

COG PRODUCTION LLC

LEA COUNTY, NM

AVALON SHALE

AZORES FEDERAL COM #1H

OWB

PWP0

Anticollision Report

19 September, 2016

COG PRODUCTION LLC

Anticollision Report

Company:	COG PRODUCTION LLC	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	AZORES FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Reference	PWP0	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	9/19/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.0	10,200.0	PWP0 (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
10,200.0	15,558.0	PWP0 (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 COM #10H - OWB - PWP0	1,500.0	1,499.8	90.0	82.9	12.684	CC, ES	
AZORES FEDERAL COM #10H - OWB - PWP0	15,558.0	14,164.5	1,559.1	1,390.0	9.221	SF	
AZORES FEDERAL COM #5H - OWB - PWP0	8,837.7	8,837.5	39.9	16.1	1.677	Advise and Monitor, CC,	
BOMBAY FED COM #1H - OWB - ACTUAL WELLPATH	8,407.7	10,734.4	118.4	55.6	1.886	Advise and Monitor, CC,	

Offset Design		AVALON SHALE - AZORES FEDERAL COM #10H - OWB - PWP0											Offset Site Error:	0.0 usft
Survey Program:		0-Standard Keeper 104, 8800-MWD											Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	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	3.0	-90.64	10,623.4	-42,397.5	90.0					
100.0	100.0	99.8	99.8	3.0	3.0	-90.64	10,623.4	-42,397.5	90.0	84.0	6.00	14.999		
200.0	200.0	199.8	199.8	3.0	3.0	-90.64	10,623.4	-42,397.5	90.0	84.0	6.01	14.974		
300.0	300.0	299.8	299.8	3.0	3.0	-90.64	10,623.4	-42,397.5	90.0	84.0	6.03	14.920		
400.0	400.0	399.8	399.8	3.0	3.0	-90.64	10,623.4	-42,397.5	90.0	83.9	6.07	14.839		
500.0	500.0	499.8	499.8	3.1	3.1	-90.64	10,623.4	-42,397.5	90.0	83.9	6.11	14.732		
600.0	600.0	599.8	599.8	3.1	3.1	-90.64	10,623.4	-42,397.5	90.0	83.8	6.16	14.600		
700.0	700.0	699.8	699.8	3.1	3.1	-90.64	10,623.4	-42,397.5	90.0	83.8	6.23	14.446		
800.0	800.0	799.8	799.8	3.2	3.2	-90.64	10,623.4	-42,397.5	90.0	83.7	6.31	14.271		
900.0	900.0	899.8	899.8	3.2	3.2	-90.64	10,623.4	-42,397.5	90.0	83.6	6.39	14.079		
1,000.0	1,000.0	999.8	999.8	3.2	3.2	-90.64	10,623.4	-42,397.5	90.0	83.5	6.49	13.871		
1,100.0	1,100.0	1,099.8	1,099.8	3.3	3.3	-90.64	10,623.4	-42,397.5	90.0	83.4	6.59	13.650		
1,200.0	1,200.0	1,199.8	1,199.8	3.4	3.4	-90.64	10,623.4	-42,397.5	90.0	83.3	6.71	13.419		
1,300.0	1,300.0	1,299.8	1,299.8	3.4	3.4	-90.64	10,623.4	-42,397.5	90.0	83.2	6.83	13.180		
1,400.0	1,400.0	1,399.8	1,399.8	3.5	3.5	-90.64	10,623.4	-42,397.5	90.0	83.0	6.96	12.934		
1,500.0	1,500.0	1,499.8	1,499.8	3.5	3.5	-90.64	10,623.4	-42,397.5	90.0	82.9	7.10	12.684	CC, ES	
1,600.0	1,600.0	1,596.7	1,596.7	3.6	3.6	-90.63	10,623.4	-42,399.1	91.7	84.5	7.21	12.712		
1,700.0	1,700.0	1,693.4	1,693.3	3.7	3.6	-90.59	10,623.4	-42,404.0	96.8	89.4	7.31	13.230		
1,800.0	1,800.0	1,791.1	1,790.7	3.8	3.6	-90.55	10,623.4	-42,412.0	104.9	97.5	7.42	14.136		
1,900.0	1,900.0	1,890.8	1,889.9	3.9	3.7	-90.51	10,623.4	-42,420.7	113.6	106.1	7.53	15.078		
2,000.0	2,000.0	1,990.4	1,989.1	3.9	3.7	-90.47	10,623.4	-42,429.4	122.3	114.7	7.66	15.977		
2,100.0	2,100.0	2,090.0	2,088.4	4.0	3.8	-90.44	10,623.4	-42,438.0	131.0	123.3	7.78	16.833		

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 COM #10H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104, 8800-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Tooface (°)	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 +N/-S (usft)	Centre +E/-W (usft)					
2,200.0	2,200.0	2,189.6	2,187.6	4.1	3.8	-90.41	10,623.4	-42,446.7	139.8	131.8	7.92	17.646	
2,300.0	2,300.0	2,289.2	2,286.9	4.2	3.9	-90.39	10,623.4	-42,455.4	148.5	140.4	8.06	18.418	
2,400.0	2,400.0	2,388.8	2,386.1	4.3	3.9	-90.37	10,623.4	-42,464.1	157.2	149.0	8.21	19.150	
2,500.0	2,500.0	2,488.5	2,485.3	4.4	4.0	-90.35	10,623.4	-42,472.8	165.9	157.5	8.36	19.843	
2,600.0	2,600.0	2,588.1	2,584.6	4.5	4.0	-90.33	10,623.4	-42,481.4	174.6	166.1	8.52	20.499	
2,700.0	2,700.0	2,687.7	2,683.8	4.6	4.1	-90.31	10,623.4	-42,490.1	183.3	174.6	8.68	21.119	
2,800.0	2,800.0	2,787.3	2,783.1	4.7	4.2	-90.30	10,623.4	-42,498.8	192.0	183.2	8.85	21.704	
2,900.0	2,900.0	2,886.9	2,882.3	4.8	4.2	-90.29	10,623.4	-42,507.5	200.8	191.7	9.02	22.257	
3,000.0	3,000.0	2,986.6	2,981.5	4.9	4.3	-90.27	10,623.4	-42,516.2	209.5	200.3	9.20	22.778	
3,100.0	3,100.0	3,086.2	3,080.8	5.0	4.4	-90.26	10,623.4	-42,524.9	218.2	208.8	9.38	23.270	
3,200.0	3,200.0	3,185.8	3,180.0	5.1	4.5	-90.25	10,623.4	-42,533.5	226.9	217.3	9.56	23.735	
3,300.0	3,300.0	3,285.4	3,279.3	5.2	4.5	-90.24	10,623.4	-42,542.2	235.6	225.9	9.75	24.173	
3,400.0	3,400.0	3,385.0	3,378.5	5.3	4.6	-90.24	10,623.4	-42,550.9	244.3	234.4	9.94	24.587	
3,500.0	3,500.0	3,484.7	3,477.7	5.4	4.7	-90.23	10,623.4	-42,559.6	253.1	242.9	10.13	24.977	
3,600.0	3,600.0	3,584.3	3,577.0	5.5	4.8	-90.22	10,623.4	-42,568.3	261.8	251.4	10.33	25.346	
3,700.0	3,700.0	3,683.9	3,676.2	5.7	4.9	-90.21	10,623.4	-42,577.0	270.5	260.0	10.53	25.694	
3,800.0	3,800.0	3,783.5	3,775.5	5.8	5.0	-90.21	10,623.4	-42,585.6	279.2	268.5	10.73	26.022	
3,900.0	3,900.0	3,883.1	3,874.7	5.9	5.1	-90.20	10,623.4	-42,594.3	287.9	277.0	10.93	26.333	
4,000.0	4,000.0	3,982.8	3,973.9	6.0	5.1	-90.19	10,623.4	-42,603.0	296.6	285.5	11.14	26.626	
4,100.0	4,100.0	4,082.4	4,073.2	6.1	5.2	-90.19	10,623.4	-42,611.7	305.3	294.0	11.35	26.904	
4,200.0	4,200.0	4,182.0	4,172.4	6.2	5.3	-90.18	10,623.4	-42,620.4	314.1	302.5	11.56	27.166	
4,300.0	4,300.0	4,281.6	4,271.7	6.3	5.4	-90.18	10,623.4	-42,629.0	322.8	311.0	11.77	27.415	
4,400.0	4,400.0	4,381.2	4,370.9	6.5	5.5	-90.17	10,623.4	-42,637.7	331.5	319.5	11.99	27.650	
4,500.0	4,500.0	4,480.9	4,470.1	6.6	5.6	-90.17	10,623.4	-42,646.4	340.2	328.0	12.21	27.873	
4,600.0	4,600.0	4,580.5	4,569.4	6.7	5.7	-90.16	10,623.4	-42,655.1	348.9	336.5	12.42	28.084	
4,700.0	4,700.0	4,680.1	4,668.6	6.8	5.8	-90.16	10,623.4	-42,663.8	357.6	345.0	12.64	28.285	
4,800.0	4,800.0	4,784.1	4,772.2	6.9	5.9	-90.16	10,623.4	-42,672.6	366.2	353.3	12.87	28.451	
4,900.0	4,900.0	4,888.7	4,886.7	7.0	6.1	-90.15	10,623.4	-42,679.0	371.7	358.6	13.11	28.360	
5,000.0	5,000.0	5,011.9	4,999.8	7.2	6.2	-90.15	10,623.4	-42,680.8	373.3	359.9	13.32	28.014	
5,100.0	5,100.0	5,111.9	5,099.8	7.3	6.2	-90.15	10,623.4	-42,680.8	373.3	359.8	13.52	27.608	
5,200.0	5,200.0	5,211.9	5,199.8	7.4	6.3	-90.15	10,623.4	-42,680.8	373.3	359.6	13.72	27.210	
5,300.0	5,300.0	5,311.9	5,299.8	7.5	6.4	-90.15	10,623.4	-42,680.8	373.3	359.4	13.92	26.818	
5,400.0	5,400.0	5,411.9	5,399.8	7.6	6.5	-90.15	10,623.4	-42,680.8	373.3	359.2	14.12	26.435	
5,500.0	5,500.0	5,511.9	5,499.8	7.8	6.6	-90.15	10,623.4	-42,680.8	373.3	358.9	14.32	26.058	
5,600.0	5,600.0	5,611.9	5,599.8	7.9	6.6	-90.15	10,623.4	-42,680.8	373.3	358.7	14.53	25.688	
5,700.0	5,700.0	5,711.9	5,699.8	8.0	6.7	-90.15	10,623.4	-42,680.8	373.3	358.5	14.74	25.326	
5,800.0	5,800.0	5,811.9	5,799.8	8.1	6.8	-90.15	10,623.4	-42,680.8	373.3	358.3	14.95	24.971	
5,900.0	5,900.0	5,911.9	5,899.8	8.3	6.9	-90.15	10,623.4	-42,680.8	373.3	358.1	15.16	24.624	
6,000.0	6,000.0	6,011.9	5,999.8	8.4	7.0	-90.15	10,623.4	-42,680.8	373.3	357.9	15.37	24.283	
6,100.0	6,100.0	6,111.9	6,099.8	8.5	7.1	-90.15	10,623.4	-42,680.8	373.3	357.7	15.59	23.949	
6,200.0	6,200.0	6,211.9	6,199.8	8.6	7.2	-90.15	10,623.4	-42,680.8	373.3	357.5	15.80	23.623	
6,300.0	6,300.0	6,311.9	6,299.8	8.8	7.3	-90.15	10,623.4	-42,680.8	373.3	357.3	16.02	23.303	
6,400.0	6,400.0	6,411.9	6,399.8	8.9	7.4	-90.15	10,623.4	-42,680.8	373.3	357.0	16.24	22.989	
6,500.0	6,500.0	6,511.9	6,499.8	9.0	7.5	-90.15	10,623.4	-42,680.8	373.3	356.8	16.46	22.683	
6,600.0	6,600.0	6,611.9	6,599.8	9.1	7.6	-90.15	10,623.4	-42,680.8	373.3	356.6	16.68	22.382	
6,700.0	6,700.0	6,711.9	6,699.8	9.3	7.6	-90.15	10,623.4	-42,680.8	373.3	356.4	16.90	22.088	
6,800.0	6,800.0	6,811.9	6,799.8	9.4	7.7	-90.15	10,623.4	-42,680.8	373.3	356.1	17.12	21.801	
6,900.0	6,900.0	6,911.9	6,899.8	9.5	7.8	-90.15	10,623.4	-42,680.8	373.3	355.9	17.35	21.519	
7,000.0	7,000.0	7,011.9	6,999.8	9.6	7.9	-90.15	10,623.4	-42,680.8	373.3	355.7	17.57	21.243	
7,100.0	7,100.0	7,111.9	7,099.8	9.8	8.0	-90.15	10,623.4	-42,680.8	373.3	355.5	17.80	20.973	
7,200.0	7,200.0	7,211.9	7,199.8	9.9	8.1	-90.15	10,623.4	-42,680.8	373.3	355.2	18.03	20.708	
7,300.0	7,300.0	7,311.9	7,299.8	10.0	8.3	-90.15	10,623.4	-42,680.8	373.3	355.0	18.25	20.449	

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference:
 TVD Reference:
 MD Reference:
 North Reference:
 Survey Calculation Method:
 Output errors are at
 Database:
 Offset TVD Reference:

Site AVALON SHALE
 RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 Grid
 Minimum Curvature
 2.00 sigma
 EDM_Users
 Offset Datum

Offset Design AVALON SHALE - AZORES FEDERAL COM #10H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-Standard Keeper 104, 8800-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Tooface (")	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)						
7,400.0	7,400.0	7,411.9	7,399.8	10.1	8.4	-90.15	10,623.4	-42,680.8	373.3	354.8	18.48	20.196		
7,500.0	7,500.0	7,511.9	7,499.8	10.3	8.5	-90.15	10,623.4	-42,680.8	373.3	354.6	18.71	19.948		
7,600.0	7,600.0	7,611.9	7,599.8	10.4	8.6	-90.15	10,623.4	-42,680.8	373.3	354.3	18.94	19.705		
7,700.0	7,700.0	7,711.9	7,699.8	10.5	8.7	-90.15	10,623.4	-42,680.8	373.3	354.1	19.18	19.466		
7,800.0	7,800.0	7,811.9	7,799.8	10.6	8.8	-90.15	10,623.4	-42,680.8	373.3	353.9	19.41	19.233		
7,900.0	7,900.0	7,911.9	7,899.8	10.8	8.9	-90.15	10,623.4	-42,680.8	373.3	353.6	19.64	19.005		
8,000.0	8,000.0	8,011.9	7,999.8	10.9	9.0	-90.15	10,623.4	-42,680.8	373.3	353.4	19.87	18.781		
8,100.0	8,100.0	8,111.9	8,099.8	11.0	9.1	-90.15	10,623.4	-42,680.8	373.3	353.2	20.11	18.562		
8,200.0	8,200.0	8,211.9	8,199.8	11.1	9.2	-90.15	10,623.4	-42,680.8	373.3	352.9	20.35	18.347		
8,300.0	8,300.0	8,311.9	8,299.8	11.3	9.3	-90.15	10,623.4	-42,680.8	373.3	352.7	20.58	18.137		
8,400.0	8,400.0	8,411.9	8,399.8	11.4	9.4	-90.15	10,623.4	-42,680.8	373.3	352.5	20.82	17.930		
8,500.0	8,500.0	8,511.9	8,499.8	11.5	9.5	-90.15	10,623.4	-42,680.8	373.3	352.2	21.06	17.728		
8,600.0	8,600.0	8,611.9	8,599.8	11.6	9.6	-90.15	10,623.4	-42,680.8	373.3	352.0	21.29	17.530		
8,700.0	8,700.0	8,711.9	8,699.8	11.8	9.7	-90.15	10,623.4	-42,680.8	373.3	351.7	21.53	17.341		
8,800.0	8,800.0	8,811.9	8,799.8	11.9	9.8	-90.15	10,623.4	-42,680.8	373.3	351.6	21.70	17.198		
8,900.0	8,900.0	8,891.3	8,879.1	12.0	9.8	-89.49	10,627.7	-42,682.6	375.7	353.8	21.85	17.194		
9,000.0	9,000.0	8,964.6	8,950.6	12.2	9.9	-87.32	10,642.2	-42,688.6	384.7	362.7	22.01	17.478		
9,100.0	9,100.0	9,031.7	9,013.2	12.3	9.9	-84.17	10,664.3	-42,697.8	401.7	379.6	22.19	18.109		
9,200.0	9,200.0	9,091.2	9,065.5	12.4	10.0	-80.66	10,690.4	-42,708.6	428.2	405.8	22.37	19.141		
9,300.0	9,300.0	9,142.6	9,107.5	12.5	10.0	-77.26	10,717.6	-42,720.0	464.6	442.0	22.55	20.599		
9,400.0	9,400.0	9,186.6	9,140.9	12.7	10.1	-74.21	10,744.2	-42,731.1	510.7	488.0	22.73	22.465		
9,500.0	9,500.0	9,225.0	9,167.6	12.8	10.1	-71.51	10,769.6	-42,741.6	565.6	542.7	22.91	24.687		
9,600.0	9,600.0	9,250.0	9,183.8	12.9	10.1	-69.76	10,787.1	-42,748.9	628.0	604.9	23.07	27.220		
9,700.0	9,700.0	9,283.4	9,203.9	13.1	10.2	-67.47	10,811.7	-42,759.2	696.4	673.2	23.24	29.963		
9,800.0	9,800.0	9,300.0	9,213.2	13.2	10.2	-66.35	10,824.5	-42,764.5	770.0	746.7	23.39	32.916		
9,900.0	9,900.0	9,325.0	9,226.2	13.3	10.2	-64.71	10,844.2	-42,772.7	847.6	824.0	23.56	35.980		
10,000.0	10,000.0	9,350.0	9,238.1	13.4	10.3	-63.12	10,864.5	-42,781.1	928.5	904.8	23.72	39.144		
10,100.0	10,100.0	9,360.3	9,242.7	13.6	10.3	-62.48	10,873.0	-42,784.7	1,012.0	988.1	23.86	42.411		
10,200.0	10,200.0	9,375.0	9,248.9	13.6	10.3	-61.59	10,885.3	-42,789.8	1,097.7	1,073.7	23.95	45.836		
10,262.5	10,262.5	9,375.0	9,248.9	13.6	10.3	-61.59	10,885.3	-42,789.8	1,152.3	1,128.3	23.95	48.105		
10,275.0	10,275.0	9,375.0	9,248.9	13.6	10.3	-58.23	10,885.3	-42,789.8	1,163.2	1,139.3	23.95	48.560		
10,300.0	10,300.0	9,386.4	9,253.4	13.6	10.3	-53.31	10,894.9	-42,793.8	1,184.8	1,160.8	23.97	49.422		
10,325.0	10,324.8	9,389.8	9,254.7	13.7	10.3	-49.30	10,897.9	-42,795.0	1,206.2	1,182.2	23.98	50.291		
10,350.0	10,349.5	9,400.0	9,258.4	13.7	10.4	-45.56	10,906.6	-42,798.7	1,227.3	1,203.3	24.01	51.121		
10,375.0	10,374.0	9,400.0	9,258.4	13.7	10.4	-42.52	10,906.6	-42,798.7	1,247.9	1,223.9	24.02	51.960		
10,400.0	10,398.1	9,400.0	9,258.4	13.7	10.4	-39.80	10,906.6	-42,798.7	1,268.2	1,244.1	24.03	52.779		
10,425.0	10,421.9	9,400.0	9,258.4	13.7	10.4	-37.37	10,906.6	-42,798.7	1,288.0	1,263.9	24.04	53.575		
10,450.0	10,445.2	9,410.0	9,261.9	13.7	10.4	-35.13	10,915.3	-42,802.3	1,307.2	1,283.1	24.07	54.310		
10,475.0	10,468.1	9,414.5	9,263.4	13.7	10.4	-33.21	10,919.2	-42,803.9	1,325.9	1,301.8	24.09	55.036		
10,500.0	10,490.3	9,425.0	9,266.7	13.7	10.4	-31.50	10,928.4	-42,807.7	1,344.0	1,319.9	24.13	55.707		
10,525.0	10,512.0	9,425.0	9,266.7	13.8	10.4	-30.00	10,928.4	-42,807.7	1,361.5	1,337.4	24.15	56.388		
10,550.0	10,532.9	9,425.0	9,266.7	13.8	10.4	-28.66	10,928.4	-42,807.7	1,378.4	1,354.2	24.16	57.040		
10,575.0	10,553.2	9,425.0	9,266.7	13.8	10.4	-27.45	10,928.4	-42,807.7	1,394.6	1,370.5	24.19	57.664		
10,600.0	10,572.6	9,439.0	9,270.9	13.8	10.4	-26.43	10,940.7	-42,812.9	1,410.0	1,385.8	24.23	58.188		
10,625.0	10,591.2	9,450.0	9,273.8	13.8	10.4	-25.53	10,950.5	-42,816.9	1,424.8	1,400.5	24.28	58.681		
10,650.0	10,608.8	9,450.0	9,273.8	13.9	10.4	-24.67	10,950.5	-42,816.9	1,438.8	1,414.5	24.30	59.200		
10,675.0	10,625.6	9,450.0	9,273.8	13.9	10.4	-23.90	10,950.5	-42,816.9	1,452.0	1,427.7	24.33	59.688		
10,700.0	10,641.3	9,460.3	9,276.4	13.9	10.5	-23.29	10,959.7	-42,820.8	1,464.5	1,440.1	24.38	60.079		
10,725.0	10,656.0	9,475.0	9,279.6	13.9	10.5	-22.80	10,973.0	-42,826.3	1,476.2	1,451.8	24.45	60.373		
10,750.0	10,669.6	9,475.0	9,279.6	14.0	10.5	-22.26	10,973.0	-42,826.3	1,487.0	1,462.5	24.48	60.753		
10,775.0	10,682.1	9,475.0	9,279.6	14.0	10.5	-21.77	10,973.0	-42,826.3	1,496.9	1,472.4	24.50	61.101		
10,800.0	10,693.5	9,475.0	9,279.6	14.0	10.5	-21.33	10,973.0	-42,826.3	1,506.1	1,481.6	24.53	61.409		

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 COM #10H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104, 8800-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,825.0	10,703.6	9,488.2	9,282.2	14.0	10.6	-21.09	10,984.9	-42,831.3	1,514.3	1,489.7	24.60	61.552	
10,850.0	10,712.6	9,500.0	9,284.2	14.0	10.7	-20.89	10,995.7	-42,835.7	1,521.8	1,497.1	24.71	61.593	
10,875.0	10,720.3	9,500.0	9,284.2	14.1	10.7	-20.60	10,995.7	-42,835.7	1,528.3	1,503.5	24.77	61.689	
10,900.0	10,726.8	9,500.0	9,284.2	14.1	10.7	-20.36	10,995.7	-42,835.7	1,533.9	1,509.1	24.84	61.744	
10,925.0	10,732.0	9,511.1	9,285.8	14.1	10.8	-20.29	11,005.8	-42,839.9	1,538.6	1,513.6	25.01	61.528	
10,950.0	10,735.9	9,525.0	9,287.4	14.1	10.9	-20.31	11,018.5	-42,845.2	1,542.5	1,517.3	25.23	61.138	
10,975.0	10,738.5	9,525.0	9,287.4	14.1	10.9	-20.19	11,018.5	-42,845.2	1,545.4	1,520.1	25.30	61.071	
11,000.0	10,739.8	9,525.0	9,287.4	14.1	10.9	-20.10	11,018.5	-42,845.2	1,547.4	1,522.0	25.38	60.972	
11,012.6	10,740.0	9,525.0	9,287.4	14.1	10.9	-20.08	11,018.5	-42,845.2	1,548.1	1,522.7	25.42	60.912	
11,022.0	10,740.0	9,525.0	9,287.4	14.1	10.9	-20.07	11,018.5	-42,845.2	1,548.6	1,523.1	25.43	60.888	
11,100.0	10,739.7	9,550.0	9,289.4	14.1	11.2	-20.42	11,041.5	-42,854.8	1,553.6	1,527.7	25.89	60.002	
11,200.0	10,739.4	9,574.6	9,290.0	14.2	11.6	-20.74	11,064.3	-42,864.3	1,564.6	1,538.2	26.46	59.129	
11,300.0	10,739.1	9,736.0	9,290.0	14.9	14.1	-22.48	11,216.4	-42,917.8	1,576.5	1,547.3	29.28	53.847	
11,400.0	10,738.7	9,911.3	9,290.0	16.3	17.0	-23.68	11,387.3	-42,956.1	1,584.3	1,551.1	33.26	47.632	
11,500.0	10,738.4	10,092.9	9,290.0	17.8	19.7	-24.16	11,568.0	-42,973.5	1,587.2	1,549.7	37.48	42.351	
11,600.0	10,738.1	10,209.2	9,290.0	19.3	21.4	-24.14	11,684.3	-42,974.8	1,586.6	1,546.0	40.66	39.022	
11,700.0	10,737.7	10,309.2	9,290.0	20.8	22.8	-24.11	11,784.3	-42,975.6	1,585.9	1,542.3	43.65	36.330	
11,800.0	10,737.4	10,409.2	9,290.0	22.4	24.3	-24.08	11,884.3	-42,976.3	1,585.2	1,538.5	46.69	33.951	
11,900.0	10,737.1	10,509.2	9,290.0	23.9	25.8	-24.06	11,984.3	-42,977.1	1,584.5	1,534.7	49.77	31.839	
12,000.0	10,736.8	10,609.2	9,290.0	25.5	27.4	-24.03	12,084.3	-42,977.8	1,583.8	1,530.9	52.87	29.955	
12,100.0	10,736.4	10,709.2	9,290.0	27.1	28.9	-24.00	12,184.3	-42,978.6	1,583.1	1,527.1	56.01	28.267	
12,200.0	10,736.1	10,809.2	9,290.0	28.7	30.5	-23.97	12,284.3	-42,979.3	1,582.4	1,523.3	59.16	26.748	
12,300.0	10,735.8	10,909.2	9,290.0	30.3	32.0	-23.95	12,384.3	-42,980.1	1,581.7	1,519.4	62.33	25.376	
12,400.0	10,735.4	11,009.2	9,290.0	31.9	33.6	-23.92	12,484.3	-42,980.8	1,581.0	1,515.5	65.52	24.130	
12,500.0	10,735.1	11,109.2	9,290.0	33.6	35.2	-23.89	12,584.2	-42,981.6	1,580.3	1,511.6	68.72	22.996	
12,600.0	10,734.8	11,209.2	9,290.0	35.2	36.8	-23.86	12,684.2	-42,982.3	1,579.6	1,507.7	71.94	21.959	
12,700.0	10,734.4	11,309.2	9,290.0	36.8	38.4	-23.84	12,784.2	-42,983.1	1,578.9	1,503.8	75.16	21.007	
12,800.0	10,734.1	11,409.1	9,290.0	38.4	40.0	-23.81	12,884.2	-42,983.8	1,578.2	1,499.8	78.39	20.132	
12,900.0	10,733.8	11,509.1	9,290.0	40.1	41.6	-23.78	12,984.2	-42,984.6	1,577.5	1,495.9	81.63	19.324	
13,000.0	10,733.5	11,609.1	9,290.0	41.7	43.2	-23.75	13,084.2	-42,985.3	1,576.8	1,491.9	84.88	18.576	
13,100.0	10,733.1	11,709.1	9,290.0	43.4	44.8	-23.72	13,184.2	-42,986.1	1,576.1	1,488.0	88.14	17.882	
13,200.0	10,732.8	11,809.1	9,290.0	45.0	46.4	-23.70	13,284.2	-42,986.8	1,575.4	1,484.0	91.40	17.237	
13,300.0	10,732.5	11,909.1	9,290.0	46.6	48.0	-23.67	13,384.2	-42,987.6	1,574.7	1,480.1	94.66	16.635	
13,400.0	10,732.1	12,009.1	9,290.0	48.3	49.7	-23.64	13,484.2	-42,988.3	1,574.0	1,476.1	97.93	16.072	
13,500.0	10,731.8	12,109.1	9,290.0	49.9	51.3	-23.61	13,584.2	-42,989.1	1,573.3	1,472.1	101.21	15.545	
13,600.0	10,731.5	12,209.1	9,290.0	51.6	52.9	-23.59	13,684.2	-42,989.8	1,572.6	1,468.2	104.49	15.051	
13,700.0	10,731.1	12,309.1	9,290.0	53.2	54.5	-23.56	13,784.1	-42,990.6	1,571.9	1,464.2	107.77	14.586	
13,800.0	10,730.8	12,409.1	9,290.0	54.9	56.2	-23.53	13,884.1	-42,991.3	1,571.3	1,460.2	111.05	14.148	
13,900.0	10,730.5	12,509.1	9,290.0	56.5	57.8	-23.50	13,984.1	-42,992.1	1,570.6	1,456.2	114.34	13.736	
14,000.0	10,730.1	12,609.1	9,290.0	58.2	59.4	-23.47	14,084.1	-42,992.8	1,569.9	1,452.2	117.63	13.345	
14,100.0	10,729.8	12,709.1	9,290.0	59.8	61.1	-23.45	14,184.1	-42,993.6	1,569.2	1,448.2	120.93	12.976	
14,200.0	10,729.5	12,809.1	9,290.0	61.5	62.7	-23.42	14,284.1	-42,994.3	1,568.5	1,444.3	124.22	12.626	
14,300.0	10,729.2	12,909.1	9,290.0	63.2	64.4	-23.39	14,384.1	-42,995.1	1,567.8	1,440.3	127.52	12.295	
14,400.0	10,728.8	13,009.1	9,290.0	64.8	66.0	-23.36	14,484.1	-42,995.8	1,567.1	1,436.3	130.82	11.979	
14,500.0	10,728.5	13,109.1	9,290.0	66.5	67.6	-23.33	14,584.1	-42,996.6	1,566.4	1,432.3	134.12	11.679	
14,600.0	10,728.2	13,209.0	9,290.0	68.1	69.3	-23.30	14,684.1	-42,997.3	1,565.7	1,428.3	137.42	11.393	
14,700.0	10,727.8	13,309.0	9,290.0	69.8	70.9	-23.28	14,784.1	-42,998.1	1,565.0	1,424.3	140.73	11.121	
14,800.0	10,727.5	13,409.0	9,290.0	71.4	72.6	-23.25	14,884.1	-42,998.8	1,564.3	1,420.3	144.03	10.861	
14,900.0	10,727.2	13,509.0	9,290.0	73.1	74.2	-23.22	14,984.0	-42,999.6	1,563.6	1,416.3	147.34	10.613	
15,000.0	10,726.8	13,609.0	9,290.0	74.8	75.9	-23.19	15,084.0	-43,000.3	1,562.9	1,412.3	150.65	10.375	
15,100.0	10,726.5	13,709.0	9,290.0	76.4	77.5	-23.16	15,184.0	-43,001.1	1,562.3	1,408.3	153.96	10.147	
15,200.0	10,726.2	13,809.0	9,290.0	78.1	79.2	-23.13	15,284.0	-43,001.8	1,561.6	1,404.3	157.27	9.929	

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 COM #10H - OWB - PWP0		Offset Site Error: 0.0 usft	
Survey Program: 0-Standard Keeper 104, 8800-MWD													Offset Well Error: 3.0 usft			
Reference		Offset		Semi Major Axis			Distance						Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor				
15,300.0	10,725.9	13,909.0	9,290.0	79.8	80.8	-23.11	15,384.0	-43,002.6	1,560.9	1,400.3	160.58	9.720				
15,400.0	10,725.5	14,009.0	9,290.0	81.4	82.5	-23.08	15,484.0	-43,003.3	1,560.2	1,396.3	163.89	9.520				
15,500.0	10,725.2	14,109.0	9,290.0	83.1	84.1	-23.05	15,584.0	-43,004.1	1,559.5	1,392.3	167.20	9.327				
15,558.0	10,725.0	14,164.5	9,290.0	84.0	85.0	-23.03	15,639.5	-43,004.5	1,559.1	1,390.0	169.08	9.221 SF				

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 COM #5H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-Standard Keeper 104, 8800-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		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)						
0.0	0.0	0.0	0.0	3.0	3.0	-90.72	10,623.9	-42,347.4	39.9					
100.0	100.0	99.8	99.8	3.0	3.0	-90.72	10,623.9	-42,347.4	39.9	33.9	6.00	6.650		
200.0	200.0	199.8	199.8	3.0	3.0	-90.72	10,623.9	-42,347.4	39.9	33.9	6.01	6.639		
300.0	300.0	299.8	299.8	3.0	3.0	-90.72	10,623.9	-42,347.4	39.9	33.9	6.03	6.615		
400.0	400.0	399.8	399.8	3.0	3.0	-90.72	10,623.9	-42,347.4	39.9	33.8	6.07	6.579		
500.0	500.0	499.8	499.8	3.1	3.1	-90.72	10,623.9	-42,347.4	39.9	33.8	6.11	6.531		
600.0	600.0	599.8	599.8	3.1	3.1	-90.72	10,623.9	-42,347.4	39.9	33.7	6.16	6.473		
700.0	700.0	699.8	699.8	3.1	3.1	-90.72	10,623.9	-42,347.4	39.9	33.7	6.23	6.404		
800.0	800.0	799.8	799.8	3.2	3.2	-90.72	10,623.9	-42,347.4	39.9	33.6	6.31	6.327		
900.0	900.0	899.8	899.8	3.2	3.2	-90.72	10,623.9	-42,347.4	39.9	33.5	6.39	6.242		
1,000.0	1,000.0	999.8	999.8	3.2	3.2	-90.72	10,623.9	-42,347.4	39.9	33.4	6.49	6.150		
1,100.0	1,100.0	1,099.8	1,099.8	3.3	3.3	-90.72	10,623.9	-42,347.4	39.9	33.3	6.59	6.052		
1,200.0	1,200.0	1,199.8	1,199.8	3.4	3.4	-90.72	10,623.9	-42,347.4	39.9	33.2	6.71	5.949		
1,300.0	1,300.0	1,299.8	1,299.8	3.4	3.4	-90.72	10,623.9	-42,347.4	39.9	33.1	6.83	5.843		
1,400.0	1,400.0	1,399.8	1,399.8	3.5	3.5	-90.72	10,623.9	-42,347.4	39.9	32.9	6.96	5.734		
1,500.0	1,500.0	1,499.8	1,499.8	3.5	3.5	-90.72	10,623.9	-42,347.4	39.9	32.8	7.10	5.623		
1,600.0	1,600.0	1,599.8	1,599.8	3.6	3.6	-90.72	10,623.9	-42,347.4	39.9	32.7	7.24	5.511		
1,700.0	1,700.0	1,699.8	1,699.8	3.7	3.7	-90.72	10,623.9	-42,347.4	39.9	32.5	7.39	5.399		
1,800.0	1,800.0	1,799.8	1,799.8	3.8	3.8	-90.72	10,623.9	-42,347.4	39.9	32.4	7.55	5.286		
1,900.0	1,900.0	1,899.8	1,899.8	3.9	3.9	-90.72	10,623.9	-42,347.4	39.9	32.2	7.71	5.175		
2,000.0	2,000.0	1,999.8	1,999.8	3.9	3.9	-90.72	10,623.9	-42,347.4	39.9	32.0	7.88	5.064		
2,100.0	2,100.0	2,099.8	2,099.8	4.0	4.0	-90.72	10,623.9	-42,347.4	39.9	31.9	8.05	4.955		
2,200.0	2,200.0	2,199.8	2,199.8	4.1	4.1	-90.72	10,623.9	-42,347.4	39.9	31.7	8.23	4.848		
2,300.0	2,300.0	2,299.8	2,299.8	4.2	4.2	-90.72	10,623.9	-42,347.4	39.9	31.5	8.41	4.743		
2,400.0	2,400.0	2,399.8	2,399.8	4.3	4.3	-90.72	10,623.9	-42,347.4	39.9	31.3	8.60	4.640		
2,500.0	2,500.0	2,499.8	2,499.8	4.4	4.4	-90.72	10,623.9	-42,347.4	39.9	31.1	8.79	4.539		
2,600.0	2,600.0	2,599.8	2,599.8	4.5	4.5	-90.72	10,623.9	-42,347.4	39.9	30.9	8.99	4.441		
2,700.0	2,700.0	2,699.8	2,699.8	4.6	4.6	-90.72	10,623.9	-42,347.4	39.9	30.7	9.18	4.345		
2,800.0	2,800.0	2,799.8	2,799.8	4.7	4.7	-90.72	10,623.9	-42,347.4	39.9	30.5	9.39	4.252		
2,900.0	2,900.0	2,899.8	2,899.8	4.8	4.8	-90.72	10,623.9	-42,347.4	39.9	30.3	9.59	4.161		
3,000.0	3,000.0	2,999.8	2,999.8	4.9	4.9	-90.72	10,623.9	-42,347.4	39.9	30.1	9.80	4.073		
3,100.0	3,100.0	3,099.8	3,099.8	5.0	5.0	-90.72	10,623.9	-42,347.4	39.9	29.9	10.01	3.988		
3,200.0	3,200.0	3,199.8	3,199.8	5.1	5.1	-90.72	10,623.9	-42,347.4	39.9	29.7	10.22	3.905		
3,300.0	3,300.0	3,299.8	3,299.8	5.2	5.2	-90.72	10,623.9	-42,347.4	39.9	29.5	10.43	3.825		
3,400.0	3,400.0	3,399.8	3,399.8	5.3	5.3	-90.72	10,623.9	-42,347.4	39.9	29.3	10.65	3.747		
3,500.0	3,500.0	3,499.8	3,499.8	5.4	5.4	-90.72	10,623.9	-42,347.4	39.9	29.0	10.87	3.671		
3,600.0	3,600.0	3,599.8	3,599.8	5.5	5.5	-90.72	10,623.9	-42,347.4	39.9	28.8	11.09	3.598		
3,700.0	3,700.0	3,699.8	3,699.8	5.7	5.7	-90.72	10,623.9	-42,347.4	39.9	28.6	11.31	3.527		
3,800.0	3,800.0	3,799.8	3,799.8	5.8	5.8	-90.72	10,623.9	-42,347.4	39.9	28.4	11.54	3.459		
3,900.0	3,900.0	3,899.8	3,899.8	5.9	5.9	-90.72	10,623.9	-42,347.4	39.9	28.1	11.76	3.392		
4,000.0	4,000.0	3,999.8	3,999.8	6.0	6.0	-90.72	10,623.9	-42,347.4	39.9	27.9	11.99	3.328		
4,100.0	4,100.0	4,099.8	4,099.8	6.1	6.1	-90.72	10,623.9	-42,347.4	39.9	27.7	12.22	3.266		
4,200.0	4,200.0	4,199.8	4,199.8	6.2	6.2	-90.72	10,623.9	-42,347.4	39.9	27.5	12.45	3.205		
4,300.0	4,300.0	4,299.8	4,299.8	6.3	6.3	-90.72	10,623.9	-42,347.4	39.9	27.2	12.68	3.147		
4,400.0	4,400.0	4,399.8	4,399.8	6.5	6.5	-90.72	10,623.9	-42,347.4	39.9	27.0	12.91	3.090		
4,500.0	4,500.0	4,499.8	4,499.8	6.6	6.6	-90.72	10,623.9	-42,347.4	39.9	26.8	13.15	3.035		
4,600.0	4,600.0	4,599.8	4,599.8	6.7	6.7	-90.72	10,623.9	-42,347.4	39.9	26.5	13.38	2.982		
4,700.0	4,700.0	4,699.8	4,699.8	6.8	6.8	-90.72	10,623.9	-42,347.4	39.9	26.3	13.62	2.930		
4,800.0	4,800.0	4,799.8	4,799.8	6.9	6.9	-90.72	10,623.9	-42,347.4	39.9	26.0	13.86	2.880		
4,900.0	4,900.0	4,899.8	4,899.8	7.0	7.0	-90.72	10,623.9	-42,347.4	39.9	25.8	14.09	2.831		
5,000.0	5,000.0	4,999.8	4,999.8	7.2	7.2	-90.72	10,623.9	-42,347.4	39.9	25.6	14.33	2.784		
5,100.0	5,100.0	5,099.8	5,099.8	7.3	7.3	-90.72	10,623.9	-42,347.4	39.9	25.3	14.57	2.738		

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 COM #1H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
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 COM #5H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-Standard Keeper 104, 8800-MWD													Offset Well Error:	3.0 usft
Reference	Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,200.0	5,200.0	5,199.8	5,199.8	7.4	7.4	-90.72	10,623.9	-42,347.4	39.9	25.1	14.81	2.694		
5,300.0	5,300.0	5,299.8	5,299.8	7.5	7.5	-90.72	10,623.9	-42,347.4	39.9	24.8	15.06	2.650		
5,400.0	5,400.0	5,399.8	5,399.8	7.6	7.6	-90.72	10,623.9	-42,347.4	39.9	24.6	15.30	2.608		
5,500.0	5,500.0	5,499.8	5,499.8	7.8	7.8	-90.72	10,623.9	-42,347.4	39.9	24.4	15.54	2.568		
5,600.0	5,600.0	5,599.8	5,599.8	7.9	7.9	-90.72	10,623.9	-42,347.4	39.9	24.1	15.78	2.528		
5,700.0	5,700.0	5,699.8	5,699.8	8.0	8.0	-90.72	10,623.9	-42,347.4	39.9	23.9	16.03	2.489		
5,800.0	5,800.0	5,799.8	5,799.8	8.1	8.1	-90.72	10,623.9	-42,347.4	39.9	23.6	16.27	2.452		
5,900.0	5,900.0	5,899.8	5,899.8	8.3	8.3	-90.72	10,623.9	-42,347.4	39.9	23.4	16.52	2.416		
6,000.0	6,000.0	5,999.8	5,999.8	8.4	8.4	-90.72	10,623.9	-42,347.4	39.9	23.1	16.76	2.380		
6,100.0	6,100.0	6,099.8	6,099.8	8.5	8.5	-90.72	10,623.9	-42,347.4	39.9	22.9	17.01	2.346		
6,200.0	6,200.0	6,199.8	6,199.8	8.6	8.6	-90.72	10,623.9	-42,347.4	39.9	22.6	17.26	2.312		
6,300.0	6,300.0	6,299.8	6,299.8	8.8	8.8	-90.72	10,623.9	-42,347.4	39.9	22.4	17.51	2.279		
6,400.0	6,400.0	6,399.8	6,399.8	8.9	8.9	-90.72	10,623.9	-42,347.4	39.9	22.1	17.75	2.248		
6,500.0	6,500.0	6,499.8	6,499.8	9.0	9.0	-90.72	10,623.9	-42,347.4	39.9	21.9	18.00	2.217		
6,600.0	6,600.0	6,599.8	6,599.8	9.1	9.1	-90.72	10,623.9	-42,347.4	39.9	21.7	18.25	2.186		
6,700.0	6,700.0	6,699.8	6,699.8	9.3	9.3	-90.72	10,623.9	-42,347.4	39.9	21.4	18.50	2.157		
6,800.0	6,800.0	6,799.8	6,799.8	9.4	9.4	-90.72	10,623.9	-42,347.4	39.9	21.2	18.75	2.128		
6,900.0	6,900.0	6,899.8	6,899.8	9.5	9.5	-90.72	10,623.9	-42,347.4	39.9	20.9	19.00	2.100		
7,000.0	7,000.0	6,999.8	6,999.8	9.6	9.6	-90.72	10,623.9	-42,347.4	39.9	20.7	19.25	2.073		
7,100.0	7,100.0	7,099.8	7,099.8	9.8	9.8	-90.72	10,623.9	-42,347.4	39.9	20.4	19.50	2.046		
7,200.0	7,200.0	7,199.8	7,199.8	9.9	9.9	-90.72	10,623.9	-42,347.4	39.9	20.2	19.75	2.020		
7,300.0	7,300.0	7,299.8	7,299.8	10.0	10.0	-90.72	10,623.9	-42,347.4	39.9	19.9	20.00	1.995 Advise and Monitor		
7,400.0	7,400.0	7,399.8	7,399.8	10.1	10.1	-90.72	10,623.9	-42,347.4	39.9	19.6	20.26	1.970 Advise and Monitor		
7,500.0	7,500.0	7,499.8	7,499.8	10.3	10.3	-90.72	10,623.9	-42,347.4	39.9	19.4	20.51	1.946 Advise and Monitor		
7,600.0	7,600.0	7,599.8	7,599.8	10.4	10.4	-90.72	10,623.9	-42,347.4	39.9	19.1	20.76	1.922 Advise and Monitor		
7,700.0	7,700.0	7,699.8	7,699.8	10.5	10.5	-90.72	10,623.9	-42,347.4	39.9	18.9	21.01	1.899 Advise and Monitor		
7,800.0	7,800.0	7,799.8	7,799.8	10.6	10.6	-90.72	10,623.9	-42,347.4	39.9	18.6	21.26	1.876 Advise and Monitor		
7,900.0	7,900.0	7,899.8	7,899.8	10.8	10.8	-90.72	10,623.9	-42,347.4	39.9	18.4	21.52	1.854 Advise and Monitor		
8,000.0	8,000.0	7,999.8	7,999.8	10.9	10.9	-90.72	10,623.9	-42,347.4	39.9	18.1	21.77	1.833 Advise and Monitor		
8,100.0	8,100.0	8,099.8	8,099.8	11.0	11.0	-90.72	10,623.9	-42,347.4	39.9	17.9	22.02	1.812 Advise and Monitor		
8,200.0	8,200.0	8,199.8	8,199.8	11.1	11.1	-90.72	10,623.9	-42,347.4	39.9	17.6	22.28	1.791 Advise and Monitor		
8,300.0	8,300.0	8,299.8	8,299.8	11.3	11.3	-90.72	10,623.9	-42,347.4	39.9	17.4	22.53	1.771 Advise and Monitor		
8,400.0	8,400.0	8,399.8	8,399.8	11.4	11.4	-90.72	10,623.9	-42,347.4	39.9	17.1	22.79	1.751 Advise and Monitor		
8,500.0	8,500.0	8,499.8	8,499.8	11.5	11.5	-90.72	10,623.9	-42,347.4	39.9	16.9	23.04	1.732 Advise and Monitor		
8,600.0	8,600.0	8,599.8	8,599.8	11.6	11.6	-90.72	10,623.9	-42,347.4	39.9	16.6	23.30	1.713 Advise and Monitor		
8,700.0	8,700.0	8,699.8	8,699.8	11.8	11.8	-90.72	10,623.9	-42,347.4	39.9	16.4	23.55	1.694 Advise and Monitor		
8,800.0	8,800.0	8,799.8	8,799.8	11.9	11.8	-90.72	10,623.9	-42,347.4	39.9	16.2	23.74	1.681 Advise and Monitor		
8,837.7	8,837.7	8,837.5	8,837.5	12.0	11.8	-89.78	10,624.6	-42,347.4	39.9	16.1	23.80	1.677 Advise and Monitor, CC, ES, SF		
8,900.0	8,900.0	8,898.9	8,898.5	12.0	11.9	-79.63	10,631.7	-42,347.4	40.6	16.7	23.89	1.699 Advise and Monitor		
9,000.0	9,000.0	8,991.2	8,987.0	12.2	11.9	-50.79	10,656.9	-42,347.4	53.0	29.0	24.06	2.204		
9,100.0	9,100.0	9,071.4	9,058.9	12.3	12.0	-30.39	10,692.4	-42,347.4	88.8	64.5	24.24	3.662		
9,200.0	9,200.0	9,138.2	9,113.5	12.4	12.0	-20.55	10,730.7	-42,347.3	142.6	118.2	24.43	5.837		
9,300.0	9,300.0	9,192.6	9,153.7	12.5	12.1	-15.56	10,767.4	-42,347.3	208.2	183.6	24.61	8.461		
9,400.0	9,400.0	9,236.8	9,183.2	12.7	12.1	-12.75	10,800.4	-42,347.3	281.9	257.1	24.79	11.374		
9,500.0	9,500.0	9,275.0	9,206.0	12.8	12.2	-10.91	10,830.9	-42,347.3	361.3	336.4	24.96	14.478		
9,600.0	9,600.0	9,300.0	9,219.6	12.9	12.2	-9.92	10,851.9	-42,347.3	444.8	419.7	25.11	17.715		
9,700.0	9,700.0	9,325.0	9,232.1	13.1	12.2	-9.07	10,873.5	-42,347.3	531.4	506.1	25.26	21.034		
9,800.0	9,800.0	9,350.0	9,243.5	13.2	12.2	-8.33	10,895.8	-42,347.3	620.3	594.9	25.42	24.406		
9,900.0	9,900.0	9,365.2	9,249.8	13.3	12.2	-7.94	10,909.6	-42,347.2	710.9	685.4	25.56	27.818		
10,000.0	10,000.0	9,375.0	9,253.6	13.4	12.3	-7.69	10,918.6	-42,347.2	803.1	777.4	25.69	31.254		
10,100.0	10,100.0	9,400.0	9,262.6	13.6	12.3	-7.13	10,942.0	-42,347.2	896.3	870.4	25.84	34.681		
10,200.0	10,200.0	9,400.0	9,262.6	13.6	12.3	-7.13	10,942.0	-42,347.2	990.3	964.4	25.91	38.223		

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 COM #5H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104.8800-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,262.5	10,262.5	9,410.8	9,266.1	13.6	12.3	-6.91	10,952.2	-42,347.2	1,049.5	1,023.6	25.92	40.486	
10,275.0	10,275.0	9,412.0	9,266.5	13.6	12.3	-5.46	10,953.4	-42,347.2	1,061.3	1,035.4	25.92	40.938	
10,300.0	10,300.0	9,414.8	9,267.3	13.6	12.3	-4.72	10,956.0	-42,347.2	1,084.7	1,058.7	25.93	41.829	
10,325.0	10,324.8	9,425.0	9,270.3	13.7	12.3	-4.09	10,965.7	-42,347.2	1,107.6	1,081.7	25.94	42.692	
10,350.0	10,349.5	9,425.0	9,270.3	13.7	12.3	-3.68	10,965.7	-42,347.2	1,130.0	1,104.0	25.95	43.541	
10,375.0	10,374.0	9,425.0	9,270.3	13.7	12.3	-3.35	10,965.7	-42,347.2	1,151.9	1,125.9	25.96	44.369	
10,400.0	10,398.1	9,425.0	9,270.3	13.7	12.3	-3.07	10,965.7	-42,347.2	1,173.2	1,147.3	25.97	45.173	
10,425.0	10,421.9	9,425.0	9,270.3	13.7	12.3	-2.84	10,965.7	-42,347.2	1,194.0	1,168.1	25.98	45.952	
10,450.0	10,445.2	9,436.7	9,273.5	13.7	12.3	-2.59	10,977.0	-42,347.2	1,214.1	1,188.1	26.01	46.684	
10,475.0	10,468.1	9,450.0	9,276.8	13.7	12.3	-2.38	10,989.9	-42,347.2	1,233.6	1,207.6	26.03	47.392	
10,500.0	10,490.3	9,450.0	9,276.8	13.7	12.3	-2.25	10,989.9	-42,347.2	1,252.3	1,226.3	26.05	48.078	
10,525.0	10,512.0	9,450.0	9,276.8	13.8	12.3	-2.13	10,989.9	-42,347.2	1,270.3	1,244.3	26.07	48.736	
10,550.0	10,532.9	9,450.0	9,276.8	13.8	12.3	-2.02	10,989.9	-42,347.2	1,287.7	1,261.6	26.09	49.364	
10,575.0	10,553.2	9,460.3	9,279.1	13.8	12.3	-1.91	11,000.0	-42,347.2	1,304.2	1,278.1	26.11	49.945	
10,600.0	10,572.6	9,465.5	9,280.2	13.8	12.3	-1.82	11,005.0	-42,347.2	1,319.9	1,293.8	26.14	50.500	
10,625.0	10,591.2	9,475.0	9,282.0	13.8	12.3	-1.73	11,014.3	-42,347.2	1,334.8	1,308.7	26.16	51.017	
10,650.0	10,608.8	9,475.0	9,282.0	13.9	12.3	-1.67	11,014.3	-42,347.2	1,348.9	1,322.7	26.19	51.509	
10,675.0	10,625.6	9,475.0	9,282.0	13.9	12.3	-1.61	11,014.3	-42,347.2	1,362.2	1,336.0	26.21	51.970	
10,700.0	10,641.3	9,487.4	9,284.1	13.9	12.3	-1.55	11,026.6	-42,347.2	1,374.5	1,348.2	26.24	52.379	
10,725.0	10,656.0	9,500.0	9,285.9	13.9	12.3	-1.49	11,039.0	-42,347.2	1,386.0	1,359.7	26.27	52.758	
10,750.0	10,669.6	9,500.0	9,285.9	14.0	12.3	-1.45	11,039.0	-42,347.2	1,396.5	1,370.2	26.29	53.111	
10,775.0	10,682.1	9,500.0	9,285.9	14.0	12.3	-1.42	11,039.0	-42,347.2	1,406.2	1,379.9	26.32	53.433	
10,800.0	10,693.5	9,510.7	9,287.2	14.0	12.3	-1.38	11,049.6	-42,347.2	1,414.9	1,388.5	26.34	53.710	
10,825.0	10,703.6	9,525.0	9,288.5	14.0	12.3	-1.34	11,063.9	-42,347.2	1,422.7	1,396.4	26.37	53.955	
10,850.0	10,712.6	9,525.0	9,288.5	14.0	12.3	-1.33	11,063.9	-42,347.2	1,429.5	1,403.1	26.39	54.159	
10,875.0	10,720.3	9,525.0	9,288.5	14.1	12.3	-1.31	11,063.9	-42,347.2	1,435.3	1,408.9	26.46	54.244	
10,900.0	10,726.8	9,534.9	9,289.2	14.1	12.4	-1.29	11,073.7	-42,347.2	1,440.2	1,413.7	26.53	54.280	
10,925.0	10,732.0	9,550.0	9,289.8	14.1	12.4	-1.26	11,088.8	-42,347.2	1,444.2	1,417.6	26.61	54.277	
10,950.0	10,735.9	9,550.0	9,289.8	14.1	12.4	-1.25	11,088.8	-42,347.2	1,447.1	1,420.4	26.68	54.234	
10,975.0	10,738.5	9,550.0	9,289.8	14.1	12.4	-1.25	11,088.8	-42,347.2	1,449.0	1,422.3	26.76	54.158	
11,000.0	10,739.8	9,562.6	9,290.0	14.1	12.4	-1.24	11,101.4	-42,347.1	1,450.0	1,423.2	26.83	54.039	
11,012.6	10,740.0	9,563.0	9,290.0	14.1	12.4	-1.24	11,101.8	-42,347.1	1,450.1	1,423.3	26.87	53.969	
11,022.0	10,740.0	9,572.5	9,290.0	14.1	12.4	-1.23	11,111.3	-42,347.1	1,450.1	1,423.2	26.89	53.931	
11,100.0	10,739.7	9,650.4	9,290.0	14.1	12.4	-1.18	11,189.3	-42,347.1	1,449.8	1,422.8	27.04	53.617	
11,200.0	10,739.4	9,750.4	9,290.0	14.2	13.0	-1.11	11,289.3	-42,347.0	1,449.5	1,421.6	27.84	52.068	
11,300.0	10,739.1	9,850.4	9,290.0	14.9	14.4	-1.04	11,389.2	-42,347.0	1,449.1	1,419.6	29.51	49.110	
11,400.0	10,738.7	9,950.4	9,290.0	16.3	15.8	-0.96	11,489.2	-42,346.9	1,448.7	1,416.6	32.15	45.069	
11,500.0	10,738.4	10,050.4	9,290.0	17.8	17.3	-0.89	11,589.2	-42,346.9	1,448.4	1,413.3	35.12	41.240	
11,600.0	10,738.1	10,150.3	9,290.0	19.3	18.9	-0.82	11,689.2	-42,346.8	1,448.0	1,409.9	38.16	37.951	
11,700.0	10,737.7	10,250.3	9,290.0	20.8	20.4	-0.75	11,789.2	-42,346.8	1,447.7	1,406.4	41.24	35.107	
11,800.0	10,737.4	10,350.3	9,290.0	22.4	22.0	-0.68	11,889.2	-42,346.7	1,447.3	1,403.0	44.35	32.631	
11,900.0	10,737.1	10,450.3	9,290.0	23.9	23.6	-0.61	11,989.1	-42,346.7	1,447.0	1,399.5	47.50	30.463	
12,000.0	10,736.8	10,550.3	9,290.0	25.5	25.2	-0.54	12,089.1	-42,346.6	1,446.6	1,395.9	50.67	28.550	
12,100.0	10,736.4	10,650.3	9,290.0	27.1	26.8	-0.47	12,189.1	-42,346.5	1,446.3	1,392.4	53.86	26.853	
12,200.0	10,736.1	10,750.2	9,290.0	28.7	28.4	-0.40	12,289.1	-42,346.5	1,445.9	1,388.9	57.07	25.338	
12,300.0	10,735.8	10,850.2	9,290.0	30.3	30.0	-0.33	12,389.1	-42,346.4	1,445.6	1,385.3	60.28	23.979	
12,400.0	10,735.4	10,950.2	9,290.0	31.9	31.6	-0.26	12,489.1	-42,346.4	1,445.2	1,381.7	63.52	22.754	
12,500.0	10,735.1	11,050.2	9,290.0	33.6	33.2	-0.19	12,589.0	-42,346.3	1,444.9	1,378.2	66.76	21.644	
12,600.0	10,734.8	11,150.2	9,290.0	35.2	34.8	-0.12	12,689.0	-42,346.3	1,444.6	1,374.6	70.01	20.635	
12,700.0	10,734.4	11,250.2	9,290.0	36.8	36.5	-0.05	12,789.0	-42,346.2	1,444.2	1,371.0	73.26	19.713	
12,800.0	10,734.1	11,350.1	9,290.0	38.4	38.1	0.02	12,889.0	-42,346.1	1,443.9	1,367.4	76.53	18.868	
12,900.0	10,733.8	11,450.1	9,290.0	40.1	39.7	0.10	12,989.0	-42,346.1	1,443.6	1,363.8	79.80	18.091	

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 COM #5H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104, 8800-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
13,000.0	10,733.5	11,550.1	9,290.0	41.7	41.4	0.17	13,089.0	-42,346.0	1,443.3	1,360.2	83.07	17.374	
13,100.0	10,733.1	11,650.1	9,290.0	43.4	43.0	0.24	13,188.9	-42,346.0	1,442.9	1,356.6	86.35	16.711	
13,200.0	10,732.8	11,750.1	9,290.0	45.0	44.6	0.31	13,288.9	-42,345.9	1,442.6	1,353.0	89.63	16.095	
13,300.0	10,732.5	11,850.1	9,290.0	46.6	46.3	0.38	13,388.9	-42,345.9	1,442.3	1,349.4	92.92	15.523	
13,400.0	10,732.1	11,950.1	9,290.0	48.3	47.9	0.45	13,488.9	-42,345.8	1,442.0	1,345.8	96.20	14.989	
13,500.0	10,731.8	12,050.0	9,290.0	49.9	49.6	0.52	13,588.9	-42,345.8	1,441.7	1,342.2	99.50	14.490	
13,600.0	10,731.5	12,150.0	9,290.0	51.6	51.2	0.59	13,688.9	-42,345.7	1,441.3	1,338.6	102.79	14.022	
13,700.0	10,731.1	12,250.0	9,290.0	53.2	52.9	0.66	13,788.8	-42,345.6	1,441.0	1,334.9	106.09	13.583	
13,800.0	10,730.8	12,350.0	9,290.0	54.9	54.5	0.74	13,888.8	-42,345.6	1,440.7	1,331.3	109.39	13.171	
13,900.0	10,730.5	12,450.0	9,290.0	56.5	56.1	0.81	13,988.8	-42,345.5	1,440.4	1,327.7	112.69	12.783	
14,000.0	10,730.1	12,550.0	9,290.0	58.2	57.8	0.88	14,088.8	-42,345.5	1,440.1	1,324.1	115.99	12.416	
14,100.0	10,729.8	12,649.9	9,290.0	59.8	59.4	0.95	14,188.8	-42,345.4	1,439.8	1,320.5	119.29	12.070	
14,200.0	10,729.5	12,749.9	9,290.0	61.5	61.1	1.02	14,288.8	-42,345.4	1,439.5	1,316.9	122.60	11.742	
14,300.0	10,729.2	12,849.9	9,290.0	63.2	62.7	1.09	14,388.7	-42,345.3	1,439.2	1,313.3	125.91	11.431	
14,400.0	10,728.8	12,949.9	9,290.0	64.8	64.4	1.16	14,488.7	-42,345.2	1,438.9	1,309.7	129.21	11.136	
14,500.0	10,728.5	13,049.9	9,290.0	66.5	66.1	1.23	14,588.7	-42,345.2	1,438.6	1,306.1	132.52	10.856	
14,600.0	10,728.2	13,149.9	9,290.0	68.1	67.7	1.31	14,688.7	-42,345.1	1,438.3	1,302.5	135.83	10.589	
14,700.0	10,727.8	13,249.8	9,290.0	69.8	69.4	1.38	14,788.7	-42,345.1	1,438.0	1,298.9	139.15	10.335	
14,800.0	10,727.5	13,349.8	9,290.0	71.4	71.0	1.45	14,888.7	-42,345.0	1,437.8	1,295.3	142.46	10.093	
14,900.0	10,727.2	13,449.8	9,290.0	73.1	72.7	1.52	14,988.6	-42,345.0	1,437.5	1,291.7	145.77	9.861	
15,000.0	10,726.8	13,549.8	9,290.0	74.8	74.3	1.59	15,088.6	-42,344.9	1,437.2	1,288.1	149.08	9.640	
15,100.0	10,726.5	13,649.8	9,290.0	76.4	76.0	1.66	15,188.6	-42,344.9	1,436.9	1,284.5	152.40	9.429	
15,200.0	10,726.2	13,749.8	9,290.0	78.1	77.6	1.73	15,288.6	-42,344.8	1,436.6	1,280.9	155.72	9.226	
15,300.0	10,725.9	13,849.7	9,290.0	79.8	79.3	1.81	15,388.6	-42,344.7	1,436.4	1,277.3	159.03	9.032	
15,400.0	10,725.5	13,949.7	9,290.0	81.4	80.9	1.88	15,488.6	-42,344.7	1,436.1	1,273.7	162.35	8.846	
15,500.0	10,725.2	14,049.7	9,290.0	83.1	82.6	1.95	15,588.5	-42,344.6	1,435.8	1,270.2	165.67	8.667	
15,558.0	10,725.0	14,107.7	9,290.0	84.0	83.5	1.99	15,646.6	-42,344.6	1,435.7	1,268.1	167.59	8.566	

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 - BOMBAY FED COM #1H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 200-GYRO-NS, 7857-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Tooface (")	Distance		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)						
0.0	0.0	0.0	0.0	3.0	3.0	-178.16	8,103.3	-42,388.5	2,522.5					
100.0	100.0	75.7	75.7	3.0	3.0	-178.16	8,103.1	-42,388.5	2,522.6	2,516.6	6.00	420.243		
200.0	200.0	163.5	163.5	3.0	3.0	-178.16	8,102.5	-42,388.6	2,523.3	2,517.2	6.02	419.408		
300.0	300.0	259.2	259.2	3.0	3.0	-178.15	8,101.5	-42,388.8	2,524.3	2,518.2	6.06	416.493		
400.0	400.0	360.6	360.5	3.0	3.1	-178.15	8,100.5	-42,388.9	2,525.4	2,519.2	6.16	410.076		
500.0	500.0	462.3	462.3	3.1	3.2	-178.15	8,099.5	-42,389.0	2,526.3	2,520.0	6.30	401.114		
600.0	600.0	564.3	564.3	3.1	3.4	-178.15	8,098.6	-42,389.2	2,527.2	2,520.8	6.48	390.180		
700.0	700.0	663.4	663.4	3.1	3.6	-178.14	8,097.7	-42,389.5	2,528.1	2,521.4	6.69	378.171		
800.0	800.0	761.0	760.9	3.2	3.8	-178.13	8,096.8	-42,390.0	2,529.1	2,522.1	6.92	365.538		
900.0	900.0	862.2	862.2	3.2	4.0	-178.12	8,095.8	-42,390.4	2,530.1	2,522.9	7.19	352.110		
1,000.0	1,000.0	965.9	965.9	3.2	4.2	-178.12	8,094.9	-42,390.4	2,530.9	2,523.5	7.48	338.282		
1,100.0	1,100.0	1,065.7	1,065.6	3.3	4.5	-178.13	8,094.1	-42,390.2	2,531.7	2,523.9	7.79	325.079		
1,200.0	1,200.0	1,163.6	1,163.5	3.4	4.8	-178.14	8,093.3	-42,389.8	2,532.6	2,524.5	8.11	312.446		
1,300.0	1,300.0	1,261.5	1,261.5	3.4	5.0	-178.15	8,092.3	-42,389.4	2,533.5	2,525.1	8.44	300.264		
1,400.0	1,400.0	1,359.6	1,359.5	3.5	5.3	-178.16	8,091.3	-42,389.0	2,534.5	2,525.7	8.78	288.602		
1,500.0	1,500.0	1,462.3	1,462.2	3.5	5.6	-178.17	8,090.2	-42,388.6	2,535.6	2,526.4	9.15	277.080		
1,600.0	1,600.0	1,568.3	1,568.2	3.6	5.9	-178.18	8,089.3	-42,388.0	2,536.4	2,526.9	9.54	265.872		
1,700.0	1,700.0	1,674.3	1,674.2	3.7	6.2	-178.20	8,088.7	-42,387.2	2,537.0	2,527.0	9.94	255.280		
1,800.0	1,800.0	1,780.2	1,780.2	3.8	6.6	-178.22	8,088.3	-42,386.2	2,537.3	2,527.0	10.34	245.285		
1,900.0	1,900.0	1,887.2	1,887.1	3.9	6.9	-178.25	8,088.1	-42,384.9	2,537.4	2,526.7	10.76	235.811		
2,000.0	2,000.0	1,994.3	1,994.2	3.9	7.2	-178.29	8,088.3	-42,383.2	2,537.3	2,526.1	11.18	226.869		
2,100.0	2,100.0	2,099.1	2,098.9	4.0	7.6	-178.34	8,088.6	-42,380.9	2,536.9	2,525.3	11.61	218.546		
2,200.0	2,200.0	2,200.0	2,199.8	4.1	7.9	-178.41	8,089.1	-42,377.9	2,536.3	2,524.2	12.03	210.917		
2,300.0	2,300.0	2,299.9	2,299.7	4.2	8.2	-178.49	8,089.6	-42,374.3	2,535.7	2,523.2	12.45	203.728		
2,400.0	2,400.0	2,396.4	2,396.1	4.3	8.6	-178.58	8,090.0	-42,370.5	2,535.2	2,522.4	12.86	197.131		
2,500.0	2,500.0	2,494.1	2,493.7	4.4	8.9	-178.67	8,090.2	-42,366.4	2,534.9	2,521.6	13.28	190.835		
2,600.0	2,600.0	2,591.9	2,591.4	4.5	9.2	-178.76	8,090.4	-42,362.2	2,534.6	2,520.9	13.71	184.885		
2,700.0	2,700.0	2,690.1	2,689.5	4.6	9.5	-178.86	8,090.4	-42,357.8	2,534.5	2,520.3	14.14	179.234		
2,800.0	2,800.0	2,788.3	2,787.6	4.7	9.9	-178.97	8,090.5	-42,353.1	2,534.4	2,519.8	14.57	173.887		
2,900.0	2,900.0	2,898.5	2,897.7	4.8	10.3	-179.10	8,090.6	-42,347.3	2,534.1	2,519.1	15.06	168.321		
3,000.0	3,000.0	3,009.2	3,008.2	4.9	10.6	-179.24	8,091.3	-42,340.9	2,533.5	2,517.9	15.54	163.024		
3,100.0	3,100.0	3,109.3	3,108.1	5.0	11.0	-179.37	8,092.1	-42,335.5	2,532.6	2,516.6	15.99	158.403		
3,200.0	3,200.0	3,209.9	3,208.6	5.1	11.3	-179.46	8,092.9	-42,331.2	2,531.7	2,515.3	16.44	154.002		
3,300.0	3,300.0	3,314.1	3,312.8	5.2	11.7	-179.56	8,093.9	-42,327.1	2,530.8	2,513.9	16.90	149.739		
3,400.0	3,400.0	3,418.1	3,416.6	5.3	12.0	-179.65	8,095.0	-42,323.0	2,529.6	2,512.3	17.36	145.685		
3,500.0	3,500.0	3,520.9	3,519.4	5.4	12.4	-179.74	8,096.3	-42,318.9	2,528.4	2,510.5	17.82	141.852		
3,600.0	3,600.0	3,624.7	3,623.1	5.5	12.7	-179.84	8,097.7	-42,314.7	2,527.0	2,508.7	18.29	138.168		
3,700.0	3,700.0	3,732.0	3,730.2	5.7	13.1	-179.93	8,099.4	-42,310.5	2,525.4	2,506.6	18.77	134.564		
3,800.0	3,800.0	3,828.1	3,826.3	5.8	13.4	-179.99	8,101.1	-42,307.0	2,523.6	2,504.4	19.21	131.378		
3,900.0	3,900.0	3,904.9	3,903.0	5.9	13.7	-179.92	8,102.0	-42,304.0	2,522.5	2,502.9	19.58	128.796		
4,000.0	4,000.0	4,000.0	3,998.0	6.0	14.0	-179.83	8,102.1	-42,299.8	2,522.3	2,502.3	20.03	125.957		
4,011.8	4,011.8	4,000.0	3,998.0	6.0	14.0	-179.83	8,102.1	-42,299.8	2,522.3	2,502.3	20.04	125.871		
4,100.0	4,100.0	4,069.3	4,067.3	6.1	14.3	-179.75	8,101.7	-42,296.4	2,522.8	2,502.4	20.38	123.788		
4,200.0	4,200.0	4,160.5	4,158.3	6.2	14.6	-179.63	8,100.9	-42,291.4	2,523.7	2,502.9	20.81	121.266		
4,300.0	4,300.0	4,249.8	4,247.4	6.3	14.9	-179.51	8,099.7	-42,286.1	2,525.0	2,503.8	21.24	118.901		
4,400.0	4,400.0	4,337.8	4,335.3	6.5	15.2	-179.41	8,098.2	-42,281.7	2,526.8	2,505.2	21.66	116.674		
4,500.0	4,500.0	4,430.7	4,428.1	6.6	15.5	-179.33	8,096.2	-42,278.0	2,529.0	2,507.0	22.09	114.465		
4,600.0	4,600.0	4,535.7	4,533.0	6.7	15.9	-179.26	8,093.9	-42,274.8	2,531.2	2,508.7	22.57	112.146		
4,700.0	4,700.0	4,641.9	4,639.2	6.8	16.2	-179.21	8,091.8	-42,272.4	2,533.2	2,510.2	23.05	109.892		
4,800.0	4,800.0	4,750.0	4,747.3	6.9	16.6	-179.16	8,090.0	-42,270.4	2,534.9	2,511.4	23.54	107.685		
4,900.0	4,900.0	4,855.2	4,852.4	7.0	17.0	-179.13	8,088.6	-42,268.9	2,536.3	2,512.3	24.02	105.598		
5,000.0	5,000.0	4,957.7	4,954.9	7.2	17.3	-179.10	8,087.3	-42,267.4	2,537.6	2,513.1	24.49	103.622		

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 - BOMBAY FED COM #1H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 200-GYRO-NS, 7857-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Tooface (")	Distance		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	5,058.6	5,055.8	7.3	17.7	179.06	8,086.1	-42,265.9	2,538.8	2,513.9	24.95	101.737		
5,200.0	5,200.0	5,158.4	5,155.6	7.4	18.0	179.03	8,084.9	-42,264.3	2,540.0	2,514.6	25.42	99.934		
5,300.0	5,300.0	5,253.6	5,250.7	7.5	18.3	178.99	8,083.7	-42,262.9	2,541.3	2,515.4	25.86	98.254		
5,400.0	5,400.0	5,345.4	5,342.5	7.6	18.7	178.96	8,082.3	-42,261.3	2,542.8	2,516.5	26.30	96.682		
5,500.0	5,500.0	5,445.0	5,442.1	7.8	19.0	178.92	8,080.6	-42,259.4	2,544.7	2,517.9	26.76	95.074		
5,600.0	5,600.0	5,556.0	5,553.1	7.9	19.4	178.87	8,078.9	-42,257.5	2,546.2	2,518.9	27.27	93.374		
5,700.0	5,700.0	5,654.5	5,651.6	8.0	19.7	178.84	8,077.7	-42,256.0	2,547.4	2,519.7	27.73	91.865		
5,800.0	5,800.0	5,744.8	5,741.8	8.1	20.0	178.81	8,076.4	-42,254.6	2,549.0	2,520.8	28.16	90.507		
5,900.0	5,900.0	5,839.2	5,836.3	8.3	50.6	-116.57	10,566.3	-42,423.6	2,509.5	2,450.6	58.90	42.605		
6,000.0	6,000.0	5,932.3	5,929.4	8.4	50.6	-116.57	10,566.3	-42,423.6	2,409.6	2,350.6	59.02	40.824		
6,100.0	6,100.0	6,025.4	6,022.5	8.5	50.6	-116.57	10,566.3	-42,423.6	2,309.7	2,250.6	59.15	39.051		
6,200.0	6,200.0	6,118.5	6,115.6	8.6	50.6	-116.57	10,566.3	-42,423.6	2,209.9	2,150.6	59.27	37.285		
6,300.0	6,300.0	6,211.6	6,208.7	8.8	50.6	-116.57	10,566.3	-42,423.6	2,110.1	2,050.7	59.39	35.527		
6,400.0	6,400.0	6,304.7	6,301.8	8.9	50.6	-116.57	10,566.3	-42,423.6	2,010.3	1,950.8	59.52	33.776		
6,500.0	6,500.0	6,397.8	6,394.9	9.0	50.6	-116.57	10,566.3	-42,423.6	1,910.5	1,850.9	59.64	32.033		
6,600.0	6,600.0	6,490.9	6,488.0	9.1	50.6	-116.57	10,566.3	-42,423.6	1,810.8	1,751.0	59.77	30.297		
6,700.0	6,700.0	6,584.0	6,581.1	9.3	50.6	-116.57	10,566.3	-42,423.6	1,711.0	1,651.1	59.89	28.569		
6,800.0	6,800.0	6,677.1	6,674.2	9.4	50.6	-116.57	10,566.3	-42,423.6	1,611.3	1,551.3	60.02	26.848		
6,900.0	6,900.0	6,770.2	6,767.3	9.5	50.7	-116.25	10,567.1	-42,423.7	1,511.7	1,451.5	60.15	25.131		
7,000.0	7,000.0	6,863.3	6,860.4	9.6	50.7	-114.30	10,571.8	-42,423.9	1,412.1	1,351.7	60.35	23.400		
7,100.0	7,100.0	6,956.4	6,953.5	9.8	50.8	-112.41	10,576.3	-42,424.1	1,312.5	1,252.0	60.53	21.682		
7,200.0	7,200.0	7,049.5	7,046.6	9.9	50.8	-110.56	10,580.6	-42,424.2	1,213.0	1,152.3	60.72	19.977		
7,300.0	7,300.0	7,142.6	7,139.7	10.0	50.9	-108.76	10,584.7	-42,424.4	1,113.6	1,052.7	60.90	18.284		
7,400.0	7,400.0	7,235.7	7,232.8	10.1	51.0	-107.01	10,588.6	-42,424.6	1,014.2	953.2	61.09	16.604		
7,500.0	7,500.0	7,328.8	7,325.9	10.3	51.0	-105.32	10,592.3	-42,424.7	915.0	853.8	61.26	14.936		
7,600.0	7,600.0	7,421.9	7,419.0	10.4	51.1	-103.68	10,595.8	-42,424.9	816.0	754.6	61.44	13.282		
7,700.0	7,700.0	7,515.0	7,512.1	10.5	51.1	-102.09	10,599.2	-42,425.0	717.3	655.7	61.62	11.641		
7,800.0	7,800.0	7,608.1	7,605.2	10.6	51.2	-100.55	10,602.5	-42,425.1	618.9	557.1	61.79	10.017		
7,900.0	7,900.0	7,701.2	7,698.3	10.8	51.2	-99.06	10,605.6	-42,425.3	521.2	459.2	61.96	8.411		
8,000.0	8,000.0	7,794.3	7,791.4	10.9	51.2	-97.63	10,608.6	-42,425.4	424.4	362.3	62.13	6.831		
8,100.0	8,100.0	7,887.4	7,884.5	11.0	51.3	-96.24	10,611.5	-42,425.5	329.6	267.3	62.30	5.291		
8,200.0	8,200.0	7,980.5	7,977.6	11.1	51.3	-94.91	10,614.3	-42,425.6	239.0	176.6	62.46	3.827		
8,300.0	8,300.0	8,073.6	8,070.7	11.3	51.4	-93.62	10,616.9	-42,425.7	160.0	97.4	62.63	2.555		
8,400.0	8,400.0	8,166.7	8,163.8	11.4	51.4	-92.38	10,619.5	-42,425.8	118.7	55.9	62.79	1.890 Advise and Monitor		
8,407.7	8,407.7	8,166.7	8,163.8	11.4	51.4	-92.29	10,619.7	-42,425.8	118.4	55.6	62.80	1.886 Advise and Monitor, CC, ES, SF		
8,500.0	8,500.0	8,259.8	8,256.9	11.5	51.4	-91.19	10,622.0	-42,425.9	150.1	87.2	62.95	2.385		
8,600.0	8,600.0	8,352.9	8,350.0	11.6	51.5	-90.03	10,624.3	-42,426.0	225.8	162.7	63.12	3.578		
8,700.0	8,700.0	8,446.0	8,443.1	11.8	51.5	-88.93	10,626.6	-42,426.1	315.3	252.0	63.28	4.983		
8,800.0	8,800.0	8,539.1	8,536.2	11.9	51.5	-87.86	10,628.8	-42,426.2	409.7	346.2	63.43	6.458		
8,900.0	8,900.0	8,632.2	8,629.3	12.0	51.6	-86.83	10,631.0	-42,426.3	506.2	442.6	63.59	7.960		
9,000.0	9,000.0	8,725.3	8,722.4	12.2	51.6	-85.84	10,633.0	-42,426.4	603.9	540.1	63.75	9.472		
9,100.0	9,100.0	8,818.4	8,815.5	12.3	51.6	-84.88	10,635.0	-42,426.4	702.2	638.3	63.91	10.988		
9,200.0	9,200.0	8,911.5	8,908.6	12.4	51.6	-83.97	10,637.0	-42,426.5	800.9	736.8	64.06	12.502		
9,300.0	9,300.0	9,004.6	8,999.7	12.5	51.7	-83.08	10,638.9	-42,426.6	899.9	835.7	64.22	14.014		
9,400.0	9,400.0	9,097.7	9,092.8	12.7	51.7	-82.23	10,640.7	-42,426.7	999.1	934.7	64.37	15.521		
9,500.0	9,500.0	9,190.8	9,185.9	12.8	51.7	-81.40	10,642.4	-42,426.7	1,098.4	1,033.9	64.52	17.024		
9,600.0	9,600.0	9,283.9	9,279.0	12.9	51.7	-80.61	10,644.1	-42,426.8	1,197.9	1,133.2	64.68	18.521		
9,700.0	9,700.0	9,377.0	9,372.1	13.1	51.8	-79.84	10,645.8	-42,426.9	1,297.4	1,232.6	64.83	20.013		
9,800.0	9,800.0	9,470.1	9,465.2	13.2	51.8	-79.10	10,647.4	-42,426.9	1,397.0	1,332.0	64.98	21.499		
9,900.0	9,900.0	9,563.2	9,558.3	13.3	51.8	-78.39	10,648.9	-42,427.0	1,496.6	1,431.5	65.13	22.979		
10,000.0	10,000.0	9,656.3	9,651.4	13.4	52.0	-73.37	10,660.2	-42,427.4	1,596.4	1,530.9	65.42	24.402		
10,100.0	10,100.0	9,749.4	9,744.5	13.6	52.0	-73.37	10,660.2	-42,427.4	1,696.1	1,630.5	65.55	25.876		

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 - BOMBAY FED COM #1H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 200-GYRO-NS, 7857-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,200.0	10,200.0	10,775.0	8,394.8	13.6	52.0	-73.37	10,660.2	-42,427.4	1,795.8	1,730.2	65.61	27.370	
10,262.5	10,262.5	10,775.0	8,394.8	13.6	52.0	-73.37	10,660.2	-42,427.4	1,858.2	1,792.5	65.62	28.318	
10,275.0	10,275.0	10,775.0	8,394.8	13.6	52.0	-54.03	10,660.2	-42,427.4	1,870.6	1,805.0	65.62	28.508	
10,300.0	10,300.0	10,775.0	8,394.8	13.6	52.0	-32.85	10,660.2	-42,427.4	1,895.5	1,829.9	65.62	28.885	
10,325.0	10,324.8	10,775.0	8,394.8	13.7	52.0	-22.81	10,660.2	-42,427.4	1,920.3	1,854.6	65.63	29.259	
10,350.0	10,349.5	10,775.0	8,394.8	13.7	52.0	-17.29	10,660.2	-42,427.4	1,944.8	1,879.2	65.64	29.631	
10,375.0	10,374.0	10,775.0	8,394.8	13.7	52.0	-13.88	10,660.2	-42,427.4	1,969.2	1,903.5	65.65	29.997	
10,400.0	10,398.1	10,775.0	8,394.8	13.7	52.0	-11.57	10,660.2	-42,427.4	1,993.2	1,927.6	65.66	30.359	
10,425.0	10,421.9	10,775.0	8,394.8	13.7	52.0	-9.92	10,660.2	-42,427.4	2,016.9	1,951.2	65.67	30.713	
10,450.0	10,445.2	10,775.0	8,394.8	13.7	52.0	-8.69	10,660.2	-42,427.4	2,040.2	1,974.5	65.68	31.061	
10,475.0	10,468.1	10,800.1	8,395.1	13.7	52.3	-7.57	10,685.3	-42,428.4	2,062.7	1,996.7	66.06	31.226	
10,500.0	10,490.3	10,806.9	8,395.1	13.7	52.4	-6.81	10,692.1	-42,428.6	2,084.9	2,018.7	66.17	31.507	
10,525.0	10,512.0	10,814.4	8,395.2	13.8	52.5	-6.20	10,699.6	-42,428.9	2,106.4	2,040.1	66.30	31.772	
10,550.0	10,532.9	10,822.5	8,395.2	13.8	52.7	-5.70	10,707.7	-42,429.2	2,127.3	2,060.9	66.43	32.022	
10,575.0	10,553.2	10,831.1	8,395.2	13.8	52.8	-5.28	10,716.3	-42,429.5	2,147.5	2,081.0	66.58	32.256	
10,600.0	10,572.6	10,840.3	8,395.2	13.8	52.9	-4.93	10,725.5	-42,429.8	2,167.0	2,100.3	66.73	32.473	
10,625.0	10,591.2	10,850.0	8,395.1	13.8	53.1	-4.64	10,735.2	-42,430.2	2,185.7	2,118.8	66.89	32.674	
10,650.0	10,608.8	10,870.0	8,394.9	13.9	53.3	-4.37	10,755.1	-42,430.9	2,203.5	2,136.3	67.20	32.789	
10,675.0	10,625.6	10,870.0	8,394.9	13.9	53.3	-4.16	10,755.1	-42,430.9	2,220.4	2,153.2	67.23	33.029	
10,700.0	10,641.3	10,887.2	8,394.7	13.9	53.6	-3.97	10,772.3	-42,431.5	2,236.4	2,168.9	67.50	33.133	
10,725.0	10,656.0	10,903.8	8,394.4	13.9	53.8	-3.80	10,788.9	-42,432.1	2,251.5	2,183.7	67.76	33.226	
10,750.0	10,669.6	10,921.0	8,394.1	14.0	54.1	-3.66	10,806.1	-42,432.6	2,265.4	2,197.4	68.03	33.298	
10,775.0	10,682.1	10,938.8	8,393.7	14.0	54.3	-3.54	10,823.9	-42,433.2	2,278.4	2,210.0	68.31	33.351	
10,800.0	10,693.5	10,965.0	8,393.2	14.0	54.7	-3.43	10,850.1	-42,434.0	2,290.2	2,221.5	68.72	33.329	
10,825.0	10,703.6	10,977.2	8,392.9	14.0	54.9	-3.34	10,862.3	-42,434.4	2,300.9	2,232.0	68.91	33.388	
10,850.0	10,712.6	10,998.8	8,392.4	14.0	55.2	-3.27	10,883.9	-42,435.0	2,310.4	2,241.1	69.25	33.361	
10,875.0	10,720.3	11,020.9	8,391.9	14.1	55.5	-3.20	10,905.9	-42,435.6	2,318.7	2,249.0	69.64	33.295	
10,900.0	10,726.8	11,043.3	8,391.3	14.1	55.9	-3.15	10,928.3	-42,436.1	2,325.7	2,255.7	70.04	33.208	
10,925.0	10,732.0	11,069.5	8,390.6	14.1	56.2	-3.10	10,954.5	-42,436.6	2,331.6	2,261.1	70.49	33.078	
10,950.0	10,735.9	11,105.7	8,389.8	14.1	56.8	-3.06	10,990.7	-42,437.2	2,336.0	2,264.9	71.09	32.861	
10,975.0	10,738.5	11,142.2	8,389.1	14.1	57.3	-3.03	11,027.2	-42,437.5	2,339.1	2,267.4	71.69	32.626	
11,000.0	10,739.8	11,155.0	8,389.0	14.1	57.5	-3.01	11,040.0	-42,437.5	2,340.8	2,268.8	71.95	32.531	
11,012.6	10,740.0	11,176.4	8,388.6	14.1	57.8	-3.00	11,061.4	-42,437.5	2,341.1	2,268.8	72.30	32.380	
11,022.0	10,740.0	11,183.4	8,388.5	14.1	57.9	-2.99	11,068.4	-42,437.5	2,341.2	2,268.8	72.42	32.328	
11,100.0	10,739.7	11,251.0	8,386.9	14.1	58.9	-2.94	11,136.0	-42,436.4	2,342.7	2,269.2	73.54	31.856	
11,200.0	10,739.4	11,379.5	8,383.8	14.2	60.7	-2.78	11,264.3	-42,432.2	2,344.7	2,269.1	75.61	31.010	
11,300.0	10,739.1	11,524.5	8,384.0	14.9	62.8	-2.52	11,409.1	-42,424.4	2,343.6	2,265.6	77.96	30.061	
11,400.0	10,738.7	11,631.0	8,385.1	16.3	64.4	-2.42	11,515.6	-42,421.9	2,342.1	2,261.4	80.71	29.020	
11,500.0	10,738.4	11,726.0	8,386.1	17.8	65.8	-2.37	11,610.6	-42,421.6	2,340.6	2,257.0	83.61	27.996	
11,600.0	10,738.1	11,821.0	8,387.1	19.3	67.3	-2.37	11,705.6	-42,422.8	2,339.2	2,252.7	86.55	27.026	
11,700.0	10,737.7	11,898.9	8,387.6	20.8	68.5	-2.37	11,783.5	-42,424.3	2,338.4	2,249.1	89.28	26.192	
11,720.2	10,737.7	11,916.0	8,387.5	21.1	68.7	-2.37	11,800.5	-42,424.6	2,338.4	2,248.5	89.85	26.025	
11,800.0	10,737.4	11,987.1	8,387.1	22.4	69.8	-2.37	11,871.6	-42,425.9	2,338.6	2,246.4	92.18	25.369	
11,900.0	10,737.1	12,099.7	8,386.5	23.9	71.5	-2.37	11,984.2	-42,427.7	2,338.7	2,243.3	95.48	24.495	
11,960.5	10,736.9	12,155.8	8,386.4	24.9	72.4	-2.33	12,040.3	-42,427.3	2,338.7	2,241.4	97.29	24.038	
12,000.0	10,736.8	12,191.3	8,386.2	25.5	72.9	-2.31	12,075.8	-42,426.8	2,338.7	2,240.2	98.46	23.753	
12,100.0	10,736.4	12,293.2	8,385.5	27.1	74.5	-2.22	12,177.7	-42,425.1	2,338.9	2,237.2	101.61	23.018	
12,200.0	10,736.1	12,403.4	8,385.2	28.7	76.2	-2.13	12,287.9	-42,423.3	2,338.7	2,233.8	104.90	22.295	
12,300.0	10,735.8	12,512.2	8,385.3	30.3	77.9	-2.03	12,396.7	-42,421.1	2,338.2	2,230.0	108.18	21.614	
12,400.0	10,735.4	12,616.5	8,385.7	31.9	79.5	-1.97	12,500.9	-42,420.6	2,337.3	2,225.9	111.41	20.979	
12,480.5	10,735.2	12,676.0	8,386.0	33.2	80.4	-1.96	12,560.4	-42,421.2	2,336.7	2,223.1	113.64	20.562	
12,500.0	10,735.1	12,676.0	8,386.0	33.6	80.4	-1.96	12,560.4	-42,421.2	2,336.8	2,222.8	113.96	20.505	

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 COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 - BOMBAY FED COM #1H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 200-GYRO-NS, 7857-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
12,600.0	10,734.8	12,754.8	8,385.4	35.2	81.6	-1.96	12,639.2	-42,422.4	2,337.4	2,220.6	116.82	20.008		
12,700.0	10,734.4	12,811.7	8,383.7	36.8	82.5	-1.96	12,696.1	-42,423.3	2,340.1	2,220.7	119.35	19.607		
12,800.0	10,734.1	12,837.0	8,382.6	38.4	82.9	-1.96	12,721.4	-42,423.7	2,345.0	2,223.6	121.38	19.320		
12,900.0	10,733.8	12,837.0	8,382.6	40.1	82.9	-1.96	12,721.4	-42,423.7	2,353.8	2,230.8	123.01	19.135		
13,000.0	10,733.5	12,837.0	8,382.6	41.7	82.9	-1.96	12,721.4	-42,423.7	2,366.9	2,242.3	124.65	18.988		
13,100.0	10,733.1	12,837.0	8,382.6	43.4	82.9	-1.96	12,721.4	-42,423.7	2,384.1	2,257.8	126.29	18.878		
13,200.0	10,732.8	12,837.0	8,382.6	45.0	82.9	-1.96	12,721.4	-42,423.7	2,405.3	2,277.4	127.93	18.802		
13,300.0	10,732.5	12,837.0	8,382.6	46.6	82.9	-1.96	12,721.4	-42,423.7	2,430.5	2,300.9	129.58	18.757		
13,400.0	10,732.1	12,837.0	8,382.6	48.3	82.9	-1.96	12,721.4	-42,423.7	2,459.5	2,328.3	131.22	18.743		
13,500.0	10,731.8	12,837.0	8,382.6	49.9	82.9	-1.96	12,721.4	-42,423.7	2,492.2	2,359.3	132.87	18.756		
13,600.0	10,731.5	12,837.0	8,382.6	51.6	82.9	-1.96	12,721.4	-42,423.7	2,528.3	2,393.8	134.52	18.795		
13,700.0	10,731.1	12,837.0	8,382.6	53.2	82.9	-1.96	12,721.4	-42,423.7	2,567.9	2,431.8	136.17	18.858		
13,800.0	10,730.8	12,837.0	8,382.6	54.9	82.9	-1.96	12,721.4	-42,423.7	2,610.7	2,472.9	137.82	18.942		
13,900.0	10,730.5	12,837.0	8,382.6	56.5	82.9	-1.96	12,721.4	-42,423.7	2,656.6	2,517.1	139.48	19.047		
14,000.0	10,730.1	12,837.0	8,382.6	58.2	82.9	-1.96	12,721.4	-42,423.7	2,705.4	2,564.3	141.13	19.170		
14,100.0	10,729.8	12,837.0	8,382.6	59.8	82.9	-1.96	12,721.4	-42,423.7	2,757.0	2,614.2	142.79	19.309		
14,200.0	10,729.5	12,837.0	8,382.6	61.5	82.9	-1.96	12,721.4	-42,423.7	2,811.2	2,666.7	144.44	19.462		
14,300.0	10,729.2	12,837.0	8,382.6	63.2	82.9	-1.96	12,721.4	-42,423.7	2,867.8	2,721.7	146.10	19.629		
14,400.0	10,728.8	12,837.0	8,382.6	64.8	82.9	-1.96	12,721.4	-42,423.7	2,926.8	2,779.0	147.76	19.808		
14,500.0	10,728.5	12,837.0	8,382.6	66.5	82.9	-1.96	12,721.4	-42,423.7	2,988.0	2,838.5	149.41	19.998		
14,600.0	10,728.2	12,837.0	8,382.6	68.1	82.9	-1.96	12,721.4	-42,423.7	3,051.2	2,900.1	151.07	20.197		
14,700.0	10,727.8	12,837.0	8,382.6	69.8	82.9	-1.96	12,721.4	-42,423.7	3,116.3	2,963.6	152.73	20.404		
14,800.0	10,727.5	12,837.0	8,382.6	71.4	82.9	-1.96	12,721.4	-42,423.7	3,183.2	3,028.9	154.39	20.618		
14,900.0	10,727.2	12,837.0	8,382.6	73.1	82.9	-1.96	12,721.4	-42,423.7	3,251.9	3,095.8	156.05	20.839		
15,000.0	10,726.8	12,837.0	8,382.6	74.8	82.9	-1.96	12,721.4	-42,423.7	3,322.1	3,164.4	157.71	21.065		
15,100.0	10,726.5	12,837.0	8,382.6	76.4	82.9	-1.96	12,721.4	-42,423.7	3,393.8	3,234.5	159.37	21.295		
15,200.0	10,726.2	12,837.0	8,382.6	78.1	82.9	-1.96	12,721.4	-42,423.7	3,467.0	3,305.9	161.03	21.530		
15,300.0	10,725.9	12,837.0	8,382.6	79.8	82.9	-1.96	12,721.4	-42,423.7	3,541.4	3,378.7	162.69	21.767		
15,400.0	10,725.5	12,837.0	8,382.6	81.4	82.9	-1.96	12,721.4	-42,423.7	3,617.1	3,452.7	164.36	22.008		
15,500.0	10,725.2	12,837.0	8,382.6	83.1	82.9	-1.96	12,721.4	-42,423.7	3,693.9	3,527.9	166.02	22.250		
15,558.0	10,725.0	12,837.0	8,382.6	84.0	82.9	-1.96	12,721.4	-42,423.7	3,739.0	3,572.0	166.98	22.391		

COG PRODUCTION LLC

Anticollision Report

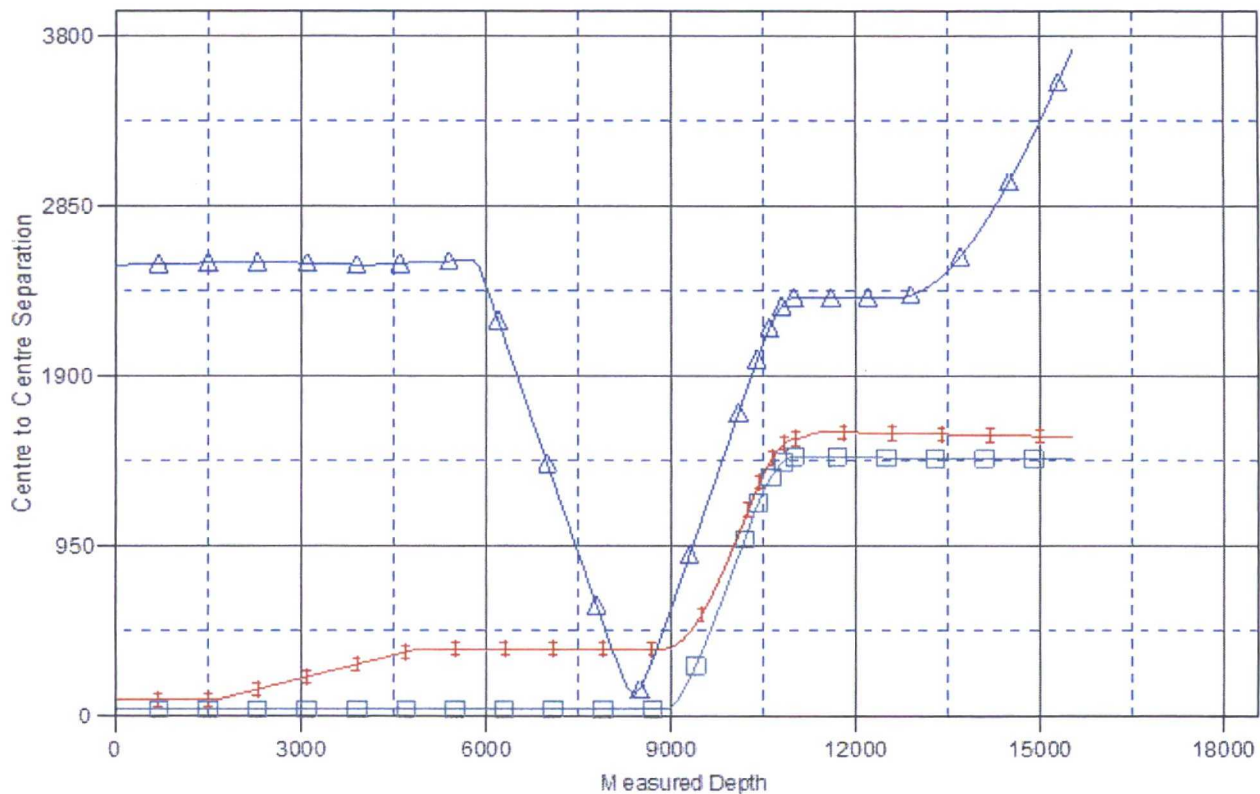
Company: COG PRODUCTION LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 RKB=3508.8+26 @ 3534.8usft (MCVA
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: AVALON SHALE
 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 COM #1H,OWB,ACTUAL WELL PATH V0 AZORES FEDERAL COM #10H,OWB,PWP0 V0 AZORES FEDERAL COM #5H,OWB,PWP0 V0

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

COG PRODUCTION LLC

Anticollision Report

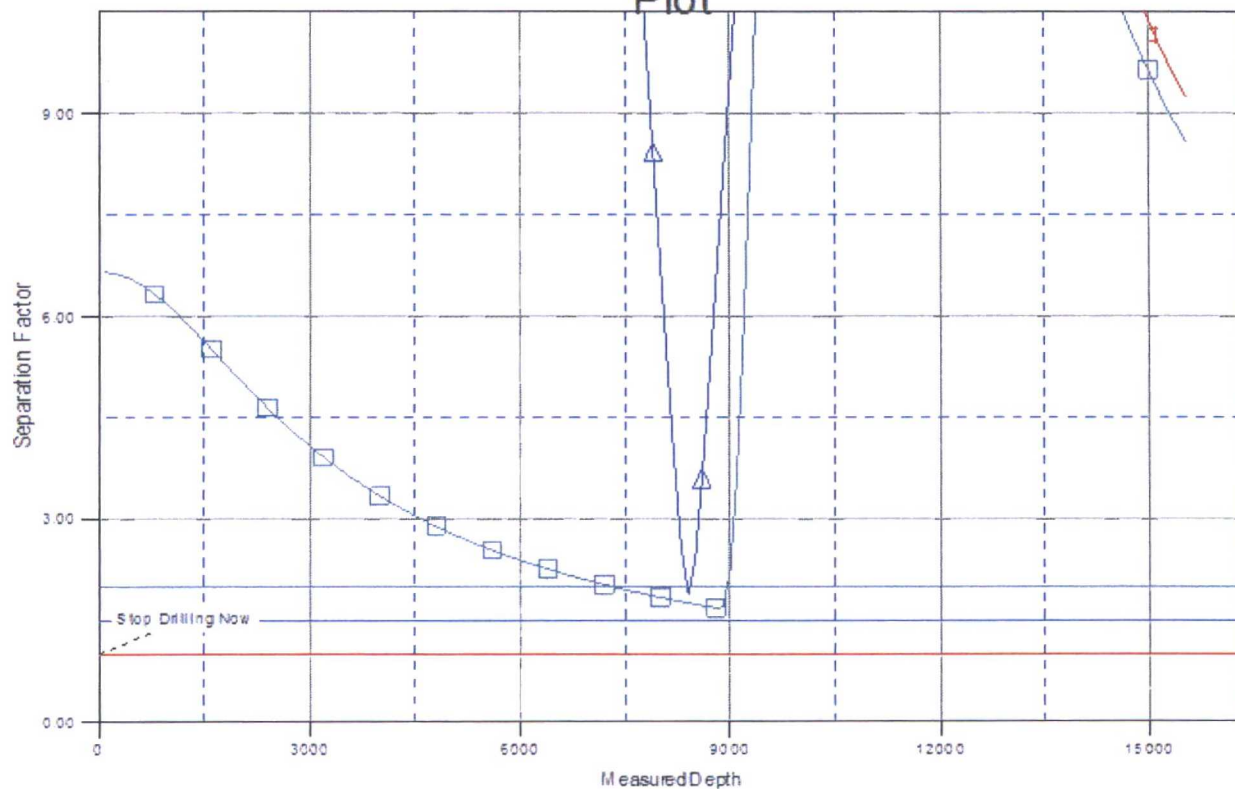
Company: COG PRODUCTION LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL COM #1H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 MD Reference: RKB=3508.8+26 @ 3534.8usft (MCVAY 8)
 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 RKB=3508.8+26 @ 3534.8usft (MCVA
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: AVALON SHALE
 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 COM #1H, OWB, ACTUAL WELLPATH V0



AZORES FEDERAL COM #10H, OWB, PWP0 V0



AZORES FEDERAL COM #5H, OWB, PWP0 V0