4	665.2	606.9	11.414		
12,388.3	9,087.3	11,505.0	8,446.0	64.7	60.4	17.82	3,323.6	53.5	664.5	604.8	11.127		
12,400.0	9,087.2	11,515.3	8,445.9	64.9	60.5	17.80	3,333.9	53.3	664.6	604.7	11.095		
12,500.0	9,086.7	11,613.8	8,444.3	66.7	62.2	17.64	3,432.3	50.9	665.0	603.6	10.825		
12,600.0	9,086.2	11,711.7	8,443.5	68.4	63.8	17.71	3,530.2	51.1	665.6	602.4	10.527		
12,700.0	9,085.6	11,808.5	8,443.6	70.1	65.4	18.11	3,627.0	55.2	666.6	601.2	10.189		
12,800.0	9,085.1	11,910.0	8,444.4	71.9	67.0	18.78	3,728.2	62.2	667.8	599.8	9.820		
12,900.0	9,084.6	11,993.3	8,443.9	73.6	68.4	19.25	3,811.4	67.4	670.0	599.8	9.541		
13,000.0	9,084.1	12,107.4	8,442.1	75.4	70.3	19.74	3,925.3	73.1	673.1	600.3	9.247		
13,100.0	9,083.5	12,239.9	8,446.2	77.2	72.4	20.27	4,057.6	77.0	670.5	594.9	8.870		
13,200.0	9,083.0	12,323.1	8,448.3	78.9	73.8	20.48	4,140.8	78.1	668.3	590.8	8.617		
13,220.5	9,082.9	12,339.4	8,448.4	79.3	74.1	20.50	4,157.1	78.2	668.2	590.3	8.575		
13,300.0	9,082.5	12,416.3	8,447.5	80.7	75.4	20.53	4,234.0	78.1	668.9	589.5	8.424		
13,400.0	9,082.0	12,546.0	8,450.1	82.5	77.5	20.56	4,363.7	76.4	666.1	584.6	8.170		
13,500.0	9,081.4	12,638.9	8,453.4	84.2	79.1	20.61	4,456.4	74.9	662.0	578.7	7.941		
13,599.6	9,080.9	12,717.5	8,454.0	86.0	80.4	20.52	4,535.0	72.8	660.3	575.4	7.780		
13,600.0	9,080.9	12,717.8	8,454.0	86.0	80.4	20.52	4,535.3	72.8	660.3	575.4	7.779		
13,700.0	9,080.4	12,798.1	8,451.5	87.8	81.8	20.36	4,615.5	71.0	662.0	575.8	7.673		
13,800.0	9,079.9	12,890.9	8,446.6	89.6	83.4	20.06	4,708.1	68.3	665.7	578.2	7.602		
13,900.0	9,079.3	12,907.0	8,445.7	91.3	83.7	20.00	4,724.2	67.8	675.1	586.5	7.624		
14,000.0	9,078.8	12,907.0	8,445.7	93.1	83.7	20.00	4,724.2	67.8	698.5	609.0	7.808		
14,082.2	9,078.4	12,907.0	8,445.7	94.6	83.7	20.00	4,724.2	67.8	727.6	637.4	8.065		
14,082.7	9,078.4	12,907.0	8,445.7	94.6	83.7	20.00	4,724.2	67.8	727.8	637.6	8.067		

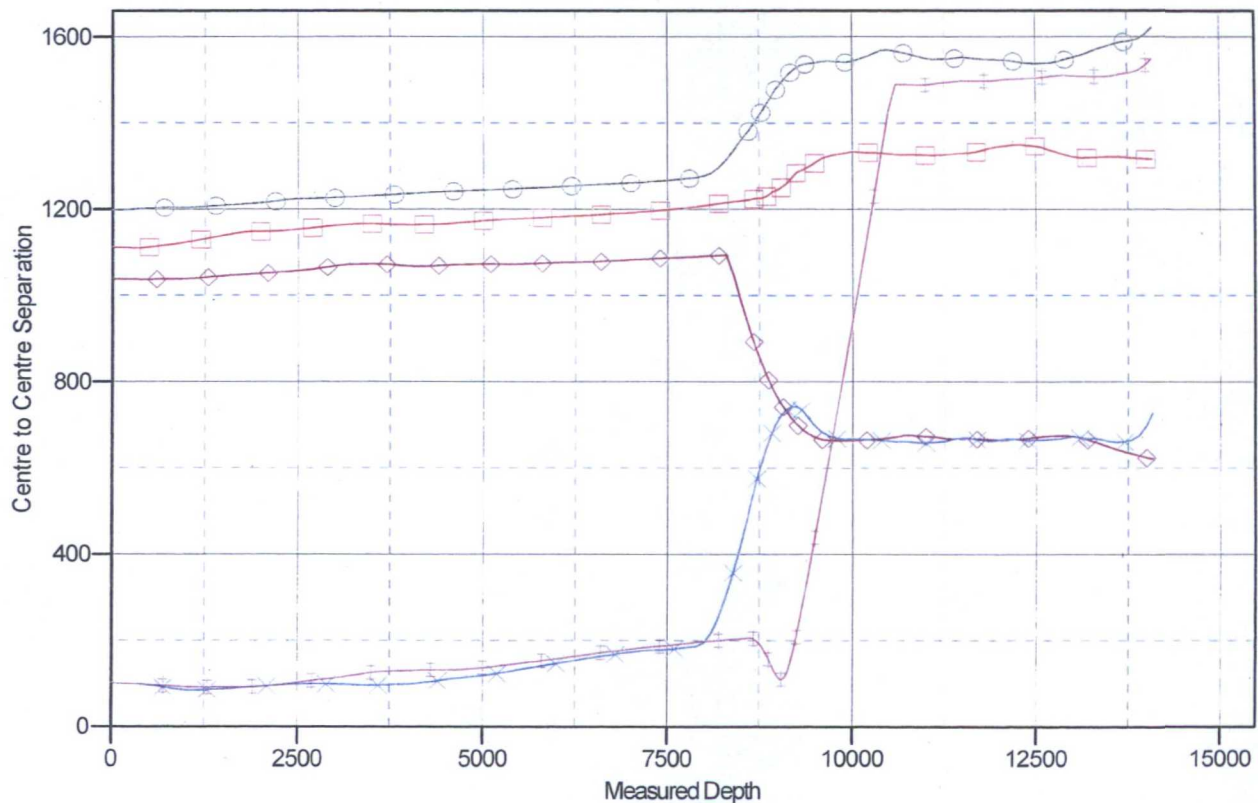
Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Plan #1

Local Co-ordinate Reference: Well Azores Federal #8H
TVD Reference: Well @ 3521.0usft (McVay 8)
MD Reference: Well @ 3521.0usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Reference Depths are relative to Well @ 3521.0usft (McVay 8)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Azores Federal #8H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.34°

Ladder Plot



LEGEND

- Azores Federal#11H, Wellbore #1, Wellbore #1 V0 - Azores Federal#7H, Wellbore #1, Wellbore #1 V0 - Azores Federal#3H, Wellbore #1, Wellbore #1 V0
- Convo Federal#2H, Wellbore #1, Wellbore #1 V0 - Convo Federal#3H, Wellbore #1, Wellbore #1 V0

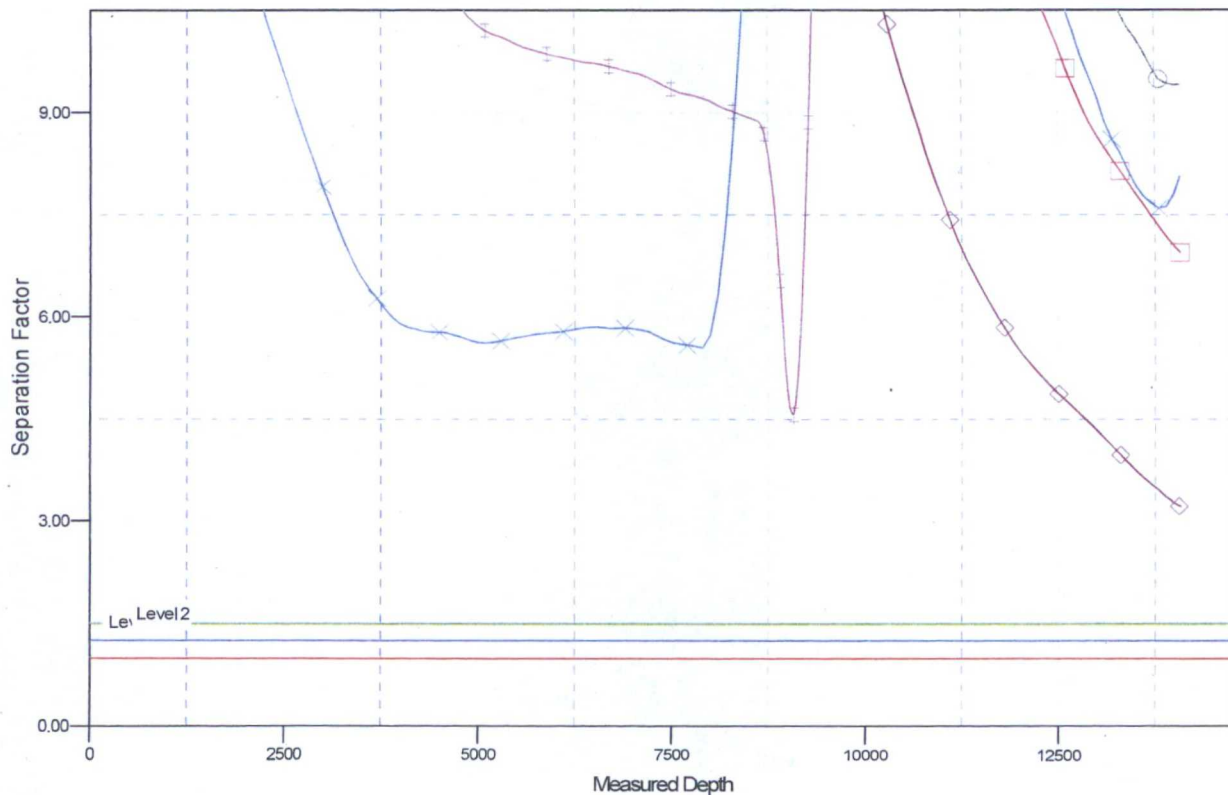
Company: COG Operating, LLC
Project: Lea County, NM
Reference Site: Sec 32, T24-S, R32E
Site Error: 0.0 usft
Reference Well: Azores Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
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TVD Reference: Well @ 3521.0usft (McVay 8)
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Reference Depths are relative to Well @ 3521.0usft (McVay 8)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Azores Federal #8H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.34°

Separation Factor Plot



LEGEND

- Azores Federal #11H, Wellbore #1, Wellbore #1 V0
- Convo Federal #2H, Wellbore #1, Wellbore #1 V0
- Azores Federal #7H, Wellbore #1, Wellbore #1 V0
- Convo Federal #3H, Wellbore #1, Wellbore #1 V0
- Azores Federal #3H, Wellbore #1, Wellbore #1 V0