

COG PRODUCTION LLC

LEA COUNTY, NM

AVALON SHALE

AZORES FEDERAL COM #10H

OWB

PWP0

Anticollision Report

12 September, 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 COM #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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	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	9/12/2016	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	8,800.0	PWP0 (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
8,800.0	14,164.0	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 #5H - OWB - PWP0	1,500.0	1,500.0	50.1	43.0	7.060 CC, ES	
AZORES FEDERAL COM #5H - OWB - PWP0	14,164.5	14,100.3	659.9	491.4	3.917 SF	
BOMBAY FED COM #1H - OWB - ACTUAL WELLPATH	8,419.9	10,748.2	254.6	193.6	4.172 CC, ES, SF	

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			
0.0	0.0	0.0	0.0	3.0	3.0	89.43	0.5	50.1	50.1						
100.0	100.0	100.0	100.0	3.0	3.0	89.43	0.5	50.1	50.1	44.1	6.00	8.349			
200.0	200.0	200.0	200.0	3.0	3.0	89.43	0.5	50.1	50.1	44.1	6.01	8.335			
300.0	300.0	300.0	300.0	3.0	3.0	89.43	0.5	50.1	50.1	44.1	6.03	8.305			
400.0	400.0	400.0	400.0	3.0	3.0	89.43	0.5	50.1	50.1	44.0	6.07	8.260			
500.0	500.0	500.0	500.0	3.1	3.1	89.43	0.5	50.1	50.1	44.0	6.11	8.201			
600.0	600.0	600.0	600.0	3.1	3.1	89.43	0.5	50.1	50.1	43.9	6.16	8.127			
700.0	700.0	700.0	700.0	3.1	3.1	89.43	0.5	50.1	50.1	43.9	6.23	8.041			
800.0	800.0	800.0	800.0	3.2	3.2	89.43	0.5	50.1	50.1	43.8	6.31	7.944			
900.0	900.0	900.0	900.0	3.2	3.2	89.43	0.5	50.1	50.1	43.7	6.39	7.837			
1,000.0	1,000.0	1,000.0	1,000.0	3.2	3.2	89.43	0.5	50.1	50.1	43.6	6.49	7.721			
1,100.0	1,100.0	1,100.0	1,100.0	3.3	3.3	89.43	0.5	50.1	50.1	43.5	6.59	7.599			
1,200.0	1,200.0	1,200.0	1,200.0	3.4	3.4	89.43	0.5	50.1	50.1	43.4	6.71	7.470			
1,300.0	1,300.0	1,300.0	1,300.0	3.4	3.4	89.43	0.5	50.1	50.1	43.3	6.83	7.336			
1,400.0	1,400.0	1,400.0	1,400.0	3.5	3.5	89.43	0.5	50.1	50.1	43.1	6.96	7.200			
1,500.0	1,500.0	1,500.0	1,500.0	3.5	3.5	89.43	0.5	50.1	50.1	43.0	7.10	7.060 CC, ES			
1,600.0	1,600.0	1,600.0	1,600.0	3.6	3.6	179.45	0.5	50.1	51.8	44.6	7.21	7.186			
1,700.0	1,699.8	1,699.8	1,699.8	3.6	3.7	179.50	0.5	50.1	57.1	49.8	7.31	7.803			
1,750.0	1,749.7	1,749.7	1,749.7	3.6	3.7	179.53	0.5	50.1	61.0	53.6	7.37	8.280			
1,800.0	1,799.5	1,799.5	1,799.5	3.6	3.8	179.56	0.5	50.1	65.4	57.9	7.42	8.806			
1,900.0	1,899.1	1,899.1	1,899.1	3.7	3.9	179.61	0.5	50.1	74.1	66.5	7.54	9.828			
2,000.0	1,998.7	1,998.7	1,998.7	3.7	3.9	179.65	0.5	50.1	82.8	75.1	7.66	10.810			
2,100.0	2,098.4	2,098.4	2,098.4	3.8	4.0	179.69	0.5	50.1	91.5	83.7	7.79	11.750			

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 #10H
 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:

Well AZORES FEDERAL COM #10H
 RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 Grid
 Minimum Curvature
 2.00 sigma
 EDM_Users
 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	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Semi Major Axis	Highside	Offset Wellbore Centre	Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning	
Measured Depth (usft)	Depth (usft)	Depth (usft)	Depth (usft)	(usft)	(usft)	Toolface (°)		+N/-S (usft)	+E/-W (usft)	(usft)	(usft)	(usft)		
2,200.0	2,198.0	2,198.0	2,198.0	3.8	4.1	179.71		0.5	50.1	100.2	92.3	7.92	12.650	
2,300.0	2,297.6	2,297.6	2,297.6	3.9	4.2	179.74		0.5	50.1	108.9	100.9	8.06	13.509	
2,400.0	2,397.2	2,397.2	2,397.2	3.9	4.3	179.76		0.5	50.1	117.7	109.4	8.21	14.328	
2,500.0	2,496.8	2,496.8	2,496.8	4.0	4.4	179.77		0.5	50.1	126.4	118.0	8.36	15.109	
2,600.0	2,596.4	2,596.4	2,596.4	4.0	4.5	179.79		0.5	50.1	135.1	126.6	8.52	15.851	
2,700.0	2,696.1	2,696.1	2,696.1	4.1	4.6	179.80		0.5	50.1	143.8	135.1	8.69	16.557	
2,800.0	2,795.7	2,795.7	2,795.7	4.2	4.7	179.81		0.5	50.1	152.5	143.7	8.85	17.228	
2,900.0	2,895.3	2,895.3	2,895.3	4.2	4.8	179.82		0.5	50.1	161.2	152.2	9.02	17.865	
3,000.0	2,994.9	2,994.9	2,994.9	4.3	4.9	179.83		0.5	50.1	169.9	160.7	9.20	18.471	
3,100.0	3,094.5	3,094.5	3,094.5	4.4	5.0	179.84		0.5	50.1	178.7	169.3	9.38	19.045	
3,200.0	3,194.2	3,194.2	3,194.2	4.5	5.1	179.85		0.5	50.1	187.4	177.8	9.56	19.590	
3,300.0	3,293.8	3,293.8	3,293.8	4.5	5.2	179.85		0.5	50.1	196.1	186.3	9.75	20.107	
3,400.0	3,393.4	3,393.4	3,393.4	4.6	5.3	179.86		0.5	50.1	204.8	194.9	9.94	20.598	
3,500.0	3,493.0	3,493.0	3,493.0	4.7	5.4	179.87		0.5	50.1	213.5	203.4	10.14	21.064	
3,600.0	3,592.6	3,592.6	3,592.6	4.8	5.5	179.87		0.5	50.1	222.2	211.9	10.33	21.507	
3,700.0	3,692.3	3,692.3	3,692.3	4.9	5.6	179.88		0.5	50.1	231.0	220.4	10.53	21.927	
3,800.0	3,791.9	3,791.9	3,791.9	5.0	5.8	179.88		0.5	50.1	239.7	228.9	10.74	22.326	
3,900.0	3,891.5	3,891.5	3,891.5	5.1	5.9	179.88		0.5	50.1	248.4	237.4	10.94	22.705	
4,000.0	3,991.1	3,991.1	3,991.1	5.2	6.0	179.89		0.5	50.1	257.1	246.0	11.15	23.066	
4,100.0	4,090.7	4,090.7	4,090.7	5.3	6.1	179.89		0.5	50.1	265.8	254.5	11.36	23.408	
4,200.0	4,190.4	4,190.4	4,190.4	5.4	6.2	179.90		0.5	50.1	274.5	263.0	11.57	23.734	
4,300.0	4,290.0	4,290.0	4,290.0	5.5	6.3	179.90		0.5	50.1	283.2	271.5	11.78	24.044	
4,400.0	4,389.6	4,389.6	4,389.6	5.6	6.4	179.90		0.5	50.1	292.0	280.0	12.00	24.340	
4,500.0	4,489.2	4,489.2	4,489.2	5.7	6.6	179.90		0.5	50.1	300.7	288.5	12.21	24.621	
4,600.0	4,588.8	4,588.8	4,588.8	5.8	6.7	179.91		0.5	50.1	309.4	297.0	12.43	24.889	
4,700.0	4,688.5	4,688.5	4,688.5	5.9	6.8	179.91		0.5	50.1	318.1	305.5	12.65	25.145	
4,750.0	4,738.3	4,738.3	4,738.3	5.9	6.9	179.91		0.5	50.1	322.5	309.7	12.76	25.268	
4,800.0	4,788.1	4,788.1	4,788.1	6.0	6.9	179.91		0.5	50.1	326.4	313.5	12.88	25.351	
4,900.0	4,888.0	4,888.0	4,888.0	6.1	7.0	179.91		0.5	50.1	331.6	318.5	13.10	25.319	
5,000.0	4,987.9	4,987.9	4,987.9	6.1	7.2	89.91		0.5	50.1	333.4	320.1	13.30	25.063	
5,100.0	5,087.9	5,087.9	5,087.9	6.2	7.3	89.91		0.5	50.1	333.4	319.9	13.50	24.700	
5,200.0	5,187.9	5,187.9	5,187.9	6.3	7.4	89.91		0.5	50.1	333.4	319.7	13.69	24.343	
5,300.0	5,287.9	5,287.9	5,287.9	6.4	7.5	89.91		0.5	50.1	333.4	319.5	13.89	23.993	
5,400.0	5,387.9	5,387.9	5,387.9	6.5	7.6	89.91		0.5	50.1	333.4	319.3	14.10	23.649	
5,500.0	5,487.9	5,487.9	5,487.9	6.5	7.8	89.91		0.5	50.1	333.4	319.1	14.30	23.312	
5,600.0	5,587.9	5,587.9	5,587.9	6.6	7.9	89.91		0.5	50.1	333.4	318.9	14.51	22.982	
5,700.0	5,687.9	5,687.9	5,687.9	6.7	8.0	89.91		0.5	50.1	333.4	318.7	14.71	22.657	
5,800.0	5,787.9	5,787.9	5,787.9	6.8	8.1	89.91		0.5	50.1	333.4	318.4	14.92	22.340	
5,900.0	5,887.9	5,887.9	5,887.9	6.9	8.2	89.91		0.5	50.1	333.4	318.2	15.13	22.028	
6,000.0	5,987.9	5,987.9	5,987.9	7.0	8.4	89.91		0.5	50.1	333.4	318.0	15.35	21.723	
6,100.0	6,087.9	6,087.9	6,087.9	7.1	8.5	89.91		0.5	50.1	333.4	317.8	15.56	21.425	
6,200.0	6,187.9	6,187.9	6,187.9	7.2	8.6	89.91		0.5	50.1	333.4	317.6	15.78	21.132	
6,300.0	6,287.9	6,287.9	6,287.9	7.3	8.7	89.91		0.5	50.1	333.4	317.4	15.99	20.846	
6,400.0	6,387.9	6,387.9	6,387.9	7.3	8.9	89.91		0.5	50.1	333.4	317.2	16.21	20.565	
6,500.0	6,487.9	6,487.9	6,487.9	7.4	9.0	89.91		0.5	50.1	333.4	316.9	16.43	20.290	
6,600.0	6,587.9	6,587.9	6,587.9	7.5	9.1	89.91		0.5	50.1	333.4	316.7	16.65	20.022	
6,700.0	6,687.9	6,687.9	6,687.9	7.6	9.2	89.91		0.5	50.1	333.4	316.5	16.87	19.758	
6,800.0	6,787.9	6,787.9	6,787.9	7.7	9.4	89.91		0.5	50.1	333.4	316.3	17.10	19.501	
6,900.0	6,887.9	6,887.9	6,887.9	7.8	9.5	89.91		0.5	50.1	333.4	316.1	17.32	19.248	
7,000.0	6,987.9	6,987.9	6,987.9	7.9	9.6	89.91		0.5	50.1	333.4	315.8	17.54	19.001	
7,100.0	7,087.9	7,087.9	7,087.9	8.0	9.7	89.91		0.5	50.1	333.4	315.6	17.77	18.759	
7,200.0	7,187.9	7,187.9	7,187.9	8.1	9.9	89.91		0.5	50.1	333.4	315.4	18.00	18.523	

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 #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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		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	Warning
7,300.0	7,287.9	7,287.9	7,287.9	8.2	10.0	89.91	0.5	50.1	333.4	315.1	18.23	18.291	
7,400.0	7,387.9	7,387.9	7,387.9	8.3	10.1	89.91	0.5	50.1	333.4	314.9	18.46	18.064	
7,500.0	7,487.9	7,487.9	7,487.9	8.4	10.2	89.91	0.5	50.1	333.4	314.7	18.69	17.842	
7,600.0	7,587.9	7,587.9	7,587.9	8.6	10.4	89.91	0.5	50.1	333.4	314.5	18.92	17.624	
7,700.0	7,687.9	7,687.9	7,687.9	8.7	10.5	89.91	0.5	50.1	333.4	314.2	19.15	17.411	
7,800.0	7,787.9	7,787.9	7,787.9	8.8	10.6	89.91	0.5	50.1	333.4	314.0	19.38	17.202	
7,900.0	7,887.9	7,887.9	7,887.9	8.9	10.7	89.91	0.5	50.1	333.4	313.8	19.61	16.997	
8,000.0	7,987.9	7,987.9	7,987.9	9.0	10.9	89.91	0.5	50.1	333.4	313.5	19.85	16.797	
8,100.0	8,087.9	8,087.9	8,087.9	9.1	11.0	89.91	0.5	50.1	333.4	313.3	20.08	16.601	
8,200.0	8,187.9	8,187.9	8,187.9	9.2	11.1	89.91	0.5	50.1	333.4	313.1	20.32	16.409	
8,300.0	8,287.9	8,287.9	8,287.9	9.3	11.3	89.91	0.5	50.1	333.4	312.8	20.55	16.220	
8,400.0	8,387.9	8,387.9	8,387.9	9.4	11.4	89.91	0.5	50.1	333.4	312.6	20.79	16.036	
8,500.0	8,487.9	8,487.9	8,487.9	9.5	11.5	89.91	0.5	50.1	333.4	312.3	21.03	15.855	
8,600.0	8,587.9	8,587.9	8,587.9	9.6	11.6	89.91	0.5	50.1	333.4	312.1	21.26	15.677	
8,700.0	8,687.9	8,687.9	8,687.9	9.7	11.8	89.91	0.5	50.1	333.4	311.9	21.50	15.503	
8,800.0	8,787.9	8,787.9	8,787.9	9.8	11.8	89.91	0.5	50.1	333.4	311.7	21.63	15.410	
8,824.5	8,812.4	8,812.4	8,812.4	9.8	11.8	89.91	0.5	50.1	333.4	311.7	21.64	15.403	
8,850.0	8,837.9	8,837.9	8,837.9	9.8	11.8	112.48	1.2	50.1	333.6	312.0	21.66	15.401	
8,875.0	8,862.9	8,862.9	8,862.8	9.8	11.8	112.37	3.2	50.1	334.4	312.7	21.68	15.423	
8,900.0	8,887.6	8,887.6	8,887.5	9.8	11.9	112.19	6.4	50.1	335.7	314.0	21.70	15.467	
8,925.0	8,912.2	8,912.6	8,911.9	9.8	11.9	111.93	11.0	50.1	337.4	315.7	21.72	15.534	
8,950.0	8,936.5	8,937.5	8,936.0	9.8	11.9	111.61	16.8	50.1	339.7	317.9	21.74	15.623	
8,975.0	8,960.5	8,962.2	8,959.7	9.9	11.9	111.22	23.8	50.1	342.4	320.7	21.77	15.732	
9,000.0	8,984.0	8,986.8	8,983.0	9.9	11.9	110.77	32.0	50.1	345.7	323.9	21.79	15.863	
9,025.0	9,007.1	9,011.4	9,005.7	9.9	11.9	110.26	41.3	50.1	349.3	327.5	21.82	16.012	
9,050.0	9,029.7	9,035.8	9,027.8	9.9	11.9	109.68	51.8	50.1	353.5	331.7	21.85	16.181	
9,075.0	9,051.6	9,060.2	9,049.2	9.9	11.9	109.05	63.3	50.1	358.1	336.2	21.89	16.362	
9,100.0	9,072.9	9,084.4	9,069.9	10.0	12.0	108.36	75.8	50.1	363.2	341.2	21.93	16.558	
9,125.0	9,093.5	9,108.5	9,089.9	10.0	12.0	107.63	89.3	50.1	368.6	346.6	21.98	16.771	
9,150.0	9,113.3	9,132.4	9,109.0	10.0	12.0	106.85	103.7	50.2	374.5	352.5	22.03	16.999	
9,175.0	9,132.3	9,156.3	9,127.3	10.0	12.0	106.02	119.0	50.2	380.8	358.7	22.08	17.242	
9,200.0	9,150.4	9,180.0	9,144.8	10.1	12.1	105.16	135.1	50.2	387.4	365.3	22.14	17.499	
9,225.0	9,167.6	9,203.6	9,161.3	10.1	12.1	104.26	151.9	50.2	394.4	372.2	22.19	17.770	
9,250.0	9,183.8	9,227.0	9,176.9	10.1	12.1	103.32	169.4	50.2	401.7	379.5	22.25	18.053	
9,275.0	9,199.0	9,250.4	9,191.5	10.2	12.1	102.36	187.6	50.2	409.4	387.0	22.31	18.349	
9,300.0	9,213.2	9,273.6	9,205.2	10.2	12.2	101.37	206.4	50.2	417.3	394.9	22.37	18.657	
9,325.0	9,226.2	9,296.8	9,217.9	10.2	12.2	100.36	225.7	50.2	425.5	403.1	22.42	18.974	
9,350.0	9,238.1	9,319.8	9,229.6	10.3	12.2	99.33	245.6	50.2	433.9	411.5	22.49	19.299	
9,375.0	9,248.9	9,342.8	9,240.3	10.3	12.2	98.28	265.9	50.2	442.6	420.1	22.56	19.619	
9,400.0	9,258.4	9,365.7	9,250.0	10.4	12.2	97.23	286.7	50.2	451.5	428.9	22.64	19.945	
9,425.0	9,266.7	9,388.6	9,258.6	10.4	12.3	96.16	307.8	50.3	460.6	437.8	22.72	20.276	
9,450.0	9,273.8	9,411.4	9,266.3	10.4	12.3	95.10	329.3	50.3	469.8	447.0	22.79	20.609	
9,475.0	9,279.6	9,434.2	9,272.9	10.5	12.3	94.03	351.2	50.3	479.1	456.2	22.88	20.944	
9,500.0	9,284.2	9,457.0	9,278.4	10.7	12.3	92.96	373.3	50.3	488.6	465.6	22.98	21.263	
9,525.0	9,287.4	9,479.8	9,282.9	10.9	12.3	91.90	395.7	50.3	498.1	474.8	23.23	21.439	
9,550.0	9,289.4	9,502.7	9,286.2	11.2	12.3	90.85	418.3	50.3	507.7	484.1	23.56	21.544	
9,574.6	9,290.0	9,525.2	9,288.5	11.6	12.3	89.83	440.7	50.3	517.1	493.2	23.93	21.612	
9,600.0	9,290.0	9,548.7	9,289.8	12.0	12.4	89.98	464.1	50.3	526.7	502.4	24.32	21.656	
9,700.0	9,290.0	9,642.8	9,290.0	13.6	12.4	90.00	558.3	50.4	560.2	534.3	25.94	21.600	
9,800.0	9,290.0	9,739.1	9,290.0	15.2	12.8	90.00	654.6	50.4	587.2	559.2	27.99	20.979	
9,900.0	9,290.0	9,837.0	9,290.0	16.8	14.2	90.00	752.5	50.5	607.3	576.3	30.96	19.612	
10,000.0	9,290.0	9,936.1	9,290.0	18.3	15.6	90.00	851.6	50.6	620.5	586.6	33.95	18.276	

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 #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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	Warning		
10,100.0	9,290.0	10,035.9	9,290.0	19.8	17.1	90.00	951.4	50.6	626.9	589.9	36.93	16.976			
10,128.9	9,290.0	10,064.8	9,290.0	20.2	17.6	90.00	980.3	50.6	627.4	589.6	37.78	16.606			
10,200.0	9,290.0	10,135.9	9,290.0	21.2	18.6	90.00	1,051.4	50.7	627.9	588.1	39.89	15.743			
10,300.0	9,290.0	10,235.9	9,290.0	22.7	20.2	90.00	1,151.4	50.7	628.8	585.9	42.89	14.659			
10,400.0	9,290.0	10,335.9	9,290.0	24.2	21.8	90.00	1,251.3	50.8	629.6	583.6	45.94	13.703			
10,500.0	9,290.0	10,435.9	9,290.0	25.7	23.3	90.00	1,351.3	50.8	630.4	581.3	49.03	12.858			
10,600.0	9,290.0	10,535.9	9,290.0	27.2	24.9	90.00	1,451.3	50.9	631.2	579.0	52.14	12.106			
10,700.0	9,290.0	10,635.9	9,290.0	28.8	26.5	90.00	1,551.3	51.0	632.0	576.7	55.27	11.433			
10,800.0	9,290.0	10,735.9	9,290.0	30.3	28.1	90.00	1,651.3	51.0	632.8	574.4	58.43	10.829			
10,900.0	9,290.0	10,835.9	9,290.0	31.9	29.7	90.00	1,751.3	51.1	633.6	572.0	61.61	10.284			
11,000.0	9,290.0	10,935.9	9,290.0	33.4	31.4	90.00	1,851.3	51.1	634.4	569.6	64.80	9.791			
11,100.0	9,290.0	11,035.9	9,290.0	35.0	33.0	90.00	1,951.3	51.2	635.2	567.2	68.00	9.341			
11,200.0	9,290.0	11,135.9	9,290.0	36.6	34.6	90.00	2,051.3	51.2	636.0	564.8	71.21	8.931			
11,300.0	9,290.0	11,235.9	9,290.0	38.2	36.2	90.00	2,151.3	51.3	636.8	562.4	74.43	8.555			
11,400.0	9,290.0	11,335.9	9,290.0	39.8	37.9	90.00	2,251.3	51.3	637.6	560.0	77.67	8.210			
11,500.0	9,290.0	11,435.9	9,290.0	41.4	39.5	90.00	2,351.3	51.4	638.4	557.5	80.91	7.891			
11,600.0	9,290.0	11,535.9	9,290.0	43.0	41.1	90.00	2,451.3	51.5	639.2	555.1	84.15	7.596			
11,700.0	9,290.0	11,635.9	9,290.0	44.6	42.8	90.00	2,551.3	51.5	640.0	552.6	87.40	7.323			
11,800.0	9,290.0	11,735.9	9,290.0	46.3	44.4	90.00	2,651.3	51.6	640.8	550.2	90.66	7.069			
11,900.0	9,290.0	11,835.9	9,290.0	47.9	46.0	90.00	2,751.3	51.6	641.6	547.7	93.92	6.832			
12,000.0	9,290.0	11,935.9	9,290.0	49.5	47.7	90.00	2,851.3	51.7	642.5	545.3	97.19	6.610			
12,100.0	9,290.0	12,035.8	9,290.0	51.1	49.3	90.00	2,951.3	51.7	643.3	542.8	100.46	6.403			
12,200.0	9,290.0	12,135.8	9,290.0	52.8	51.0	90.00	3,051.3	51.8	644.1	540.3	103.73	6.209			
12,300.0	9,290.0	12,235.8	9,290.0	54.4	52.6	90.00	3,151.3	51.8	644.9	537.9	107.01	6.026			
12,400.0	9,290.0	12,335.8	9,290.0	56.0	54.3	90.00	3,251.3	51.9	645.7	535.4	110.29	5.854			
12,500.0	9,290.0	12,435.8	9,290.0	57.7	55.9	90.00	3,351.3	52.0	646.5	532.9	113.57	5.692			
12,600.0	9,290.0	12,535.8	9,290.0	59.3	57.6	90.00	3,451.3	52.0	647.3	530.4	116.86	5.539			
12,700.0	9,290.0	12,635.8	9,290.0	60.9	59.2	90.00	3,551.3	52.1	648.1	527.9	120.15	5.394			
12,800.0	9,290.0	12,735.8	9,290.0	62.6	60.9	90.00	3,651.3	52.1	648.9	525.5	123.44	5.257			
12,900.0	9,290.0	12,835.8	9,290.0	64.2	62.5	90.00	3,751.3	52.2	649.7	523.0	126.73	5.127			
13,000.0	9,290.0	12,935.8	9,290.0	65.9	64.2	90.00	3,851.3	52.2	650.5	520.5	130.02	5.003			
13,100.0	9,290.0	13,035.8	9,290.0	67.5	65.8	90.00	3,951.3	52.3	651.3	518.0	133.32	4.886			
13,200.0	9,290.0	13,135.8	9,290.0	69.1	67.5	90.00	4,051.3	52.4	652.1	515.5	136.61	4.774			
13,300.0	9,290.0	13,235.8	9,290.0	70.8	69.1	90.00	4,151.3	52.4	652.9	513.0	139.91	4.667			
13,400.0	9,290.0	13,335.8	9,290.0	72.4	70.8	90.00	4,251.2	52.5	653.7	510.5	143.21	4.565			
13,500.0	9,290.0	13,435.8	9,290.0	74.1	72.4	90.00	4,351.2	52.5	654.5	508.0	146.51	4.468			
13,600.0	9,290.0	13,535.8	9,290.0	75.7	74.1	90.00	4,451.2	52.6	655.3	505.5	149.81	4.375			
13,700.0	9,290.0	13,635.8	9,290.0	77.4	75.7	90.00	4,551.2	52.6	656.2	503.0	153.11	4.285			
13,800.0	9,290.0	13,735.8	9,290.0	79.0	77.4	90.00	4,651.2	52.7	657.0	500.5	156.42	4.200			
13,900.0	9,290.0	13,835.8	9,290.0	80.7	79.0	90.00	4,751.2	52.7	657.8	498.0	159.72	4.118			
14,000.0	9,290.0	13,935.8	9,290.0	82.3	80.7	90.00	4,851.2	52.8	658.6	495.5	163.03	4.040			
14,100.0	9,290.0	14,035.8	9,290.0	84.0	82.4	90.00	4,951.2	52.9	659.4	493.0	166.33	3.964			
14,164.5	9,290.0	14,100.3	9,290.0	85.0	83.4	90.00	5,015.7	52.9	659.9	491.4	168.47	3.917 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 #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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	Warning		
0.0	0.0	0.0	0.0	3.0	3.0	179.79	-2,520.1	9.0	2,520.2						
100.0	100.0	75.9	75.9	3.0	3.0	179.80	-2,520.3	9.0	2,520.3	2,514.3	6.00	419.861			
200.0	200.0	163.8	163.8	3.0	3.0	179.80	-2,520.9	8.9	2,521.0	2,515.0	6.02	419.025			
300.0	300.0	259.6	259.5	3.0	3.0	179.80	-2,521.9	8.7	2,522.0	2,516.0	6.06	416.100			
400.0	400.0	360.9	360.8	3.0	3.1	179.81	-2,522.9	8.6	2,523.1	2,516.9	6.16	409.684			
500.0	500.0	462.6	462.6	3.1	3.2	179.81	-2,523.9	8.5	2,524.0	2,517.7	6.30	400.720			
600.0	600.0	564.8	564.7	3.1	3.4	179.81	-2,524.8	8.3	2,524.9	2,518.5	6.48	389.778			
700.0	700.0	663.9	663.9	3.1	3.6	179.82	-2,525.7	7.9	2,525.8	2,519.1	6.69	377.768			
800.0	800.0	761.6	761.5	3.2	3.8	179.83	-2,526.6	7.5	2,526.7	2,519.8	6.92	365.134			
900.0	900.0	862.7	862.6	3.2	4.0	179.84	-2,527.6	7.1	2,527.7	2,520.5	7.19	351.732			
1,000.0	1,000.0	966.0	966.0	3.2	4.2	179.84	-2,528.5	7.1	2,528.6	2,521.1	7.48	337.957			
1,100.0	1,100.0	1,065.6	1,065.6	3.3	4.5	179.83	-2,529.3	7.3	2,529.4	2,521.6	7.79	324.787			
1,200.0	1,200.0	1,163.4	1,163.3	3.4	4.8	179.83	-2,530.1	7.7	2,530.3	2,522.1	8.11	312.176			
1,300.0	1,300.0	1,261.4	1,261.3	3.4	5.0	179.82	-2,531.1	8.1	2,531.2	2,522.8	8.44	300.008			
1,400.0	1,400.0	1,359.4	1,359.4	3.5	5.3	179.81	-2,532.1	8.5	2,532.2	2,523.5	8.78	288.352			
1,500.0	1,500.0	1,462.0	1,462.0	3.5	5.6	179.80	-2,533.2	8.9	2,533.3	2,524.1	9.15	276.850			
1,600.0	1,600.0	1,567.8	1,567.7	3.6	5.9	-90.24	-2,534.0	9.5	2,534.1	2,524.6	9.51	266.392			
1,700.0	1,699.8	1,673.4	1,673.4	3.6	6.2	-90.37	-2,534.7	10.3	2,534.8	2,524.9	9.86	257.101			
1,750.0	1,749.7	1,726.1	1,726.0	3.6	6.4	-90.47	-2,534.9	10.7	2,535.0	2,525.0	10.04	252.606			
1,800.0	1,799.5	1,778.8	1,778.7	3.6	6.6	-90.58	-2,535.1	11.3	2,535.3	2,525.0	10.21	248.211			
1,900.0	1,899.1	1,884.7	1,884.6	3.7	6.9	-90.82	-2,535.3	12.5	2,535.5	2,524.9	10.58	239.667			
2,000.0	1,998.7	1,990.8	1,990.7	3.7	7.2	-91.07	-2,535.1	14.2	2,535.6	2,524.6	10.95	231.492			
2,100.0	2,098.4	2,094.0	2,093.9	3.8	7.6	-91.32	-2,534.8	16.5	2,535.5	2,524.1	11.33	223.829			
2,200.0	2,198.0	2,196.8	2,196.6	3.8	7.9	-91.59	-2,534.3	19.5	2,535.3	2,523.6	11.71	216.543			
2,300.0	2,297.6	2,292.4	2,292.1	3.9	8.2	-91.86	-2,533.8	22.9	2,535.1	2,523.0	12.07	209.967			
2,318.3	2,315.8	2,309.8	2,309.5	3.9	8.3	-91.91	-2,533.7	23.6	2,535.1	2,523.0	12.14	208.803			
2,400.0	2,397.2	2,387.7	2,387.4	3.9	8.5	-92.13	-2,533.4	26.7	2,535.2	2,522.7	12.44	203.716			
2,500.0	2,496.8	2,484.3	2,483.9	4.0	8.9	-92.41	-2,533.2	30.7	2,535.5	2,522.6	12.83	197.684			
2,600.0	2,596.4	2,581.2	2,580.7	4.0	9.2	-92.69	-2,533.0	34.9	2,535.9	2,522.7	13.21	191.929			
2,700.0	2,696.1	2,678.1	2,677.5	4.1	9.5	-92.98	-2,533.0	39.2	2,536.4	2,522.8	13.60	186.439			
2,800.0	2,795.7	2,775.0	2,774.3	4.2	9.8	-93.28	-2,532.9	43.8	2,537.2	2,523.2	14.00	181.212			
2,900.0	2,895.3	2,881.3	2,880.5	4.2	10.2	-93.61	-2,532.9	49.2	2,537.9	2,523.5	14.44	175.804			
3,000.0	2,994.9	2,990.8	2,989.8	4.3	10.6	-93.96	-2,532.3	55.5	2,538.4	2,523.5	14.89	170.511			
3,100.0	3,094.5	3,093.0	3,091.8	4.4	10.9	-94.29	-2,531.5	61.2	2,538.6	2,523.3	15.31	165.782			
3,200.0	3,194.2	3,194.9	3,193.6	4.5	11.3	-94.60	-2,530.6	65.8	2,538.8	2,523.1	15.74	161.289			
3,300.0	3,293.8	3,298.2	3,296.9	4.5	11.6	-94.89	-2,529.7	69.8	2,538.9	2,522.8	16.17	156.990			
3,400.0	3,393.4	3,401.6	3,400.2	4.6	12.0	-95.19	-2,528.6	73.9	2,539.0	2,522.4	16.61	152.881			
3,500.0	3,493.0	3,503.5	3,501.9	4.7	12.3	-95.48	-2,527.3	77.9	2,538.9	2,521.9	17.04	148.999			
3,600.0	3,592.6	3,605.6	3,604.0	4.8	12.7	-95.77	-2,526.0	82.0	2,538.9	2,521.4	17.48	145.278			
3,700.0	3,692.3	3,712.9	3,711.2	4.9	13.0	-96.08	-2,524.3	86.3	2,538.6	2,520.7	17.93	141.576			
3,795.5	3,787.4	3,800.0	3,798.2	5.0	13.3	-96.33	-2,522.8	89.4	2,538.2	2,519.9	18.32	138.582			
3,800.0	3,791.9	3,800.0	3,798.2	5.0	13.3	-96.33	-2,522.8	89.4	2,538.2	2,519.9	18.32	138.551			
3,858.2	3,849.8	3,858.0	3,856.1	5.0	13.5	-96.49	-2,521.8	91.6	2,538.1	2,519.5	18.57	136.664			
3,900.0	3,891.5	3,889.5	3,887.6	5.1	13.7	-96.58	-2,521.5	92.8	2,538.3	2,519.6	18.72	135.602			
4,000.0	3,991.1	3,964.7	3,962.7	5.2	13.9	-96.80	-2,521.2	96.1	2,539.4	2,520.3	19.07	133.159			
4,100.0	4,090.7	4,047.0	4,045.0	5.3	14.2	-97.05	-2,521.6	100.0	2,541.5	2,522.0	19.45	130.667			
4,200.0	4,190.4	4,135.7	4,133.5	5.4	14.5	-97.32	-2,522.3	104.7	2,544.0	2,524.2	19.85	128.138			
4,300.0	4,290.0	4,224.6	4,222.3	5.5	14.8	-97.61	-2,523.3	110.0	2,547.1	2,526.8	20.26	125.720			
4,400.0	4,389.6	4,314.9	4,312.4	5.6	15.1	-97.89	-2,524.7	114.7	2,550.6	2,529.9	20.67	123.389			
4,500.0	4,489.2	4,406.4	4,403.8	5.7	15.4	-98.14	-2,526.7	118.6	2,554.5	2,533.4	21.09	121.136			
4,600.0	4,588.8	4,513.8	4,511.1	5.8	15.8	-98.42	-2,529.0	122.1	2,558.4	2,536.9	21.56	118.685			
4,700.0	4,688.5	4,621.7	4,618.9	5.9	16.2	-98.68	-2,531.2	124.7	2,562.1	2,540.1	22.03	116.309			

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 #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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		
4,750.0	4,738.3	4,676.2	4,673.5	5.9	16.4	-98.80	-2,532.2	125.8	2,563.8	2,541.5	22.27	115.142		
4,800.0	4,788.1	4,730.9	4,728.2	6.0	16.5	-98.95	-2,533.1	126.7	2,565.4	2,542.8	22.51	113.979		
4,900.0	4,888.0	4,837.7	4,834.9	6.1	16.9	-99.15	-2,534.6	128.3	2,567.8	2,544.8	22.98	111.761		
5,000.0	4,987.9	4,939.8	4,937.0	6.1	17.3	170.75	-2,535.9	129.8	2,569.6	2,546.2	23.41	109.767		
5,100.0	5,087.9	5,041.0	5,038.2	6.2	17.6	170.72	-2,537.1	131.4	2,571.0	2,547.2	23.83	107.882		
5,200.0	5,187.9	5,140.9	5,138.1	6.3	17.9	170.69	-2,538.3	132.9	2,572.4	2,548.2	24.25	106.072		
5,300.0	5,287.9	5,237.3	5,234.4	6.4	18.3	170.66	-2,539.4	134.4	2,573.9	2,549.2	24.66	104.368		
5,400.0	5,387.9	5,328.4	5,325.5	6.5	18.6	170.63	-2,540.8	135.9	2,575.6	2,550.5	25.06	102.797		
5,500.0	5,487.9	5,423.9	5,421.0	6.5	18.9	170.60	-2,542.5	137.7	2,577.6	2,552.2	25.47	101.218		
5,600.0	5,587.9	5,536.1	5,533.2	6.6	19.3	170.56	-2,544.2	139.7	2,579.5	2,553.5	25.94	99.456		
5,700.0	5,687.9	5,638.7	5,635.8	6.7	19.7	170.53	-2,545.4	141.3	2,580.9	2,554.5	26.37	97.855		
5,800.0	5,787.9	5,728.8	5,725.8	6.8	20.0	170.50	-2,546.8	142.7	2,582.6	2,555.8	26.77	96.467		
5,900.0	5,887.9	10,681.0	8,392.3	6.9	50.6	102.52	-57.1	-26.1	2,531.7	2,474.2	57.53	44.006		
6,000.0	5,987.9	10,681.0	8,392.3	7.0	50.6	102.52	-57.1	-26.1	2,432.2	2,374.6	57.62	42.212		
6,100.0	6,087.9	10,681.0	8,392.3	7.1	50.6	102.52	-57.1	-26.1	2,332.9	2,275.1	57.71	40.424		
6,200.0	6,187.9	10,681.0	8,392.3	7.2	50.6	102.52	-57.1	-26.1	2,233.5	2,175.7	57.80	38.641		
6,300.0	6,287.9	10,681.0	8,392.3	7.3	50.6	102.52	-57.1	-26.1	2,134.3	2,076.4	57.90	36.864		
6,400.0	6,387.9	10,681.0	8,392.3	7.3	50.6	102.52	-57.1	-26.1	2,035.1	1,977.1	57.99	35.094		
6,500.0	6,487.9	10,682.3	8,392.3	7.4	50.7	102.25	-55.8	-26.2	1,935.9	1,877.8	58.10	33.319		
6,600.0	6,587.9	10,687.4	8,392.5	7.5	50.7	101.16	-50.7	-26.4	1,836.9	1,778.6	58.27	31.523		
6,700.0	6,687.9	10,692.3	8,392.7	7.6	50.8	100.12	-45.8	-26.6	1,738.0	1,679.6	58.44	29.740		
6,800.0	6,787.9	10,696.9	8,392.8	7.7	50.9	99.12	-41.2	-26.8	1,639.2	1,580.6	58.60	27.971		
6,900.0	6,887.9	10,701.3	8,393.0	7.8	50.9	98.17	-36.8	-27.0	1,540.5	1,481.8	58.76	26.215		
7,000.0	6,987.9	10,705.5	8,393.1	7.9	51.0	97.26	-32.6	-27.2	1,442.0	1,383.1	58.92	24.473		
7,100.0	7,087.9	10,709.5	8,393.2	8.0	51.0	96.39	-28.7	-27.3	1,343.8	1,284.7	59.08	22.745		
7,200.0	7,187.9	10,713.2	8,393.3	8.1	51.1	95.55	-24.9	-27.5	1,245.8	1,186.5	59.24	21.030		
7,300.0	7,287.9	10,716.9	8,393.4	8.2	51.2	94.76	-21.3	-27.6	1,148.1	1,088.7	59.39	19.331		
7,400.0	7,387.9	10,720.3	8,393.5	8.3	51.2	93.99	-17.8	-27.8	1,050.9	991.3	59.54	17.649		
7,500.0	7,487.9	10,723.6	8,393.6	8.4	51.2	93.26	-14.5	-27.9	954.2	894.5	59.69	15.985		
7,600.0	7,587.9	10,726.7	8,393.7	8.6	51.3	92.56	-11.4	-28.0	858.3	798.4	59.84	14.342		
7,700.0	7,687.9	10,729.8	8,393.8	8.7	51.3	91.88	-8.4	-28.1	763.4	703.4	59.99	12.725		
7,800.0	7,787.9	10,732.6	8,393.8	8.8	51.4	91.24	-5.5	-28.3	670.0	609.8	60.14	11.140		
7,900.0	7,887.9	10,735.4	8,393.9	8.9	51.4	90.61	-2.7	-28.4	578.7	518.5	60.28	9.600		
8,000.0	7,987.9	10,738.1	8,394.0	9.0	51.5	90.02	-0.1	-28.5	490.9	430.5	60.43	8.124		
8,100.0	8,087.9	10,740.6	8,394.0	9.1	51.5	89.44	2.5	-28.6	408.8	348.2	60.57	6.748		
8,200.0	8,187.9	10,743.1	8,394.1	9.2	51.5	88.89	4.9	-28.7	336.4	275.6	60.72	5.540		
8,300.0	8,287.9	10,745.5	8,394.2	9.3	51.6	88.36	7.3	-28.8	281.4	220.5	60.86	4.624		
8,400.0	8,387.9	10,747.7	8,394.2	9.4	51.6	87.84	9.6	-28.9	255.4	194.4	61.00	4.186		
8,419.9	8,407.8	10,748.2	8,394.2	9.4	51.6	87.74	10.0	-28.9	254.6	193.6	61.03	4.172 CC, ES, SF		
8,500.0	8,487.9	10,749.9	8,394.3	9.5	51.6	87.35	11.8	-28.9	266.9	205.8	61.14	4.365		
8,600.0	8,587.9	10,752.1	8,394.3	9.6	51.7	86.87	13.9	-29.0	311.8	250.6	61.28	5.089		
8,700.0	8,687.9	10,754.1	8,394.3	9.7	51.7	86.41	15.9	-29.1	378.5	317.1	61.42	6.162		
8,800.0	8,787.9	10,756.1	8,394.4	9.8	51.7	85.97	17.9	-29.2	457.4	395.9	61.51	7.437		
8,824.5	8,812.4	10,756.6	8,394.4	9.8	51.7	85.86	18.4	-29.2	478.0	416.5	61.52	7.770		
8,850.0	8,837.9	10,757.6	8,394.4	9.8	51.7	103.32	19.5	-29.2	499.8	438.3	61.55	8.121		
8,875.0	8,862.9	10,759.8	8,394.5	9.8	51.8	97.47	21.6	-29.3	521.7	460.1	61.60	8.470		
8,900.0	8,887.6	10,763.1	8,394.5	9.8	51.8	90.94	24.9	-29.5	544.0	482.3	61.65	8.823		
8,925.0	8,912.2	10,767.4	8,394.6	9.8	51.9	83.94	29.2	-29.6	566.4	504.7	61.73	9.176		
8,950.0	8,936.5	10,775.0	8,394.8	9.8	52.0	76.36	36.8	-29.9	588.9	527.1	61.85	9.522		
8,975.0	8,960.5	10,775.0	8,394.8	9.9	52.0	70.36	36.8	-29.9	611.5	549.6	61.86	9.885		
9,000.0	8,984.0	10,785.7	8,394.9	9.9	52.1	63.19	47.5	-30.3	633.9	571.9	62.02	10.221		
9,025.0	9,007.1	10,793.4	8,395.0	9.9	52.2	57.20	55.2	-30.6	656.2	594.1	62.15	10.559		

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 #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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 Toolface (°)	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)				Offset	Well	
9,050.0	9,029.7	10,802.0	8,395.1	9.9	52.4	51.89	63.7	-30.9	678.3	616.0	62.28	10.890		
9,075.0	9,051.6	10,811.3	8,395.2	9.9	52.5	47.26	73.0	-31.3	700.0	637.6	62.44	11.211		
9,100.0	9,072.9	10,821.3	8,395.2	10.0	52.6	43.27	83.1	-31.7	721.3	658.7	62.61	11.522		
9,125.0	9,093.5	10,832.1	8,395.2	10.0	52.8	39.86	93.9	-32.0	742.2	679.4	62.79	11.821		
9,150.0	9,113.3	10,843.5	8,395.2	10.0	53.0	36.95	105.3	-32.5	762.6	699.6	62.98	12.109		
9,175.0	9,132.3	10,855.6	8,395.1	10.0	53.1	34.47	117.4	-32.9	782.5	719.3	63.18	12.384		
9,200.0	9,150.4	10,870.0	8,394.9	10.1	53.3	32.35	131.7	-33.4	801.7	738.3	63.42	12.641		
9,225.0	9,167.6	10,883.6	8,394.7	10.1	53.5	30.56	145.3	-33.9	820.2	756.6	63.65	12.887		
9,250.0	9,183.8	10,899.8	8,394.5	10.1	53.8	29.05	161.5	-34.4	838.1	774.1	63.92	13.112		
9,275.0	9,199.0	10,916.7	8,394.2	10.2	54.0	27.77	178.4	-35.0	855.1	790.9	64.19	13.320		
9,300.0	9,213.2	10,934.2	8,393.8	10.2	54.3	26.70	195.9	-35.6	871.3	806.8	64.48	13.512		
9,325.0	9,226.2	10,952.3	8,393.5	10.2	54.5	25.82	213.9	-36.1	886.6	821.8	64.78	13.687		
9,350.0	9,238.1	10,971.0	8,393.0	10.3	54.8	25.08	232.6	-36.7	901.0	835.9	65.09	13.843		
9,375.0	9,248.9	10,990.3	8,392.6	10.3	55.1	24.49	252.0	-37.3	914.5	849.0	65.42	13.978		
9,400.0	9,258.4	11,010.1	8,392.1	10.4	55.4	24.03	271.8	-37.8	927.0	861.2	65.76	14.096		
9,425.0	9,266.7	11,030.3	8,391.6	10.4	55.7	23.67	291.9	-38.3	938.5	872.3	66.11	14.195		
9,450.0	9,273.8	11,050.8	8,391.1	10.4	56.0	23.42	312.4	-38.8	949.0	882.5	66.47	14.276		
9,475.0	9,279.6	11,073.1	8,390.5	10.5	56.3	23.28	334.7	-39.2	958.4	891.5	66.86	14.334		
9,500.0	9,284.2	11,097.0	8,390.0	10.7	56.6	23.26	358.6	-39.5	966.7	899.4	67.30	14.366		
9,525.0	9,287.4	11,121.0	8,389.5	10.9	57.0	23.33	382.6	-39.8	974.0	906.1	67.89	14.347		
9,550.0	9,289.4	11,145.2	8,389.1	11.2	57.3	23.49	406.8	-40.0	980.0	911.5	68.56	14.295		
9,574.6	9,290.0	11,165.5	8,388.8	11.6	57.6	23.65	427.1	-40.0	985.0	915.7	69.21	14.231		
9,600.0	9,290.0	11,183.8	8,388.5	12.0	57.9	24.18	445.4	-40.0	989.5	919.7	69.86	14.164		
9,700.0	9,290.0	11,258.4	8,386.6	13.6	59.0	26.18	520.0	-38.7	1,007.5	935.0	72.55	13.888		
9,800.0	9,290.0	11,356.7	8,384.1	15.2	60.4	28.20	618.2	-35.6	1,024.0	948.4	75.59	13.546		
9,900.0	9,290.0	11,466.0	8,383.7	16.8	62.0	30.00	727.3	-29.7	1,037.0	958.3	78.76	13.167		
10,000.0	9,290.0	11,589.5	8,384.6	18.3	63.8	31.30	850.7	-25.0	1,045.2	963.0	82.11	12.728		
10,100.0	9,290.0	11,698.5	8,385.9	19.8	65.4	31.80	959.7	-24.1	1,047.8	962.6	85.22	12.296		
10,128.9	9,290.0	11,727.9	8,386.1	20.2	65.9	31.83	989.1	-24.1	1,047.9	961.8	86.08	12.174		
10,200.0	9,290.0	11,814.3	8,387.0	21.2	67.2	31.84	1,075.5	-25.2	1,047.1	958.7	88.41	11.844		
10,300.0	9,290.0	11,897.8	8,387.6	22.7	68.4	31.81	1,158.9	-26.8	1,045.9	954.7	91.14	11.475		
10,400.0	9,290.0	11,998.1	8,387.0	24.2	70.0	31.74	1,259.2	-28.7	1,045.8	951.6	94.16	11.106		
10,452.3	9,290.0	12,047.0	8,386.7	25.0	70.7	31.70	1,308.2	-29.7	1,045.7	950.0	95.70	10.926		
10,500.0	9,290.0	12,089.9	8,386.6	25.7	71.4	31.69	1,351.0	-30.1	1,045.8	948.7	97.08	10.772		
10,600.0	9,290.0	12,176.7	8,386.3	27.2	72.7	31.74	1,437.8	-29.5	1,046.8	946.9	99.93	10.475		
10,700.0	9,290.0	12,278.8	8,385.6	28.8	74.3	31.84	1,539.9	-27.8	1,048.7	945.6	103.03	10.178		
10,800.0	9,290.0	12,377.8	8,385.2	30.3	75.8	31.93	1,638.9	-26.4	1,050.2	944.1	106.10	9.898		
10,900.0	9,290.0	12,480.3	8,385.2	31.9	77.4	32.06	1,741.4	-24.2	1,051.7	942.5	109.24	9.627		
11,000.0	9,290.0	12,595.8	8,385.6	33.4	79.2	32.17	1,856.9	-23.0	1,052.3	939.7	112.60	9.346		
11,100.0	9,290.0	12,697.7	8,386.1	35.0	80.8	32.17	1,958.8	-24.0	1,051.8	936.1	115.78	9.085		
11,110.8	9,290.0	12,706.1	8,386.0	35.2	80.9	32.17	1,967.1	-24.2	1,051.8	935.7	116.08	9.061		
11,200.0	9,290.0	12,787.0	8,384.6	36.6	82.2	32.09	2,048.0	-25.4	1,052.7	934.0	118.77	8.864		
11,300.0	9,290.0	12,837.0	8,382.6	38.2	82.9	32.02	2,098.0	-26.2	1,055.7	934.6	121.15	8.714		
11,400.0	9,290.0	12,837.0	8,382.6	39.8	82.9	32.02	2,098.0	-26.2	1,065.9	943.1	122.75	8.683		
11,500.0	9,290.0	12,837.0	8,382.6	41.4	82.9	32.02	2,098.0	-26.2	1,085.2	960.9	124.36	8.727		
11,600.0	9,290.0	12,837.0	8,382.6	43.0	82.9	32.02	2,098.0	-26.2	1,113.2	987.3	125.97	8.838		
11,700.0	9,290.0	12,837.0	8,382.6	44.6	82.9	32.02	2,098.0	-26.2	1,149.3	1,021.7	127.58	9.008		
11,800.0	9,290.0	12,837.0	8,382.6	46.3	82.9	32.02	2,098.0	-26.2	1,192.7	1,063.5	129.20	9.231		
11,900.0	9,290.0	12,837.0	8,382.6	47.9	82.9	32.02	2,098.0	-26.2	1,242.6	1,111.8	130.82	9.499		
12,000.0	9,290.0	12,837.0	8,382.6	49.5	82.9	32.02	2,098.0	-26.2	1,298.3	1,165.9	132.44	9.803		
12,100.0	9,290.0	12,837.0	8,382.6	51.1	82.9	32.02	2,098.0	-26.2	1,359.1	1,225.0	134.07	10.137		
12,200.0	9,290.0	12,837.0	8,382.6	52.8	82.9	32.02	2,098.0	-26.2	1,424.3	1,288.7	135.70	10.496		

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 #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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 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)						
12,300.0	9,290.0	12,837.0	8,382.6	54.4	82.9	32.02	2,098.0	-26.2	1,493.4	1,356.1	137.33	10.875		
12,400.0	9,290.0	12,837.0	8,382.6	56.0	82.9	32.02	2,098.0	-26.2	1,565.9	1,426.9	138.96	11.268		
12,500.0	9,290.0	12,837.0	8,382.6	57.7	82.9	32.02	2,098.0	-26.2	1,641.2	1,500.6	140.60	11.673		
12,600.0	9,290.0	12,837.0	8,382.6	59.3	82.9	32.02	2,098.0	-26.2	1,719.0	1,576.8	142.23	12.086		
12,700.0	9,290.0	12,837.0	8,382.6	60.9	82.9	32.02	2,098.0	-26.2	1,799.1	1,655.2	143.87	12.505		
12,800.0	9,290.0	12,837.0	8,382.6	62.6	82.9	32.02	2,098.0	-26.2	1,881.0	1,735.5	145.51	12.927		
12,900.0	9,290.0	12,837.0	8,382.6	64.2	82.9	32.02	2,098.0	-26.2	1,964.6	1,817.5	147.15	13.351		
13,000.0	9,290.0	12,837.0	8,382.6	65.9	82.9	32.02	2,098.0	-26.2	2,049.7	1,900.9	148.79	13.776		
13,100.0	9,290.0	12,837.0	8,382.6	67.5	82.9	32.02	2,098.0	-26.2	2,136.1	1,985.7	150.44	14.199		
13,200.0	9,290.0	12,837.0	8,382.6	69.1	82.9	32.02	2,098.0	-26.2	2,223.6	2,071.6	152.08	14.621		
13,300.0	9,290.0	12,837.0	8,382.6	70.8	82.9	32.02	2,098.0	-26.2	2,312.2	2,158.4	153.73	15.041		
13,400.0	9,290.0	12,837.0	8,382.6	72.4	82.9	32.02	2,098.0	-26.2	2,401.6	2,246.2	155.37	15.457		
13,500.0	9,290.0	12,837.0	8,382.6	74.1	82.9	32.02	2,098.0	-26.2	2,491.8	2,334.8	157.02	15.870		
13,600.0	9,290.0	12,837.0	8,382.6	75.7	82.9	32.02	2,098.0	-26.2	2,582.8	2,424.1	158.67	16.278		
13,700.0	9,290.0	12,837.0	8,382.6	77.4	82.9	32.02	2,098.0	-26.2	2,674.4	2,514.1	160.32	16.682		
13,800.0	9,290.0	12,837.0	8,382.6	79.0	82.9	32.02	2,098.0	-26.2	2,766.6	2,604.6	161.97	17.081		
13,900.0	9,290.0	12,837.0	8,382.6	80.7	82.9	32.02	2,098.0	-26.2	2,859.3	2,695.7	163.61	17.476		
14,000.0	9,290.0	12,837.0	8,382.6	82.3	82.9	32.02	2,098.0	-26.2	2,952.5	2,787.2	165.27	17.865		
14,100.0	9,290.0	12,837.0	8,382.6	84.0	82.9	32.02	2,098.0	-26.2	3,046.1	2,879.2	166.92	18.249		
14,164.5	9,290.0	12,837.0	8,382.6	85.0	82.9	32.02	2,098.0	-26.2	3,106.7	2,938.7	167.98	18.494		

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

COG PRODUCTION LLC

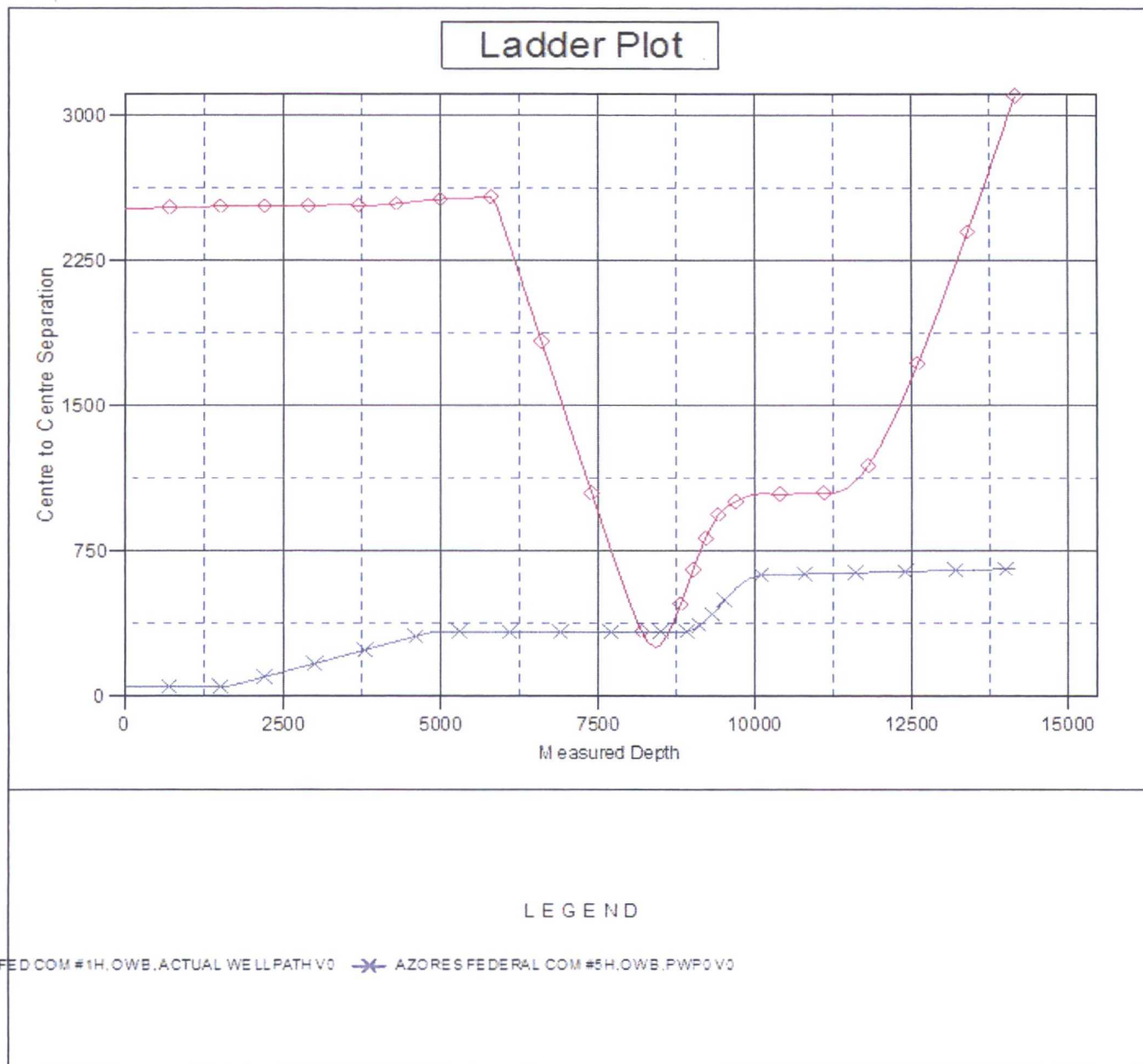
Anticollision Report

Company: COG PRODUCTION LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL COM #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference:
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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=3508.6+26 @ 3534.6usft (MCVA
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: AZORES FEDERAL COM #10H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.34°



COG PRODUCTION LLC

Anticollision Report

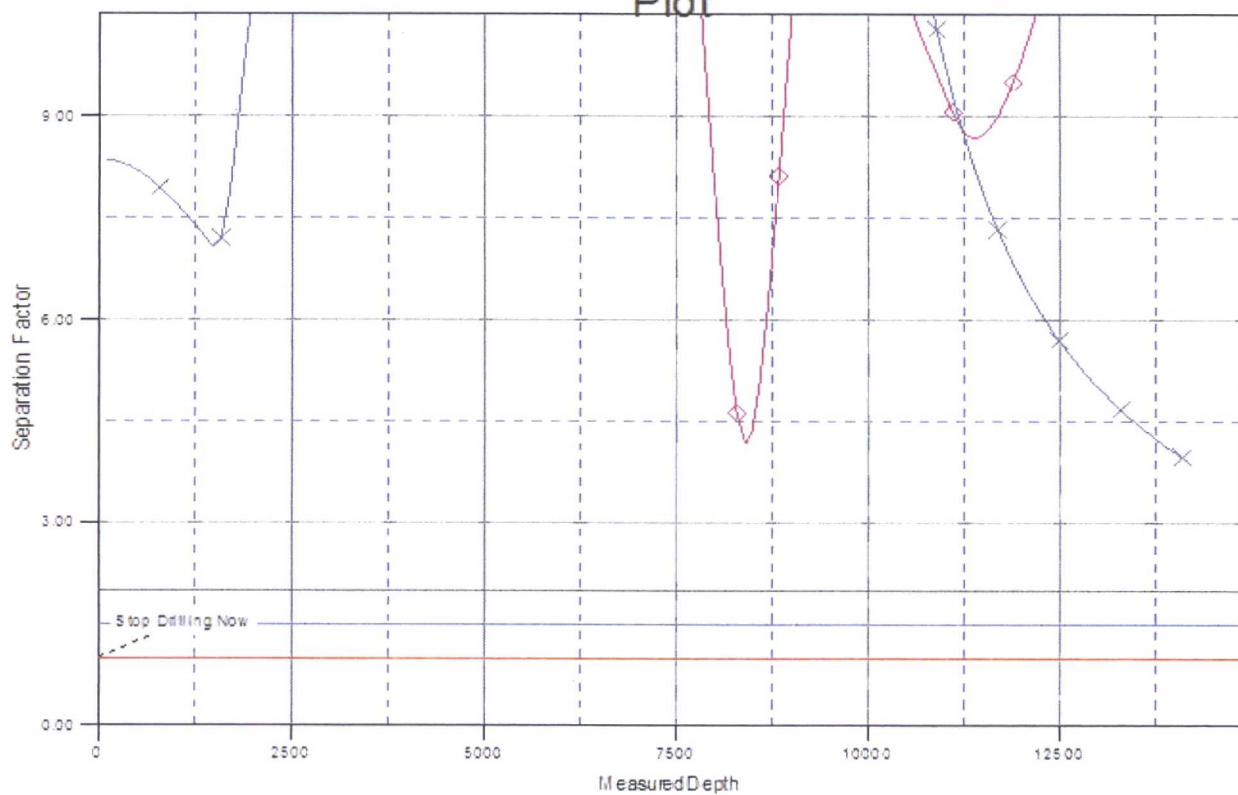
Company: COG PRODUCTION LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: AZORES FEDERAL COM #10H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well AZORES FEDERAL COM #10H
 TVD Reference: RKB=3508.6+26 @ 3534.6usft (MCVAY 8)
 MD Reference: RKB=3508.6+26 @ 3534.6usft (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=3508.6+26 @ 3534.6usft (MCVA
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: AZORES FEDERAL COM #10H
 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 #10H, OWB, ACTUAL WELL PATH V0 — X — AZORES FEDERAL COM #5H, OWB, PWP0 V0