

COG PRODUCTION, LLC

**LEA COUNTY, NM
AVALON SHALE
AZORES FEDERAL #11H**

OWB

Plan: DWD Plan 2

Standard Planning Report

19 May, 2016

AMENDED

COG Production LLC

Planning Report

Database: COG Production, LLC
Company: NEW MEXICO BASIN
Project: LEA COUNTY, NM
Site: AVALON SHALE
Well: AZORES FEDERAL #11H
Wellbore: OWB
Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
TVD Reference: WELL @ 3518.0usft (Original Well Elev)
MD Reference: WELL @ 3518.0usft (Original Well Elev)
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 AVALON SHALE
Site Position: **Northing:** 419,780.50 usft **Latitude:** 32° 9' 6.058 N
From: Map **Easting:** 741,734.30 usft **Longitude:** 103° 33' 8.114 W
Position Uncertainty: 0.0 usft **Slot Radius:** 13-3/16 " **Grid Convergence:** 0.42 °

Well AZORES FEDERAL #11H
Well Position **+N/-S** 10,180.6 usft **Northing:** 429,961.10 usft **Latitude:** 32° 10' 49.702 N
+E/-W -44,444.1 usft **Easting:** 697,290.20 usft **Longitude:** 103° 41' 44.362 W
Position Uncertainty 3.0 usft **Wellhead Elevation:** 0.0 usft **Ground Level:** 3,492.0 usft

Wellbore OWB
Magnetics **Model Name** **Sample Date** **Declination (°)** **Dip Angle (°)** **Field Strength (nT)**
 WMM2015 4/28/2016 7.14 60.01 48,007

Design DWD Plan 2
Audit Notes:
Version: **Phase:** PROTOTYPE **Tie On Depth:** 0.0
Vertical Section: **Depth From (TVD) (usft)** **+N/-S (usft)** **+E/-W (usft)** **Direction (°)**
 0.0 0.0 0.0 1.35

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	
8,642.9	0.00	0.00	8,642.9	0.0	0.0	0.00	0.00	0.00	0.00	
9,392.9	90.00	13.85	9,120.4	463.6	114.3	12.00	12.00	0.00	13.85	
9,750.4	90.12	359.55	9,120.0	817.7	155.9	4.00	0.03	-4.00	-89.51	
14,376.2	90.12	359.55	9,110.3	5,443.4	119.6	0.00	0.00	0.00	0.00	Azores Federal

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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
Azores Federal #11H - SHL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00

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 WELL @ 3518.0usft (Original Well Elev)
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 Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00
8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00
8,500.0	0.00	0.00	8,500.0	0.0	0.0	0.0	0.00	0.00	0.00
8,600.0	0.00	0.00	8,600.0	0.0	0.0	0.0	0.00	0.00	0.00
8,642.9	0.00	0.00	8,642.9	0.0	0.0	0.0	0.00	0.00	0.00
8,700.0	6.85	13.85	8,699.9	3.3	0.8	3.3	12.00	12.00	0.00
8,800.0	18.85	13.85	8,797.2	24.9	6.1	25.0	12.00	12.00	0.00
8,900.0	30.85	13.85	8,887.8	65.6	16.2	66.0	12.00	12.00	0.00
9,000.0	42.85	13.85	8,967.6	123.7	30.5	124.4	12.00	12.00	0.00
9,079.0	52.33	13.85	9,020.8	180.3	44.4	181.3	12.00	12.00	0.00
Azores Federal #11H - LP									
9,100.0	54.85	13.85	9,033.3	196.7	48.5	197.8	12.00	12.00	0.00
9,200.0	66.85	13.85	9,081.9	281.3	69.4	282.9	12.00	12.00	0.00
9,300.0	78.85	13.85	9,111.4	374.0	92.2	376.0	12.00	12.00	0.00
9,352.5	85.16	13.85	9,118.7	424.4	104.6	426.8	12.00	12.00	0.00
Azores Federal #11H - LP Shifted									
9,392.9	90.00	13.85	9,120.4	463.6	114.3	466.1	12.00	12.00	0.00
9,400.0	90.00	13.57	9,120.4	470.5	116.0	473.1	4.00	0.03	-4.00
9,500.0	90.04	9.57	9,120.3	568.4	136.0	571.5	4.00	0.03	-4.00
9,600.0	90.07	5.57	9,120.2	667.5	149.2	670.9	4.00	0.03	-4.00
9,700.0	90.10	1.57	9,120.1	767.3	155.4	770.8	4.00	0.03	-4.00
9,750.4	90.12	359.55	9,120.0	817.7	155.9	821.2	4.00	0.03	-4.00
9,800.0	90.12	359.55	9,119.9	867.3	155.5	870.7	0.00	0.00	0.00
9,900.0	90.12	359.55	9,119.7	967.3	154.7	970.7	0.00	0.00	0.00

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10,000.0	90.12	359.55	9,119.5	1,067.3	153.9	1,070.6	0.00	0.00	0.00
10,100.0	90.12	359.55	9,119.3	1,167.3	153.2	1,170.6	0.00	0.00	0.00
10,200.0	90.12	359.55	9,119.0	1,267.3	152.4	1,270.5	0.00	0.00	0.00
10,300.0	90.12	359.55	9,118.8	1,367.3	151.6	1,370.5	0.00	0.00	0.00
10,400.0	90.12	359.55	9,118.6	1,467.3	150.8	1,470.4	0.00	0.00	0.00
10,500.0	90.12	359.55	9,118.4	1,567.3	150.0	1,570.4	0.00	0.00	0.00
10,600.0	90.12	359.55	9,118.2	1,667.3	149.2	1,670.3	0.00	0.00	0.00
10,700.0	90.12	359.55	9,118.0	1,767.3	148.4	1,770.3	0.00	0.00	0.00
10,800.0	90.12	359.55	9,117.8	1,867.3	147.7	1,870.2	0.00	0.00	0.00
10,900.0	90.12	359.55	9,117.6	1,967.3	146.9	1,970.2	0.00	0.00	0.00
11,000.0	90.12	359.55	9,117.4	2,067.3	146.1	2,070.1	0.00	0.00	0.00
11,100.0	90.12	359.55	9,117.2	2,167.3	145.3	2,170.1	0.00	0.00	0.00
11,200.0	90.12	359.55	9,117.0	2,267.3	144.5	2,270.0	0.00	0.00	0.00
11,300.0	90.12	359.55	9,116.7	2,367.3	143.7	2,370.0	0.00	0.00	0.00
11,400.0	90.12	359.55	9,116.5	2,467.3	142.9	2,469.9	0.00	0.00	0.00
11,500.0	90.12	359.55	9,116.3	2,567.3	142.2	2,569.9	0.00	0.00	0.00
11,600.0	90.12	359.55	9,116.1	2,667.3	141.4	2,669.8	0.00	0.00	0.00
11,700.0	90.12	359.55	9,115.9	2,767.3	140.6	2,769.8	0.00	0.00	0.00
11,800.0	90.12	359.55	9,115.7	2,867.3	139.8	2,869.8	0.00	0.00	0.00
11,900.0	90.12	359.55	9,115.5	2,967.2	139.0	2,969.7	0.00	0.00	0.00
12,000.0	90.12	359.55	9,115.3	3,067.2	138.2	3,069.7	0.00	0.00	0.00
12,100.0	90.12	359.55	9,115.1	3,167.2	137.4	3,169.6	0.00	0.00	0.00
12,200.0	90.12	359.55	9,114.9	3,267.2	136.7	3,269.6	0.00	0.00	0.00
12,300.0	90.12	359.55	9,114.6	3,367.2	135.9	3,369.5	0.00	0.00	0.00
12,400.0	90.12	359.55	9,114.4	3,467.2	135.1	3,469.5	0.00	0.00	0.00
12,500.0	90.12	359.55	9,114.2	3,567.2	134.3	3,569.4	0.00	0.00	0.00
12,600.0	90.12	359.55	9,114.0	3,667.2	133.5	3,669.4	0.00	0.00	0.00
12,700.0	90.12	359.55	9,113.8	3,767.2	132.7	3,769.3	0.00	0.00	0.00
12,800.0	90.12	359.55	9,113.6	3,867.2	131.9	3,869.3	0.00	0.00	0.00
12,900.0	90.12	359.55	9,113.4	3,967.2	131.2	3,969.2	0.00	0.00	0.00
13,000.0	90.12	359.55	9,113.2	4,067.2	130.4	4,069.2	0.00	0.00	0.00
13,100.0	90.12	359.55	9,113.0	4,167.2	129.6	4,169.1	0.00	0.00	0.00
13,200.0	90.12	359.55	9,112.8	4,267.2	128.8	4,269.1	0.00	0.00	0.00
13,300.0	90.12	359.55	9,112.6	4,367.2	128.0	4,369.0	0.00	0.00	0.00
13,400.0	90.12	359.55	9,112.3	4,467.2	127.2	4,469.0	0.00	0.00	0.00
13,500.0	90.12	359.55	9,112.1	4,567.2	126.5	4,568.9	0.00	0.00	0.00
13,600.0	90.12	359.55	9,111.9	4,667.2	125.7	4,668.9	0.00	0.00	0.00
13,700.0	90.12	359.55	9,111.7	4,767.2	124.9	4,768.8	0.00	0.00	0.00
13,800.0	90.12	359.55	9,111.5	4,867.2	124.1	4,868.8	0.00	0.00	0.00
13,900.0	90.12	359.55	9,111.3	4,967.2	123.3	4,968.7	0.00	0.00	0.00
14,000.0	90.12	359.55	9,111.1	5,067.2	122.5	5,068.7	0.00	0.00	0.00
14,100.0	90.12	359.55	9,110.9	5,167.2	121.7	5,168.6	0.00	0.00	0.00
14,200.0	90.12	359.55	9,110.7	5,267.2	121.0	5,268.6	0.00	0.00	0.00
14,300.0	90.12	359.55	9,110.5	5,367.2	120.2	5,368.5	0.00	0.00	0.00
14,376.2	90.12	359.55	9,110.3	5,443.4	119.6	5,444.7	0.00	0.00	0.00

Azores Federal #11H - BHL

COG Production LLC

Planning Report

Database: COG Production, LLC
Company: NEW MEXICO BASIN
Project: LEA COUNTY, NM
Site: AVALON SHALE
Well: AZORES FEDERAL #11H
Wellbore: OWB
Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
TVD Reference: WELL @ 3518.0usft (Original Well Elev)
MD Reference: WELL @ 3518.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Azores Federal - plan hits target center - Point	0.00	0.00	0.0	0.0	0.0	429,961.10	697,290.20	32° 10' 49.702 N	103° 41' 44.362 W
Azores Federal - plan misses target center by 0.3usft at 14376.2usft MD (9110.3 TVD, 5443.4 N, 119.6 E) - Rectangle (sides W100.0 H5,444.7 D30.0)	0.00	359.55	9,110.0	5,443.4	119.7	435,404.50	697,409.90	32° 11' 43.561 N	103° 41' 42.593 W
Azores Federal - plan misses target center by 56.3usft at 9352.5usft MD (9118.7 TVD, 424.4 N, 104.6 E) - Point	0.00	0.00	9,120.0	410.8	159.2	430,371.94	697,449.44	32° 10' 53.758 N	103° 41' 42.480 W
Azores Federal - plan misses target center by 274.7usft at 9079.0usft MD (9020.8 TVD, 180.3 N, 44.4 E) - Point	0.00	0.00	9,190.0	-1.1	162.5	429,959.95	697,452.68	32° 10' 49.681 N	103° 41' 42.471 W

COG PRODUCTION, LLC

LEA COUNTY, NM

AVALON SHALE

AZORES FEDERAL #11H

OWB

DWD Plan 2

Anticollision Report

23 May, 2016

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Reference	DWD Plan 2		
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:	Circular Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 5/19/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	14,375.8	DWD Plan 2 (OWB)	MWD	OWSG 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						
AVALON SHALE						
AZORES FEDERAL #7H - OWB - DWD Plan 4 - land an	8,616.9	8,615.9	80.0	18.4	1.298	Shut in Produces, CC
AZORES FEDERAL #7H - OWB - DWD Plan 4 - land an	8,642.9	8,640.4	80.2	18.4	1.298	Shut in Produces, ES, SF
DELAWARE						
CORVO FEDERAL #2H - OWB - ACTUAL WELLPATH	100.0	91.8	102.0	97.0	20.380	CC
CORVO FEDERAL #2H - OWB - ACTUAL WELLPATH	7,837.8	7,829.8	108.0	77.2	3.505	ES
CORVO FEDERAL #2H - OWB - ACTUAL WELLPATH	7,900.0	7,888.0	108.8	77.7	3.503	SF

Offset Design AVALON SHALE - AZORES FEDERAL #7H - OWB - DWD Plan 4 - land and turn													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 3.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning
				Reference (usft)	Offset (usft)		+N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.0	0.0	0.0	0.0	3.0	3.0	-90.64	-0.9	-80.0	80.0				
100.0	100.0	99.0	99.0	3.0	3.0	-90.64	-0.9	-80.0	80.0	74.0	6.01	13.321	
200.0	200.0	199.0	199.0	3.0	3.0	-90.64	-0.9	-80.0	80.0	73.9	6.08	13.160	
300.0	300.0	299.0	299.0	3.1	3.1	-90.64	-0.9	-80.0	80.0	73.8	6.23	12.832	
400.0	400.0	399.0	399.0	3.2	3.2	-90.64	-0.9	-80.0	80.0	73.5	6.47	12.372	
500.0	500.0	499.0	499.0	3.4	3.4	-90.64	-0.9	-80.0	80.0	73.2	6.77	11.823	
600.0	600.0	599.0	599.0	3.6	3.6	-90.64	-0.9	-80.0	80.0	72.9	7.13	11.226	
700.0	700.0	699.0	699.0	3.8	3.8	-90.64	-0.9	-80.0	80.0	72.5	7.54	10.613	
800.0	800.0	799.0	799.0	4.0	4.0	-90.64	-0.9	-80.0	80.0	72.0	7.99	10.010	
900.0	900.0	899.0	899.0	4.2	4.2	-90.64	-0.9	-80.0	80.0	71.5	8.48	9.431	
1,000.0	1,000.0	999.0	999.0	4.5	4.5	-90.64	-0.9	-80.0	80.0	71.0	9.00	8.885	
1,100.0	1,100.0	1,099.0	1,099.0	4.8	4.8	-90.64	-0.9	-80.0	80.0	70.5	9.55	8.377	
1,200.0	1,200.0	1,199.0	1,199.0	5.1	5.1	-90.64	-0.9	-80.0	80.0	69.9	10.12	7.907	
1,300.0	1,300.0	1,299.0	1,299.0	5.4	5.4	-90.64	-0.9	-80.0	80.0	69.3	10.70	7.474	
1,400.0	1,400.0	1,399.0	1,399.0	5.7	5.7	-90.64	-0.9	-80.0	80.0	68.7	11.31	7.077	
1,500.0	1,500.0	1,499.0	1,499.0	6.0	6.0	-90.64	-0.9	-80.0	80.0	68.1	11.92	6.712	
1,600.0	1,600.0	1,599.0	1,599.0	6.3	6.3	-90.64	-0.9	-80.0	80.0	67.5	12.54	6.378	
1,700.0	1,700.0	1,699.0	1,699.0	6.6	6.6	-90.64	-0.9	-80.0	80.0	66.8	13.18	6.071	
1,800.0	1,800.0	1,799.0	1,799.0	6.9	6.9	-90.64	-0.9	-80.0	80.0	66.2	13.82	5.789	
1,900.0	1,900.0	1,899.0	1,899.0	7.2	7.2	-90.64	-0.9	-80.0	80.0	65.5	14.47	5.529	
2,000.0	2,000.0	1,999.0	1,999.0	7.6	7.6	-90.64	-0.9	-80.0	80.0	64.9	15.12	5.290	

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design AVALON SHALE - AZORES FEDERAL #7H - OWB - DWD Plan 4 - land and turn													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 3.0 usft
Reference	Offset		Semi Major Axis		Distance		Minimum Separation		Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
2,100.0	2,100.0	2,099.0	2,099.0	7.9	7.9	-90.64	-0.9	-80.0	80.0	64.2	15.79	5.068	
2,200.0	2,200.0	2,199.0	2,199.0	8.2	8.2	-90.64	-0.9	-80.0	80.0	63.6	16.45	4.863	
2,300.0	2,300.0	2,299.0	2,299.0	8.6	8.6	-90.64	-0.9	-80.0	80.0	62.9	17.12	4.673	
2,400.0	2,400.0	2,399.0	2,399.0	8.9	8.9	-90.64	-0.9	-80.0	80.0	62.2	17.79	4.496	
2,500.0	2,500.0	2,499.0	2,499.0	9.2	9.2	-90.64	-0.9	-80.0	80.0	61.5	18.47	4.332	
2,600.0	2,600.0	2,599.0	2,599.0	9.6	9.6	-90.64	-0.9	-80.0	80.0	60.9	19.15	4.178	
2,700.0	2,700.0	2,699.0	2,699.0	9.9	9.9	-90.64	-0.9	-80.0	80.0	60.2	19.83	4.034	
2,800.0	2,800.0	2,799.0	2,799.0	10.3	10.3	-90.64	-0.9	-80.0	80.0	59.5	20.52	3.900	
2,900.0	2,900.0	2,899.0	2,899.0	10.6	10.6	-90.64	-0.9	-80.0	80.0	58.8	21.20	3.773	
3,000.0	3,000.0	2,999.0	2,999.0	10.9	10.9	-90.64	-0.9	-80.0	80.0	58.1	21.89	3.655	
3,100.0	3,100.0	3,099.0	3,099.0	11.3	11.3	-90.64	-0.9	-80.0	80.0	57.4	22.58	3.543	
3,200.0	3,200.0	3,199.0	3,199.0	11.6	11.6	-90.64	-0.9	-80.0	80.0	56.7	23.27	3.438	
3,300.0	3,300.0	3,299.0	3,299.0	12.0	12.0	-90.64	-0.9	-80.0	80.0	56.0	23.97	3.338	
3,400.0	3,400.0	3,399.0	3,399.0	12.3	12.3	-90.64	-0.9	-80.0	80.0	55.3	24.66	3.244	
3,500.0	3,500.0	3,499.0	3,499.0	12.7	12.7	-90.64	-0.9	-80.0	80.0	54.6	25.36	3.155	
3,600.0	3,600.0	3,599.0	3,599.0	13.0	13.0	-90.64	-0.9	-80.0	80.0	54.0	26.05	3.071	
3,700.0	3,700.0	3,699.0	3,699.0	13.4	13.4	-90.64	-0.9	-80.0	80.0	53.3	26.75	2.990	
3,800.0	3,800.0	3,799.0	3,799.0	13.7	13.7	-90.64	-0.9	-80.0	80.0	52.6	27.45	2.914	
3,900.0	3,900.0	3,899.0	3,899.0	14.1	14.1	-90.64	-0.9	-80.0	80.0	51.9	28.15	2.842	
4,000.0	4,000.0	3,999.0	3,999.0	14.4	14.4	-90.64	-0.9	-80.0	80.0	51.2	28.85	2.773	
4,100.0	4,100.0	4,099.0	4,099.0	14.8	14.8	-90.64	-0.9	-80.0	80.0	50.5	29.55	2.707	
4,200.0	4,200.0	4,199.0	4,199.0	15.1	15.1	-90.64	-0.9	-80.0	80.0	49.7	30.26	2.644	
4,300.0	4,300.0	4,299.0	4,299.0	15.5	15.5	-90.64	-0.9	-80.0	80.0	49.0	30.96	2.584	
4,400.0	4,400.0	4,399.0	4,399.0	15.8	15.8	-90.64	-0.9	-80.0	80.0	48.3	31.66	2.527	
4,500.0	4,500.0	4,499.0	4,499.0	16.2	16.2	-90.64	-0.9	-80.0	80.0	47.6	32.37	2.472	
4,600.0	4,600.0	4,599.0	4,599.0	16.5	16.5	-90.64	-0.9	-80.0	80.0	46.9	33.07	2.419	
4,700.0	4,700.0	4,699.0	4,699.0	16.9	16.9	-90.64	-0.9	-80.0	80.0	46.2	33.78	2.369	
4,800.0	4,800.0	4,799.0	4,799.0	17.2	17.2	-90.64	-0.9	-80.0	80.0	45.5	34.48	2.320	
4,900.0	4,900.0	4,899.0	4,899.0	17.6	17.6	-90.64	-0.9	-80.0	80.0	44.8	35.19	2.274	
5,000.0	5,000.0	4,999.0	4,999.0	18.0	17.9	-90.64	-0.9	-80.0	80.0	44.1	35.90	2.229	
5,100.0	5,100.0	5,099.0	5,099.0	18.3	18.3	-90.64	-0.9	-80.0	80.0	43.4	36.60	2.186	
5,200.0	5,200.0	5,199.0	5,199.0	18.7	18.7	-90.64	-0.9	-80.0	80.0	42.7	37.31	2.144	
5,300.0	5,300.0	5,299.0	5,299.0	19.0	19.0	-90.64	-0.9	-80.0	80.0	42.0	38.02	2.104	
5,400.0	5,400.0	5,399.0	5,399.0	19.4	19.4	-90.64	-0.9	-80.0	80.0	41.3	38.73	2.066	
5,500.0	5,500.0	5,499.0	5,499.0	19.7	19.7	-90.64	-0.9	-80.0	80.0	40.6	39.44	2.029	
5,600.0	5,600.0	5,599.0	5,599.0	20.1	20.1	-90.64	-0.9	-80.0	80.0	39.9	40.14	1.993 Advise and Monitor	
5,700.0	5,700.0	5,699.0	5,699.0	20.4	20.4	-90.64	-0.9	-80.0	80.0	39.2	40.85	1.958 Advise and Monitor	
5,800.0	5,800.0	5,799.0	5,799.0	20.8	20.8	-90.64	-0.9	-80.0	80.0	38.4	41.56	1.925 Advise and Monitor	
5,900.0	5,900.0	5,899.0	5,899.0	21.1	21.1	-90.64	-0.9	-80.0	80.0	37.7	42.27	1.893 Advise and Monitor	
6,000.0	6,000.0	5,999.0	5,999.0	21.5	21.5	-90.64	-0.9	-80.0	80.0	37.0	42.98	1.861 Advise and Monitor	
6,100.0	6,100.0	6,099.0	6,099.0	21.8	21.8	-90.64	-0.9	-80.0	80.0	36.3	43.69	1.831 Advise and Monitor	
6,200.0	6,200.0	6,199.0	6,199.0	22.2	22.2	-90.64	-0.9	-80.0	80.0	35.6	44.40	1.802 Advise and Monitor	
6,300.0	6,300.0	6,299.0	6,299.0	22.6	22.6	-90.64	-0.9	-80.0	80.0	34.9	45.11	1.773 Advise and Monitor	
6,400.0	6,400.0	6,399.0	6,399.0	22.9	22.9	-90.64	-0.9	-80.0	80.0	34.2	45.82	1.746 Advise and Monitor	
6,500.0	6,500.0	6,499.0	6,499.0	23.3	23.3	-90.64	-0.9	-80.0	80.0	33.5	46.53	1.719 Advise and Monitor	
6,600.0	6,600.0	6,599.0	6,599.0	23.6	23.6	-90.64	-0.9	-80.0	80.0	32.8	47.25	1.693 Advise and Monitor	
6,700.0	6,700.0	6,699.0	6,699.0	24.0	24.0	-90.64	-0.9	-80.0	80.0	32.0	47.96	1.668 Advise and Monitor	
6,800.0	6,800.0	6,799.0	6,799.0	24.3	24.3	-90.64	-0.9	-80.0	80.0	31.3	48.67	1.644 Advise and Monitor	
6,900.0	6,900.0	6,899.0	6,899.0	24.7	24.7	-90.64	-0.9	-80.0	80.0	30.6	49.38	1.620 Advise and Monitor	
7,000.0	7,000.0	6,999.0	6,999.0	25.0	25.0	-90.64	-0.9	-80.0	80.0	29.9	50.09	1.597 Advise and Monitor	
7,100.0	7,100.0	7,099.0	7,099.0	25.4	25.4	-90.64	-0.9	-80.0	80.0	29.2	50.80	1.575 Advise and Monitor	
7,200.0	7,200.0	7,199.0	7,199.0	25.8	25.8	-90.64	-0.9	-80.0	80.0	28.5	51.52	1.553 Advise and Monitor	

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design AVALON SHALE - AZORES FEDERAL #7H - OWB - DWD Plan 4 - land and turn													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Centre +E/-W (usft)	Distance		Minimum Separation (usft)	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)			
7,300.0	7,300.0	7,299.0	7,299.0	26.1	26.1	-90.64	-0.9	-80.0	80.0	27.8	52.23	1.532	Advise and Monitor
7,400.0	7,400.0	7,399.0	7,399.0	26.5	26.5	-90.64	-0.9	-80.0	80.0	27.1	52.94	1.511	Advise and Monitor
7,500.0	7,500.0	7,499.0	7,499.0	26.8	26.8	-90.64	-0.9	-80.0	80.0	26.4	53.65	1.491	Shut in Produces
7,600.0	7,600.0	7,599.0	7,599.0	27.2	27.2	-90.64	-0.9	-80.0	80.0	25.6	54.36	1.472	Shut in Produces
7,700.0	7,700.0	7,699.0	7,699.0	27.5	27.5	-90.64	-0.9	-80.0	80.0	24.9	55.08	1.453	Shut in Produces
7,800.0	7,800.0	7,799.0	7,799.0	27.9	27.9	-90.64	-0.9	-80.0	80.0	24.2	55.79	1.434	Shut in Produces
7,900.0	7,900.0	7,899.0	7,899.0	28.3	28.2	-90.64	-0.9	-80.0	80.0	23.5	56.50	1.416	Shut in Produces
8,000.0	8,000.0	7,999.0	7,999.0	28.6	28.6	-90.64	-0.9	-80.0	80.0	22.8	57.22	1.398	Shut in Produces
8,100.0	8,100.0	8,099.0	8,099.0	29.0	29.0	-90.64	-0.9	-80.0	80.0	22.1	57.93	1.381	Shut in Produces
8,200.0	8,200.0	8,199.0	8,199.0	29.3	29.3	-90.64	-0.9	-80.0	80.0	21.4	58.64	1.364	Shut in Produces
8,300.0	8,300.0	8,299.0	8,299.0	29.7	29.7	-90.64	-0.9	-80.0	80.0	20.7	59.36	1.348	Shut in Produces
8,400.0	8,400.0	8,399.0	8,399.0	30.0	30.0	-90.64	-0.9	-80.0	80.0	19.9	60.07	1.332	Shut in Produces
8,500.0	8,500.0	8,499.0	8,499.0	30.4	30.4	-90.64	-0.9	-80.0	80.0	19.2	60.78	1.316	Shut in Produces
8,600.0	8,600.0	8,599.0	8,599.0	30.7	30.7	-90.64	-0.9	-80.0	80.0	18.5	61.50	1.301	Shut in Produces
8,616.9	8,616.9	8,615.9	8,615.9	30.8	30.8	-90.64	-0.9	-80.0	80.0	18.4	61.62	1.298	Shut in Produces, CC
8,642.9	8,642.9	8,640.4	8,640.4	30.9	30.9	-90.43	-0.6	-80.2	80.2	18.4	61.80	1.298	Shut in Produces, ES, SF
8,650.0	8,650.0	8,647.0	8,647.0	30.9	30.9	-104.12	-0.4	-80.3	80.3	18.5	61.84	1.299	Shut in Produces
8,675.0	8,675.0	8,670.0	8,669.9	31.0	31.0	-103.56	1.2	-81.2	81.5	19.5	62.02	1.315	Shut in Produces
8,700.0	8,699.9	8,693.0	8,692.7	31.1	31.1	-103.06	3.6	-82.6	83.6	21.4	62.19	1.344	Shut in Produces
8,725.0	8,724.6	8,715.7	8,715.2	31.2	31.2	-102.61	7.0	-84.5	86.6	24.2	62.35	1.389	Shut in Produces
8,750.0	8,749.1	8,738.3	8,737.2	31.3	31.2	-102.22	11.3	-86.9	90.4	27.9	62.52	1.446	Shut in Produces
8,775.0	8,773.3	8,760.7	8,758.8	31.4	31.3	-101.88	16.4	-89.8	95.1	32.5	62.68	1.518	Advise and Monitor
8,800.0	8,797.2	8,782.8	8,779.8	31.5	31.4	-101.56	22.3	-93.2	100.7	37.8	62.84	1.602	Advise and Monitor
8,825.0	8,820.6	8,804.7	8,800.3	31.5	31.5	-101.25	29.0	-97.0	107.0	44.0	63.00	1.699	Advise and Monitor
8,850.0	8,843.6	8,825.0	8,819.0	31.6	31.5	-100.90	35.9	-100.9	114.2	51.0	63.15	1.808	Advise and Monitor
8,875.0	8,866.0	8,847.4	8,839.2	31.7	31.6	-100.60	44.3	-105.7	122.0	58.7	63.30	1.928	Advise and Monitor
8,900.0	8,887.8	8,868.3	8,857.6	31.8	31.7	-100.23	52.9	-110.6	130.7	67.2	63.45	2.059	
8,925.0	8,908.9	8,888.8	8,875.2	31.9	31.7	-99.82	62.0	-115.7	140.0	76.4	63.59	2.201	
8,950.0	8,929.3	8,909.0	8,892.1	31.9	31.8	-99.36	71.6	-121.2	150.0	86.2	63.74	2.353	
8,975.0	8,948.9	8,928.8	8,908.2	32.0	31.9	-98.84	81.6	-126.9	160.6	96.7	63.88	2.514	
9,000.0	8,967.6	8,948.2	8,923.5	32.1	31.9	-98.26	92.0	-132.8	171.8	107.8	64.03	2.684	
9,025.0	8,985.5	8,967.3	8,938.1	32.2	32.0	-97.62	102.7	-138.9	183.6	119.5	64.17	2.862	
9,050.0	9,002.4	8,986.0	8,951.9	32.2	32.1	-96.90	113.7	-145.1	195.9	131.6	64.31	3.047	
9,075.0	9,018.4	9,004.4	8,964.9	32.3	32.1	-96.12	125.0	-151.5	208.8	144.3	64.45	3.239	
9,100.0	9,033.3	9,022.4	8,977.3	32.4	32.2	-95.27	136.4	-158.0	222.1	157.5	64.59	3.438	
9,125.0	9,047.2	9,040.1	8,988.9	32.5	32.3	-94.35	148.1	-164.6	235.8	171.0	64.73	3.642	
9,150.0	9,059.9	9,057.6	8,999.8	32.6	32.3	-93.37	159.9	-171.3	249.9	185.0	64.87	3.852	
9,175.0	9,071.5	9,075.0	9,010.2	32.6	32.4	-92.35	172.0	-178.2	264.4	199.3	65.02	4.066	
9,200.0	9,081.9	9,091.6	9,019.7	32.7	32.4	-91.24	183.9	-185.0	279.2	214.0	65.16	4.284	
9,225.0	9,091.1	9,108.2	9,028.7	32.8	32.5	-90.09	196.0	-191.9	294.3	229.0	65.31	4.506	
9,250.0	9,099.1	9,125.0	9,037.2	32.9	32.6	-88.92	208.6	-199.0	309.6	244.2	65.46	4.730	
9,275.0	9,105.9	9,140.9	9,044.9	33.0	32.6	-87.66	220.7	-205.9	325.3	259.6	65.61	4.957	
9,300.0	9,111.4	9,156.9	9,052.1	33.1	32.7	-86.39	233.1	-212.9	341.1	275.3	65.77	5.186	
9,325.0	9,115.5	9,172.8	9,058.8	33.1	32.8	-85.09	245.6	-220.1	357.1	291.2	65.92	5.417	
9,350.0	9,118.4	9,188.6	9,065.0	33.2	32.8	-83.76	258.3	-227.2	373.2	307.1	66.08	5.648	
9,375.0	9,120.0	9,204.3	9,070.6	33.3	32.9	-82.43	271.0	-234.5	389.5	323.2	66.24	5.880	
9,392.9	9,120.4	9,215.5	9,074.4	33.4	33.0	-81.46	280.2	-239.7	401.2	334.8	66.36	6.046	
9,400.0	9,120.4	9,219.9	9,075.8	33.4	33.0	-81.84	283.8	-241.8	405.8	339.4	66.40	6.112	
9,500.0	9,120.3	9,287.7	9,092.5	33.8	33.3	-85.78	340.9	-274.2	469.8	402.7	67.15	6.997	
9,600.0	9,120.2	9,363.4	9,099.9	34.3	33.8	-87.39	406.3	-311.3	529.8	461.8	68.03	7.787	
9,700.0	9,120.1	9,497.5	9,100.0	34.8	34.6	-87.85	525.5	-372.8	581.2	511.8	69.43	8.371	
9,750.4	9,120.0	9,576.2	9,100.0	35.1	35.2	-88.02	597.9	-403.5	601.4	531.1	70.30	8.555	

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design AVALON SHALE - AZORES FEDERAL #7H - OWB - DWD Plan 4 - land and turn													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 3.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,800.0	9,119.9	9,657.6	9,100.1	35.4	35.9	-88.13	674.5	-431.2	617.8	546.6	71.23	8.674	
9,900.0	9,119.7	9,830.7	9,100.4	36.0	37.3	-88.32	841.8	-475.2	642.5	569.2	73.28	8.768	
10,000.0	9,119.5	10,012.2	9,100.8	36.7	38.8	-88.44	1,021.5	-499.3	655.0	579.6	75.49	8.677	
10,100.0	9,119.3	10,152.9	9,101.1	37.5	39.9	-88.51	1,162.2	-503.1	656.5	579.1	77.41	8.481	
10,200.0	9,119.0	10,252.9	9,101.4	38.3	40.8	-88.55	1,262.2	-503.9	656.5	577.4	79.09	8.301	
10,300.0	9,118.8	10,352.9	9,101.7	39.2	41.7	-88.59	1,362.2	-504.7	656.5	575.6	80.87	8.118	
10,400.0	9,118.6	10,452.9	9,102.0	40.1	42.6	-88.63	1,462.2	-505.5	656.5	573.8	82.74	7.934	
10,500.0	9,118.4	10,552.9	9,102.3	41.1	43.6	-88.68	1,562.2	-506.3	656.5	571.8	84.71	7.750	
10,600.0	9,118.2	10,652.9	9,102.5	42.1	44.7	-88.72	1,662.2	-507.1	656.5	569.7	86.76	7.567	
10,700.0	9,118.0	10,752.9	9,102.8	43.2	45.7	-88.76	1,762.2	-507.9	656.5	567.6	88.88	7.386	
10,800.0	9,117.8	10,852.9	9,103.1	44.3	46.8	-88.81	1,862.2	-508.6	656.5	565.4	91.08	7.207	
10,900.0	9,117.6	10,952.9	9,103.4	45.4	48.0	-88.85	1,962.2	-509.4	656.4	563.1	93.35	7.032	
11,000.0	9,117.4	11,052.9	9,103.7	46.5	49.1	-88.89	2,062.2	-510.2	656.4	560.8	95.68	6.861	
11,100.0	9,117.2	11,152.9	9,103.9	47.7	50.3	-88.93	2,162.2	-511.0	656.4	558.4	98.07	6.694	
11,200.0	9,117.0	11,252.9	9,104.2	49.0	51.5	-88.98	2,262.2	-511.8	656.4	555.9	100.51	6.531	
11,300.0	9,116.7	11,352.9	9,104.5	50.2	52.8	-89.02	2,362.1	-512.6	656.4	553.4	103.00	6.373	
11,400.0	9,116.5	11,452.9	9,104.8	51.5	54.1	-89.06	2,462.1	-513.3	656.4	550.9	105.54	6.220	
11,500.0	9,116.3	11,552.9	9,105.1	52.8	55.3	-89.10	2,562.1	-514.1	656.4	548.3	108.12	6.071	
11,600.0	9,116.1	11,652.9	9,105.3	54.1	56.7	-89.15	2,662.1	-514.9	656.4	545.6	110.74	5.927	
11,700.0	9,115.9	11,752.9	9,105.6	55.4	58.0	-89.19	2,762.1	-515.7	656.4	543.0	113.40	5.788	
11,800.0	9,115.7	11,852.9	9,105.9	56.8	59.3	-89.23	2,862.1	-516.5	656.4	540.3	116.09	5.654	
11,900.0	9,115.5	11,952.9	9,106.2	58.1	60.7	-89.27	2,962.1	-517.3	656.4	537.5	118.82	5.524	
12,000.0	9,115.3	12,052.9	9,106.5	59.5	62.1	-89.32	3,062.1	-518.1	656.4	534.8	121.57	5.399	
12,100.0	9,115.1	12,152.9	9,106.7	60.9	63.5	-89.36	3,162.1	-518.8	656.4	532.0	124.36	5.278	
12,200.0	9,114.9	12,252.9	9,107.0	62.3	64.9	-89.40	3,262.1	-519.6	656.3	529.2	127.17	5.161	
12,300.0	9,114.6	12,352.9	9,107.3	63.7	66.3	-89.45	3,362.1	-520.4	656.3	526.3	130.01	5.049	
12,400.0	9,114.4	12,452.9	9,107.6	65.2	67.7	-89.49	3,462.1	-521.2	656.3	523.5	132.86	4.940	
12,500.0	9,114.2	12,552.9	9,107.9	66.6	69.1	-89.53	3,562.1	-522.0	656.3	520.6	135.74	4.835	
12,600.0	9,114.0	12,652.9	9,108.1	68.1	70.6	-89.57	3,662.1	-522.8	656.3	517.7	138.65	4.734	
12,700.0	9,113.8	12,752.9	9,108.4	69.5	72.0	-89.62	3,762.1	-523.6	656.3	514.8	141.56	4.636	
12,800.0	9,113.6	12,852.9	9,108.7	71.0	73.5	-89.66	3,862.1	-524.3	656.3	511.8	144.50	4.542	
12,900.0	9,113.4	12,952.9	9,109.0	72.5	75.0	-89.70	3,962.1	-525.1	656.3	508.9	147.46	4.451	
13,000.0	9,113.2	13,052.9	9,109.2	74.0	76.5	-89.74	4,062.1	-525.9	656.3	505.9	150.43	4.363	
13,100.0	9,113.0	13,152.9	9,109.5	75.5	78.0	-89.79	4,162.1	-526.7	656.3	502.9	153.41	4.278	
13,200.0	9,112.8	13,252.9	9,109.8	77.0	79.5	-89.83	4,262.1	-527.5	656.3	499.9	156.41	4.196	
13,300.0	9,112.6	13,352.9	9,110.1	78.5	81.0	-89.87	4,362.1	-528.3	656.3	496.9	159.42	4.117	
13,400.0	9,112.3	13,452.9	9,110.4	80.0	82.5	-89.91	4,462.0	-529.1	656.3	493.9	162.45	4.040	
13,500.0	9,112.1	13,552.9	9,110.6	81.5	84.0	-89.96	4,562.0	-529.8	656.3	490.8	165.48	3.966	
13,600.0	9,111.9	13,652.9	9,110.9	83.0	85.5	-90.00	4,662.0	-530.6	656.3	487.8	168.53	3.894	
13,600.6	9,111.9	13,653.5	9,110.9	83.0	85.5	-90.00	4,662.7	-530.6	656.3	487.8	168.55	3.894	
13,700.0	9,111.7	13,752.9	9,111.2	84.6	87.0	-90.04	4,762.0	-531.4	656.3	484.7	171.59	3.825	
13,800.0	9,111.5	13,852.9	9,111.5	86.1	88.6	-90.09	4,862.0	-532.2	656.3	481.7	174.66	3.758	
13,900.0	9,111.3	13,952.9	9,111.8	87.6	90.1	-90.13	4,962.0	-533.0	656.3	478.6	177.74	3.693	
14,000.0	9,111.1	14,052.9	9,112.0	89.2	91.6	-90.17	5,062.0	-533.8	656.3	475.5	180.82	3.630	
14,100.0	9,110.9	14,152.9	9,112.3	90.7	93.2	-90.21	5,162.0	-534.6	656.3	472.4	183.92	3.569	
14,200.0	9,110.7	14,252.9	9,112.6	92.3	94.7	-90.26	5,262.0	-535.3	656.3	469.3	187.02	3.509	
14,300.0	9,110.5	14,352.9	9,112.9	93.9	96.3	-90.30	5,362.0	-536.1	656.3	466.2	190.13	3.452	
14,344.1	9,110.4	14,397.0	9,113.0	94.5	97.0	-90.32	5,406.1	-536.5	656.3	464.8	191.51	3.427	
14,376.2	9,110.3	14,426.5	9,113.1	95.0	97.4	-90.33	5,435.6	-536.7	656.3	463.9	192.47	3.410	

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design DELAWARE - CORVO FEDERAL #2H - OWB - ACTUAL WELLPATH														Offset Site Error: 0.0 usft	
Survey Program: 100-GYD_DP_MS_7793-MWD														Offset Well Error: 2.0 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance						Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
0.0	0.0	0.0	0.0	3.0	2.0	78.05	21.1	99.7	102.2						
100.0	100.0	91.8	91.8	3.0	2.0	78.09	21.0	99.8	102.0	97.0	5.00	20.380	CC		
200.0	200.0	191.5	191.5	3.0	2.0	78.25	20.8	100.2	102.3	97.3	5.05	20.256			
300.0	300.0	291.0	291.0	3.1	2.0	78.53	20.5	101.0	103.1	97.9	5.14	20.047			
400.0	400.0	390.9	390.9	3.2	2.0	78.82	20.2	102.2	104.1	98.9	5.27	19.761			
500.0	500.0	490.8	490.8	3.4	2.0	78.98	20.1	103.3	105.3	99.8	5.43	19.375			
600.0	600.0	591.0	590.9	3.6	2.1	78.93	20.4	104.4	106.4	100.7	5.63	18.904			
700.0	700.0	691.6	691.6	3.8	2.1	78.84	20.7	105.0	107.1	101.2	5.84	18.320			
800.0	800.0	791.8	791.8	4.0	2.1	78.77	20.9	105.3	107.3	101.3	6.08	17.641			
900.0	900.0	891.7	891.7	4.2	2.1	78.69	21.1	105.5	107.6	101.2	6.34	16.956			
1,000.0	1,000.0	991.7	991.6	4.5	2.1	78.58	21.4	105.7	107.9	101.2	6.62	16.299			
1,100.0	1,100.0	1,091.2	1,091.2	4.8	2.1	78.39	21.8	106.2	108.4	101.5	6.90	15.697			
1,200.0	1,200.0	1,191.3	1,191.2	5.1	2.1	78.13	22.4	106.8	109.1	101.9	7.20	15.149			
1,300.0	1,300.0	1,291.7	1,291.6	5.4	2.2	77.97	22.9	107.2	109.6	102.1	7.51	14.597			
1,400.0	1,400.0	1,391.7	1,391.6	5.7	2.2	77.92	23.0	107.5	110.0	102.1	7.83	14.047			
1,500.0	1,500.0	1,491.7	1,491.7	6.0	2.2	77.89	23.1	107.8	110.3	102.1	8.15	13.529			
1,600.0	1,600.0	1,591.7	1,591.6	6.3	2.2	77.86	23.2	108.1	110.6	102.1	8.48	13.040			
1,700.0	1,700.0	1,691.5	1,691.5	6.6	2.2	77.85	23.4	108.5	111.0	102.2	8.81	12.591			
1,800.0	1,800.0	1,791.4	1,791.4	6.9	2.2	77.84	23.5	109.0	111.5	102.3	9.15	12.182			
1,900.0	1,900.0	1,891.6	1,891.5	7.2	2.3	77.85	23.6	109.5	112.0	102.5	9.49	11.795			
2,000.0	2,000.0	1,991.7	1,991.6	7.6	2.3	77.89	23.6	109.9	112.4	102.5	9.84	11.419			
2,100.0	2,100.0	2,091.1	2,091.0	7.9	2.3	77.97	23.5	110.4	112.9	102.7	10.19	11.085			
2,200.0	2,200.0	2,190.0	2,189.9	8.2	2.3	78.18	23.4	111.8	114.3	103.7	10.54	10.842			
2,300.0	2,300.0	2,290.5	2,290.4	8.6	2.3	78.46	23.2	113.6	115.9	105.0	10.89	10.645			
2,400.0	2,400.0	2,391.9	2,391.8	8.9	2.3	78.60	23.1	114.4	116.7	105.5	11.24	10.382			
2,500.0	2,500.0	2,491.5	2,491.4	9.2	2.4	78.45	23.4	114.6	117.0	105.4	11.60	10.088			
2,600.0	2,600.0	2,592.5	2,592.4	9.6	2.4	78.07	24.2	114.6	117.1	105.2	11.95	9.804			
2,700.0	2,700.0	2,692.6	2,692.5	9.9	2.4	77.84	24.6	114.1	116.7	104.4	12.29	9.499			
2,800.0	2,800.0	2,792.7	2,792.6	10.3	2.4	77.99	24.2	113.7	116.2	103.6	12.63	9.203			
2,900.0	2,900.0	2,892.3	2,892.2	10.6	2.4	78.17	23.7	113.4	115.8	102.9	12.98	8.928			
3,000.0	3,000.0	2,992.2	2,992.1	10.9	2.4	78.27	23.5	113.3	115.7	102.4	13.32	8.684			
3,100.0	3,100.0	3,092.3	3,092.2	11.3	2.4	78.45	23.1	113.2	115.6	101.9	13.68	8.451			
3,200.0	3,200.0	3,192.1	3,192.0	11.6	2.4	78.64	22.7	113.2	115.4	101.4	14.03	8.229			
3,249.2	3,249.2	3,241.3	3,241.2	11.8	2.4	78.65	22.7	113.2	115.4	101.2	14.20	8.127			
3,300.0	3,300.0	3,292.1	3,292.0	12.0	2.4	78.67	22.7	113.2	115.4	101.1	14.38	8.025			
3,400.0	3,400.0	3,392.0	3,392.0	12.3	2.4	78.71	22.6	113.2	115.5	100.7	14.74	7.831			
3,500.0	3,500.0	3,492.1	3,492.0	12.7	2.4	78.76	22.5	113.3	115.5	100.4	15.10	7.646			
3,600.0	3,600.0	3,592.1	3,592.0	13.0	2.4	78.82	22.4	113.3	115.5	100.0	15.46	7.468			
3,700.0	3,700.0	3,692.1	3,692.0	13.4	2.4	78.87	22.3	113.3	115.4	99.6	15.82	7.297			
3,800.0	3,800.0	3,792.2	3,792.1	13.7	2.5	78.97	22.1	113.2	115.4	99.2	16.18	7.131			
3,900.0	3,900.0	3,892.2	3,892.1	14.1	2.5	79.10	21.8	113.2	115.3	98.7	16.54	6.970			
4,000.0	4,000.0	3,992.1	3,992.1	14.4	2.5	79.19	21.6	113.2	115.2	98.3	16.90	6.817			
4,100.0	4,100.0	4,092.2	4,092.1	14.8	2.5	79.28	21.4	113.1	115.1	97.9	17.26	6.672			
4,200.0	4,200.0	4,192.2	4,192.1	15.1	2.5	79.38	21.2	113.1	115.1	97.5	17.62	6.531			
4,300.0	4,300.0	4,292.2	4,292.1	15.5	2.5	79.47	21.0	113.1	115.0	97.0	17.98	6.395			
4,400.0	4,400.0	4,392.2	4,392.1	15.8	2.5	79.54	20.9	113.0	114.9	96.6	18.34	6.265			
4,500.0	4,500.0	4,492.4	4,492.3	16.2	2.5	79.61	20.7	112.9	114.8	96.1	18.70	6.136			
4,600.0	4,600.0	4,592.5	4,592.4	16.5	2.5	79.71	20.5	112.6	114.5	95.4	19.06	6.005			
4,700.0	4,700.0	4,692.7	4,692.6	16.9	2.5	79.81	20.2	112.2	114.0	94.6	19.42	5.871			
4,800.0	4,800.0	4,792.7	4,792.6	17.2	2.5	79.89	19.9	111.7	113.5	93.7	19.78	5.738			
4,900.0	4,900.0	4,892.6	4,892.5	17.6	2.5	79.93	19.8	111.3	113.0	92.9	20.13	5.613			
5,000.0	5,000.0	4,992.5	4,992.4	18.0	2.5	79.94	19.7	110.9	112.6	92.1	20.49	5.495			

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design DELAWARE - CORVO FEDERAL #2H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 100-GYD_DP_MS_7793-MWD													Offset Well Error:	2.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
5,100.0	5,100.0	5,092.4	5,092.3	18.3	2.5	79.93	19.6	110.5	112.3	91.4	20.85	5.386		
5,200.0	5,200.0	5,192.4	5,192.3	18.7	2.5	79.89	19.7	110.2	112.0	90.8	21.20	5.281		
5,300.0	5,300.0	5,292.2	5,292.1	19.0	2.5	79.84	19.7	110.0	111.8	90.2	21.56	5.183		
5,400.0	5,400.0	5,392.2	5,392.1	19.4	2.6	79.81	19.8	109.9	111.7	89.7	21.92	5.095		
5,500.0	5,500.0	5,492.3	5,492.2	19.7	2.6	79.76	19.8	109.7	111.5	89.3	22.27	5.007		
5,600.0	5,600.0	5,592.4	5,592.3	20.1	2.6	79.68	19.9	109.5	111.3	88.7	22.63	4.917		
5,700.0	5,700.0	5,692.4	5,692.3	20.4	2.6	79.60	20.0	109.2	111.0	88.0	22.99	4.829		
5,800.0	5,800.0	5,792.4	5,792.3	20.8	2.6	79.47	20.2	108.9	110.8	87.4	23.35	4.744		
5,900.0	5,900.0	5,892.1	5,892.0	21.1	2.6	79.30	20.5	108.7	110.6	86.9	23.71	4.667		
5,917.8	5,917.8	5,909.9	5,909.8	21.2	2.6	79.28	20.6	108.7	110.6	86.9	23.77	4.654		
6,000.0	6,000.0	5,992.0	5,991.9	21.5	2.6	79.21	20.7	108.7	110.7	86.6	24.07	4.598		
6,100.0	6,100.0	6,091.9	6,091.8	21.8	2.6	79.28	20.6	108.8	110.8	86.3	24.43	4.534		
6,200.0	6,200.0	6,192.2	6,192.1	22.2	2.6	79.42	20.3	108.9	110.8	86.0	24.80	4.470		
6,300.0	6,300.0	6,292.2	6,292.1	22.6	2.6	79.49	20.2	108.9	110.8	85.6	25.16	4.402		
6,400.0	6,400.0	6,392.5	6,392.4	22.9	2.6	79.59	20.0	108.8	110.6	85.0	25.53	4.332		
6,500.0	6,500.0	6,492.4	6,492.3	23.3	2.6	79.72	19.7	108.5	110.3	84.4	25.89	4.258		
6,600.0	6,600.0	6,592.4	6,592.3	23.6	2.6	79.79	19.5	108.3	110.0	83.7	26.26	4.189		
6,700.0	6,700.0	6,692.7	6,692.6	24.0	2.6	79.84	19.3	107.9	109.6	83.0	26.62	4.118		
6,800.0	6,800.0	6,792.5	6,792.4	24.3	2.7	79.93	19.1	107.5	109.2	82.2	26.99	4.045		
6,900.0	6,900.0	6,892.8	6,892.7	24.7	2.7	80.19	18.5	107.1	108.7	81.3	27.36	3.972		
7,000.0	7,000.0	6,992.5	6,992.4	25.0	2.7	80.60	17.7	106.7	108.1	80.4	27.72	3.900		
7,100.0	7,100.0	7,092.4	7,092.3	25.4	2.7	80.94	17.0	106.5	107.8	79.7	28.09	3.838		
7,200.0	7,200.0	7,192.3	7,192.2	25.8	2.7	81.34	16.2	106.4	107.6	79.1	28.46	3.780		
7,300.0	7,300.0	7,292.2	7,292.1	26.1	2.7	81.74	15.4	106.4	107.5	78.6	28.84	3.727		
7,369.4	7,369.4	7,361.6	7,361.4	26.4	2.7	81.99	15.0	106.4	107.4	78.4	29.09	3.693		
7,400.0	7,400.0	7,392.1	7,392.0	26.5	2.7	82.10	14.8	106.4	107.5	78.2	29.21	3.679		
7,500.0	7,500.0	7,492.1	7,492.0	26.8	2.8	82.43	14.1	106.5	107.5	77.9	29.58	3.633		
7,600.0	7,600.0	7,592.0	7,591.9	27.2	2.8	82.81	13.5	106.7	107.5	77.6	29.95	3.590		
7,700.0	7,700.0	7,691.9	7,691.8	27.5	2.8	83.27	12.6	106.9	107.7	77.4	30.32	3.551		
7,800.0	7,800.0	7,791.9	7,791.7	27.9	2.8	83.85	11.6	107.4	108.0	77.3	30.69	3.519		
7,837.8	7,837.8	7,829.8	7,829.7	28.0	2.8	84.05	11.2	107.5	108.0	77.2	30.83	3.505 ES		
7,900.0	7,900.0	7,888.0	7,887.8	28.3	2.8	83.48	12.3	108.0	108.8	77.7	31.06	3.503 SF		
8,000.0	8,000.0	7,974.8	7,973.6	28.6	2.9	78.52	23.2	114.3	118.1	86.6	31.47	3.752		
8,100.0	8,100.0	8,051.7	8,047.1	29.0	3.0	72.34	40.8	128.0	141.7	109.7	31.93	4.437		
8,200.0	8,200.0	8,127.7	8,116.0	29.3	3.1	66.06	65.8	148.2	179.1	146.6	32.47	5.516		
8,300.0	8,300.0	8,196.8	8,174.5	29.7	3.5	59.81	97.1	166.9	226.1	192.9	33.16	6.817		
8,400.0	8,400.0	8,266.0	8,229.0	30.0	4.0	53.44	136.3	183.8	281.0	247.0	34.01	8.262		
8,500.0	8,500.0	8,324.0	8,271.1	30.4	4.5	48.03	174.8	194.3	342.2	307.3	34.89	9.809		
8,600.0	8,600.0	8,361.0	8,295.6	30.7	4.9	44.61	202.0	199.3	410.3	374.6	35.62	11.518		
8,642.9	8,642.9	8,382.3	8,308.8	30.9	5.1	42.74	218.5	201.9	441.4	405.3	36.01	12.257		
8,650.0	8,650.0	8,384.8	8,310.3	30.9	5.1	28.24	220.4	202.2	446.6	410.5	36.06	12.384		
8,675.0	8,675.0	8,392.0	8,314.6	31.0	5.2	26.23	226.2	203.0	464.7	428.5	36.23	12.826		
8,700.0	8,699.9	8,403.1	8,321.1	31.1	5.3	24.21	235.2	204.4	482.3	445.9	36.45	13.233		
8,725.0	8,724.6	8,412.9	8,326.6	31.2	5.5	22.52	243.1	205.5	499.5	462.8	36.66	13.626		
8,750.0	8,749.1	8,424.0	8,332.7	31.3	5.6	20.97	252.3	206.8	516.0	479.2	36.88	13.994		
8,775.0	8,773.3	8,433.0	8,337.5	31.4	5.7	19.70	259.8	207.9	532.0	495.0	37.07	14.350		
8,800.0	8,797.2	8,443.3	8,342.9	31.5	5.8	18.52	268.5	209.1	547.4	510.1	37.29	14.680		
8,825.0	8,820.6	8,455.0	8,348.9	31.5	6.0	17.43	278.5	210.4	562.2	524.7	37.52	14.983		
8,850.0	8,843.6	8,466.2	8,354.4	31.6	6.1	16.48	288.2	211.8	576.3	538.5	37.75	15.265		
8,875.0	8,866.0	8,479.1	8,360.7	31.7	6.3	15.58	299.3	213.2	589.6	551.6	38.00	15.515		
8,900.0	8,887.8	8,486.0	8,363.9	31.8	6.4	14.93	305.4	214.0	602.3	564.1	38.18	15.776		
8,925.0	8,908.9	8,504.4	8,372.3	31.9	6.7	14.08	321.6	216.0	614.0	575.5	38.51	15.945		

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design DELAWARE - CORVO FEDERAL #2H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 100-GYD_DP_MS, 7793-MWD													Offset Well Error:	2.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance		Minimum Separation (usft)	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)				
8,950.0	8,929.3	8,517.0	8,377.9	31.9	6.8	13.43	332.8	217.3	625.1	586.3	38.77	16.125		
8,975.0	8,948.9	8,531.3	8,384.0	32.0	7.0	12.82	345.7	218.7	635.4	596.3	39.05	16.271		
9,000.0	8,967.6	8,548.0	8,390.9	32.1	7.3	12.22	360.8	220.4	644.8	605.4	39.37	16.378		
9,025.0	8,985.5	8,558.2	8,394.9	32.2	7.4	11.81	370.1	221.3	653.3	613.8	39.60	16.499		
9,050.0	9,002.4	8,570.4	8,399.6	32.2	7.6	11.39	381.3	222.5	661.1	621.3	39.86	16.588		
9,075.0	9,018.4	8,580.0	8,403.1	32.3	7.8	11.05	390.2	223.3	668.1	628.1	40.08	16.671		
9,100.0	9,033.3	8,596.1	8,408.8	32.4	8.0	10.64	405.2	224.7	674.3	633.9	40.40	16.689		
9,125.0	9,047.2	8,612.0	8,414.0	32.5	8.2	10.26	420.2	225.9	679.6	638.9	40.73	16.687		
9,150.0	9,059.9	8,621.2	8,416.9	32.6	8.4	10.01	428.9	226.6	684.1	643.2	40.95	16.705		
9,175.0	9,071.5	8,632.6	8,420.2	32.6	8.6	9.75	439.8	227.3	687.8	646.6	41.21	16.690		
9,200.0	9,081.9	8,644.0	8,423.3	32.7	8.8	9.50	450.7	227.9	690.7	649.3	41.47	16.655		
9,225.0	9,091.1	8,657.8	8,426.8	32.8	9.0	9.22	464.0	228.5	692.8	651.0	41.78	16.584		
9,250.0	9,099.1	8,675.0	8,430.9	32.9	9.2	8.91	480.8	229.3	694.0	651.9	42.14	16.471		
9,275.0	9,105.9	8,687.3	8,433.6	33.0	9.4	8.71	492.7	229.7	694.3	651.9	42.42	16.368		
9,300.0	9,111.4	8,706.0	8,437.6	33.1	9.8	8.41	511.0	230.4	693.7	650.8	42.81	16.203		
9,325.0	9,115.5	8,717.9	8,439.9	33.1	9.9	8.25	522.7	230.8	692.0	649.0	43.09	16.060		
9,350.0	9,118.4	8,737.0	8,443.4	33.2	10.3	7.99	541.5	231.5	689.6	646.1	43.49	15.855		
9,375.0	9,120.0	8,737.0	8,443.4	33.3	10.3	8.05	541.5	231.5	686.3	642.7	43.58	15.747		
9,392.9	9,120.4	8,751.6	8,445.6	33.4	10.5	7.87	555.9	232.0	683.3	639.4	43.89	15.569		
9,400.0	9,120.4	8,754.7	8,446.1	33.4	10.6	7.87	558.9	232.1	682.1	638.1	43.96	15.515		
9,500.0	9,120.3	8,799.0	8,450.3	33.8	11.3	7.77	603.0	233.5	670.0	624.9	45.10	14.855		
9,600.0	9,120.2	8,873.4	8,452.9	34.3	12.6	7.32	677.4	235.2	665.0	618.1	46.83	14.198		
9,700.0	9,120.1	8,970.1	8,454.0	34.8	14.1	7.10	773.9	237.6	663.2	614.3	48.91	13.561		
9,750.4	9,120.0	9,018.0	8,454.6	35.1	14.9	7.19	821.8	238.8	662.6	612.6	49.95	13.266		
9,799.4	9,119.9	9,062.2	8,454.9	35.4	15.6	7.33	866.0	240.1	662.4	611.5	50.94	13.004		
9,800.0	9,119.9	9,062.7	8,454.9	35.4	15.6	7.33	866.5	240.1	662.4	611.4	50.95	13.001		
9,900.0	9,119.7	9,169.4	8,455.4	36.0	17.3	7.66	973.2	243.0	662.2	608.9	53.33	12.417		
10,000.0	9,119.5	9,274.1	8,456.9	36.7	19.0	7.80	1,077.9	243.6	660.8	605.0	55.74	11.855		
10,100.0	9,119.3	9,367.0	8,458.0	37.5	20.6	7.75	1,170.8	242.1	659.3	601.2	58.08	11.351		
10,184.0	9,119.1	9,445.0	8,458.1	38.2	21.9	7.68	1,248.7	240.5	658.9	598.8	60.11	10.962		
10,200.0	9,119.0	9,462.0	8,458.0	38.3	22.2	7.67	1,265.7	240.3	659.0	598.4	60.53	10.887		
10,300.0	9,118.8	9,542.6	8,456.7	39.2	23.6	7.89	1,346.3	242.4	660.8	598.0	62.76	10.529		
10,400.0	9,118.6	9,663.7	8,456.0	40.1	25.6	8.64	1,467.2	250.3	662.1	596.5	65.67	10.083		
10,401.7	9,118.6	9,665.0	8,456.0	40.1	25.6	8.65	1,468.4	250.4	662.1	596.4	65.70	10.077		
10,500.0	9,118.4	9,745.0	8,455.1	41.1	26.9	9.19	1,548.2	256.2	664.1	596.1	68.00	9.766		
10,600.0	9,118.2	9,862.5	8,454.3	42.1	28.9	9.94	1,665.4	264.2	665.9	594.9	71.01	9.377		
10,700.0	9,118.0	9,963.8	8,454.2	43.2	30.6	10.34	1,766.6	268.1	666.6	592.8	73.79	9.034		
10,800.0	9,117.8	10,077.5	8,456.0	44.3	32.6	10.36	1,880.3	267.1	664.8	587.9	76.84	8.651		
10,900.0	9,117.6	10,179.3	8,457.2	45.4	34.3	10.20	1,982.1	264.2	663.0	583.3	79.72	8.317		
11,000.0	9,117.4	10,286.4	8,459.7	46.5	36.1	10.00	2,089.1	260.4	660.0	577.3	82.69	7.982		
11,100.0	9,117.2	10,379.2	8,461.8	47.7	37.7	9.74	2,181.8	256.4	657.0	571.5	85.49	7.685		
11,187.5	9,117.0	10,451.8	8,462.1	48.8	39.0	9.47	2,254.2	252.5	655.9	568.0	87.83	7.468		
11,200.0	9,117.0	10,461.8	8,461.9	49.0	39.2	9.42	2,264.2	251.9	655.9	567.7	88.16	7.440		
11,300.0	9,116.7	10,564.1	8,459.7	50.2	41.0	8.91	2,366.3	245.5	657.0	565.8	91.16	7.207		
11,371.9	9,116.6	10,635.7	8,459.4	51.1	42.1	8.67	2,437.8	242.2	656.7	563.4	93.27	7.041		
11,400.0	9,116.5	10,659.9	8,459.2	51.5	42.5	8.64	2,462.0	241.6	656.8	562.8	94.03	6.986		
11,500.0	9,116.3	10,760.3	8,458.0	52.8	44.2	8.65	2,562.4	241.1	657.9	560.9	96.99	6.783		
11,600.0	9,116.1	10,851.5	8,457.0	54.1	45.8	8.70	2,653.6	241.2	658.9	559.1	99.84	6.600		
11,700.0	9,115.9	10,965.4	8,455.3	55.4	47.7	8.87	2,767.5	242.4	660.5	557.4	103.10	6.406		
11,800.0	9,115.7	11,077.1	8,456.6	56.8	49.6	9.03	2,879.1	243.1	659.4	553.0	106.34	6.200		
11,900.0	9,115.5	11,176.7	8,458.4	58.1	51.3	9.01	2,978.7	241.9	657.3	547.9	109.44	6.006		
11,970.3	9,115.3	11,235.0	8,458.7	59.1	52.3	8.94	3,037.0	240.5	656.7	545.2	111.44	5.893		

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
 TVD Reference: WELL @ 3518.0usft (Original Well Elev)
 MD Reference: WELL @ 3518.0usft (Original Well Elev)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Offset Design DELAWARE - CORVO FEDERAL #2H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-GYD_DP_MS, 7793-MWD													Offset Well Error: 2.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis		Highside Toolface (")	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Reference	Offset	Reference	Offset	(usft)	(usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
12,000.0	9,115.3	11,260.6	8,458.4	59.5	52.8	8.90	3,062.6	239.8	656.8	544.5	112.29	5.849	
12,100.0	9,115.1	11,370.0	8,458.4	60.9	54.7	8.80	3,172.0	237.8	656.4	540.8	115.55	5.680	
12,142.2	9,115.0	11,407.8	8,458.5	61.5	55.3	8.78	3,209.8	237.3	656.2	539.4	116.79	5.618	
12,200.0	9,114.9	11,465.8	8,458.2	62.3	56.3	8.75	3,267.7	236.5	656.3	537.7	118.60	5.534	
12,300.0	9,114.6	11,581.1	8,460.4	63.7	58.3	8.80	3,383.0	235.8	654.2	532.2	121.99	5.362	
12,400.0	9,114.4	11,675.3	8,462.0	65.2	59.9	8.84	3,477.2	235.2	652.2	527.2	125.05	5.216	
12,500.0	9,114.2	11,771.5	8,463.0	66.6	61.6	8.75	3,573.4	233.2	650.8	522.6	128.19	5.077	
12,600.0	9,114.0	11,874.9	8,463.3	68.1	63.4	8.53	3,676.7	229.9	650.0	518.5	131.45	4.945	
12,700.0	9,113.8	11,977.3	8,465.1	69.5	65.1	8.41	3,779.1	227.4	647.8	513.1	134.65	4.811	
12,799.1	9,113.6	12,063.9	8,466.0	71.0	66.6	8.45	3,865.7	227.0	646.7	509.1	137.59	4.700	
12,800.0	9,113.6	12,064.7	8,466.0	71.0	66.6	8.45	3,866.5	227.0	646.7	509.0	137.62	4.699	
12,900.0	9,113.4	12,190.2	8,466.6	72.5	68.8	8.58	3,992.0	227.3	646.5	505.2	141.25	4.577	
12,993.1	9,113.2	12,258.1	8,468.7	73.9	69.9	8.80	4,059.8	229.0	644.1	500.3	143.79	4.479	
13,000.0	9,113.2	12,262.4	8,468.7	74.0	70.0	8.82	4,064.1	229.2	644.1	500.1	143.97	4.474	
13,100.0	9,113.0	12,384.4	8,468.6	75.5	72.1	9.46	4,185.9	235.5	645.4	497.9	147.53	4.375	
13,200.0	9,112.8	12,470.2	8,471.3	77.0	73.5	9.96	4,271.5	240.0	643.2	492.7	150.49	4.274	
13,222.6	9,112.7	12,488.0	8,471.5	77.3	73.8	10.05	4,289.3	240.9	643.1	491.9	151.14	4.255	
13,300.0	9,112.6	12,553.7	8,471.5	78.5	75.0	10.38	4,355.0	244.1	643.8	490.3	153.45	4.195	
13,400.0	9,112.3	12,637.2	8,469.5	80.0	76.4	10.75	4,438.3	248.0	646.9	490.4	156.42	4.135	
13,500.0	9,112.1	12,731.4	8,465.3	81.5	78.1	11.15	4,532.3	252.6	652.1	492.6	159.56	4.087	
13,600.0	9,111.9	12,866.0	8,462.0	83.0	80.3	11.73	4,666.7	259.0	655.6	492.2	163.35	4.013	
13,700.0	9,111.7	12,946.5	8,461.6	84.6	81.7	12.10	4,747.1	262.7	657.0	490.8	166.26	3.952	
13,800.0	9,111.5	13,054.5	8,459.7	86.1	83.5	12.58	4,855.0	267.9	659.8	490.2	169.64	3.890	
13,900.0	9,111.3	13,168.5	8,459.5	87.6	85.5	13.02	4,968.8	272.2	660.8	487.6	173.12	3.817	
14,000.0	9,111.1	13,284.7	8,462.6	89.2	87.5	13.44	5,085.0	275.4	658.7	482.1	176.64	3.729	
14,054.2	9,111.0	13,321.0	8,463.9	90.0	88.1	13.58	5,121.3	276.5	657.5	479.4	178.10	3.692	
14,100.0	9,110.9	13,321.0	8,463.9	90.7	88.1	13.58	5,121.3	276.5	659.1	480.3	178.81	3.686	
14,200.0	9,110.7	13,321.0	8,463.9	92.3	88.1	13.58	5,121.3	276.5	673.5	493.1	180.37	3.734	
14,300.0	9,110.5	13,321.0	8,463.9	93.9	88.1	13.58	5,121.3	276.5	701.9	520.0	181.92	3.858	
14,376.2	9,110.3	13,321.0	8,463.9	95.0	88.1	13.58	5,121.3	276.5	732.1	549.0	183.12	3.998	

COG PRODUCTION, LLC

Anticollision Report

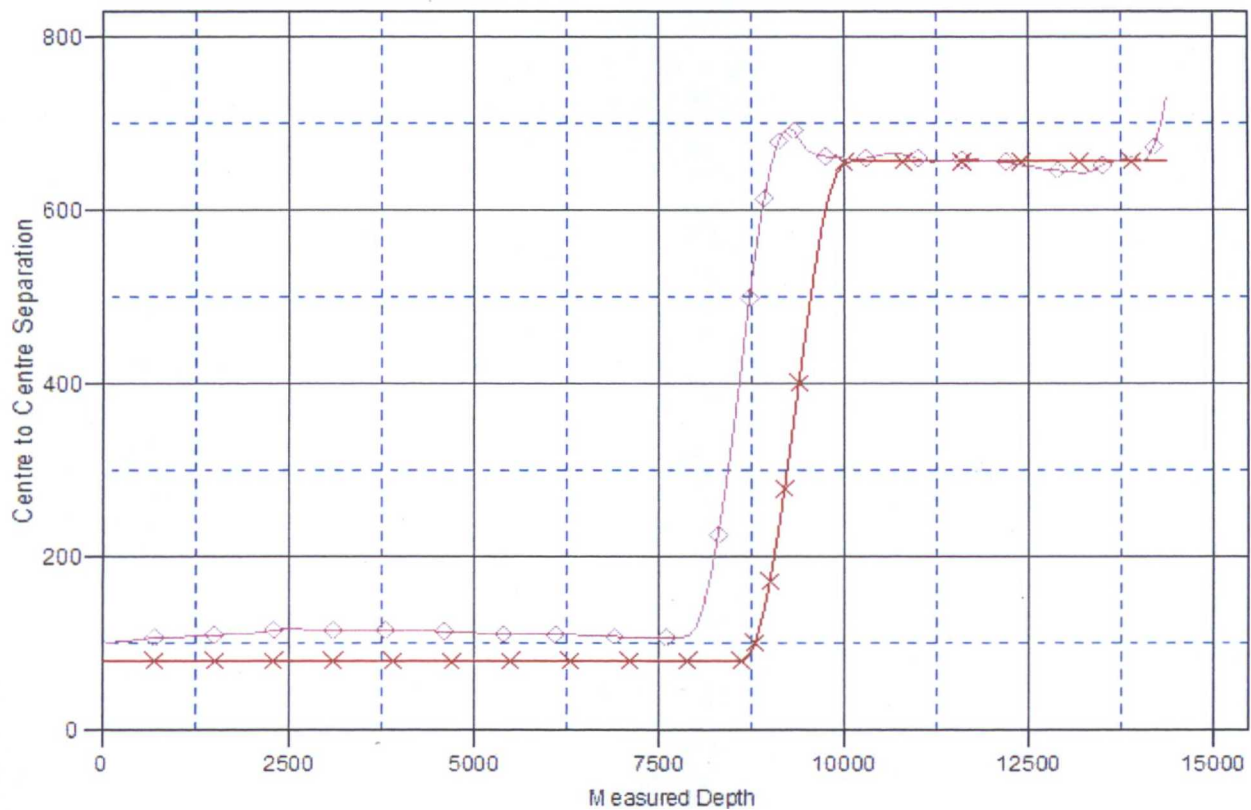
Company: COG PRODUCTION, LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: AZORES FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: DWD Plan 2

Local Co-ordinate Reference: Well AZORES FEDERAL #11H
TVD Reference: WELL @ 3518.0usft (Original Well Elev)
MD Reference: WELL @ 3518.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Reference Depths are relative to WELL @ 3518.0usft (Original Well Ele
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: AZORES FEDERAL #11H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.34°

Ladder Plot



LEGEND

RAL#7H, OWB, DWD Plan 4 - land and turn V0 ◆ CORVO FEDERAL #2H, OWB, ACTUAL WELL PATH V0

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

COG PRODUCTION, LLC

Anticollision Report

Company: COG PRODUCTION, LLC
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 Offset Depths are relative to Offset Datum
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