

CONCHO

COG OPERATING LLC

LEA COUNTY, NM

AVALON SHALE

WINDWARD FEDERAL #11H

OWB

PWP0

Anticollision Report

01 September, 2016



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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	PWP0
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	Stations
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 10,000.0 usft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Circular Conic
Casing Method:	Not applied

Survey Tool Program		Date	9/1/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.0	8,717.5	PWP0 (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
8,717.5	19,404.3	PWP0 (OWB)	MWD	OWSG MWD - Standard	

Summary	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Site Name						
Offset Well - Wellbore - Design						
AVALON SHALE						
WINDWARD FEDERAL #12H - OWB - PWP0	8,705.4	8,705.6	30.0	6.4	1.273	Shut in Produces, CC
WINDWARD FEDERAL #12H - OWB - PWP0	8,717.5	8,717.6	30.0	6.4	1.272	Shut in Produces, ES, SF
DEEP BSS						
WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPATH	8,730.9	8,735.9	109.1	66.8	2.582	CC, ES, SF
DELAWARE						
KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH	272.2	272.4	229.5	223.4	37.812	CC, ES
KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH	19,200.0	18,222.0	914.5	580.1	2.735	SF

Offset Design													AVALON SHALE - WINDWARD FEDERAL #12H - OWB - PWP0		Offset Site Error: 0.0 usft	
Survey Program: 0-Standard Keeper 104, 8715-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				
0.0	0.0	0.2	0.2	3.0	3.0	89.43	0.3	30.0	30.0							
100.0	100.0	100.2	100.2	3.0	3.0	89.43	0.3	30.0	30.0	24.0	6.00	5.000				
200.0	200.0	200.2	200.2	3.0	3.0	89.43	0.3	30.0	30.0	24.0	6.01	4.991				
300.0	300.0	300.2	300.2	3.0	3.0	89.43	0.3	30.0	30.0	24.0	6.03	4.973				
400.0	400.0	400.2	400.2	3.0	3.0	89.43	0.3	30.0	30.0	23.9	6.07	4.946				
500.0	500.0	500.2	500.2	3.1	3.1	89.43	0.3	30.0	30.0	23.9	6.11	4.910				
600.0	600.0	600.2	600.2	3.1	3.1	89.43	0.3	30.0	30.0	23.8	6.16	4.867				
700.0	700.0	700.2	700.2	3.1	3.1	89.43	0.3	30.0	30.0	23.8	6.23	4.815				
800.0	800.0	800.2	800.2	3.2	3.2	89.43	0.3	30.0	30.0	23.7	6.31	4.757				
900.0	900.0	900.2	900.2	3.2	3.2	89.43	0.3	30.0	30.0	23.6	6.39	4.693				
1,000.0	1,000.0	1,000.2	1,000.2	3.2	3.2	89.43	0.3	30.0	30.0	23.5	6.49	4.624				
1,100.0	1,100.0	1,100.2	1,100.2	3.3	3.3	89.43	0.3	30.0	30.0	23.4	6.59	4.550				
1,200.0	1,200.0	1,200.2	1,200.2	3.4	3.4	89.43	0.3	30.0	30.0	23.3	6.71	4.473				
1,300.0	1,300.0	1,300.2	1,300.2	3.4	3.4	89.43	0.3	30.0	30.0	23.2	6.83	4.393				
1,400.0	1,400.0	1,400.2	1,400.2	3.5	3.5	89.43	0.3	30.0	30.0	23.0	6.96	4.311				
1,500.0	1,500.0	1,500.2	1,500.2	3.5	3.5	89.43	0.3	30.0	30.0	22.9	7.10	4.228				
1,600.0	1,600.0	1,600.2	1,600.2	3.6	3.6	89.43	0.3	30.0	30.0	22.8	7.24	4.143				
1,700.0	1,700.0	1,700.2	1,700.2	3.7	3.7	89.43	0.3	30.0	30.0	22.6	7.39	4.059				

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



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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 - WINDWARD FEDERAL #12H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-Standard Keeper 104, 8715-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
1,800.0	1,800.0	1,800.2	1,800.2	3.8	3.8	89.43	0.3	30.0	30.0	22.5	7.55	3.974		
1,900.0	1,900.0	1,900.2	1,900.2	3.9	3.9	89.43	0.3	30.0	30.0	22.3	7.71	3.891		
2,000.0	2,000.0	2,000.2	2,000.2	3.9	3.9	89.43	0.3	30.0	30.0	22.1	7.88	3.807		
2,100.0	2,100.0	2,100.2	2,100.2	4.0	4.0	89.43	0.3	30.0	30.0	21.9	8.05	3.725		
2,200.0	2,200.0	2,200.2	2,200.2	4.1	4.1	89.43	0.3	30.0	30.0	21.8	8.23	3.645		
2,300.0	2,300.0	2,300.2	2,300.2	4.2	4.2	89.43	0.3	30.0	30.0	21.6	8.41	3.566		
2,400.0	2,400.0	2,400.2	2,400.2	4.3	4.3	89.43	0.3	30.0	30.0	21.4	8.60	3.488		
2,500.0	2,500.0	2,500.2	2,500.2	4.4	4.4	89.43	0.3	30.0	30.0	21.2	8.79	3.412		
2,600.0	2,600.0	2,600.2	2,600.2	4.5	4.5	89.43	0.3	30.0	30.0	21.0	8.99	3.339		
2,700.0	2,700.0	2,700.2	2,700.2	4.6	4.6	89.43	0.3	30.0	30.0	20.8	9.18	3.267		
2,800.0	2,800.0	2,800.2	2,800.2	4.7	4.7	89.43	0.3	30.0	30.0	20.6	9.39	3.197		
2,900.0	2,900.0	2,900.2	2,900.2	4.8	4.8	89.43	0.3	30.0	30.0	20.4	9.59	3.128		
3,000.0	3,000.0	3,000.2	3,000.2	4.9	4.9	89.43	0.3	30.0	30.0	20.2	9.80	3.062		
3,100.0	3,100.0	3,100.2	3,100.2	5.0	5.0	89.43	0.3	30.0	30.0	20.0	10.01	2.998		
3,200.0	3,200.0	3,200.2	3,200.2	5.1	5.1	89.43	0.3	30.0	30.0	19.8	10.22	2.936		
3,300.0	3,300.0	3,300.2	3,300.2	5.2	5.2	89.43	0.3	30.0	30.0	19.6	10.43	2.876		
3,400.0	3,400.0	3,400.2	3,400.2	5.3	5.3	89.43	0.3	30.0	30.0	19.4	10.65	2.817		
3,500.0	3,500.0	3,500.2	3,500.2	5.4	5.4	89.43	0.3	30.0	30.0	19.1	10.87	2.760		
3,600.0	3,600.0	3,600.2	3,600.2	5.5	5.5	89.43	0.3	30.0	30.0	18.9	11.09	2.705		
3,700.0	3,700.0	3,700.2	3,700.2	5.7	5.7	89.43	0.3	30.0	30.0	18.7	11.31	2.652		
3,800.0	3,800.0	3,800.2	3,800.2	5.8	5.8	89.43	0.3	30.0	30.0	18.5	11.54	2.600		
3,900.0	3,900.0	3,900.2	3,900.2	5.9	5.9	89.43	0.3	30.0	30.0	18.2	11.76	2.550		
4,000.0	4,000.0	4,000.2	4,000.2	6.0	6.0	89.43	0.3	30.0	30.0	18.0	11.99	2.502		
4,100.0	4,100.0	4,100.2	4,100.2	6.1	6.1	89.43	0.3	30.0	30.0	17.8	12.22	2.455		
4,200.0	4,200.0	4,200.2	4,200.2	6.2	6.2	89.43	0.3	30.0	30.0	17.6	12.45	2.410		
4,300.0	4,300.0	4,300.2	4,300.2	6.3	6.3	89.43	0.3	30.0	30.0	17.3	12.68	2.366		
4,400.0	4,400.0	4,400.2	4,400.2	6.5	6.5	89.43	0.3	30.0	30.0	17.1	12.91	2.323		
4,500.0	4,500.0	4,500.2	4,500.2	6.6	6.6	89.43	0.3	30.0	30.0	16.9	13.15	2.282		
4,600.0	4,600.0	4,600.2	4,600.2	6.7	6.7	89.43	0.3	30.0	30.0	16.6	13.38	2.242		
4,700.0	4,700.0	4,700.2	4,700.2	6.8	6.8	89.43	0.3	30.0	30.0	16.4	13.62	2.203		
4,800.0	4,800.0	4,800.2	4,800.2	6.9	6.9	89.43	0.3	30.0	30.0	16.1	13.86	2.165		
4,900.0	4,900.0	4,900.2	4,900.2	7.0	7.0	89.43	0.3	30.0	30.0	15.9	14.10	2.128		
5,000.0	5,000.0	5,000.2	5,000.2	7.2	7.2	89.43	0.3	30.0	30.0	15.7	14.33	2.093		
5,100.0	5,100.0	5,100.2	5,100.2	7.3	7.3	89.43	0.3	30.0	30.0	15.4	14.57	2.059		
5,200.0	5,200.0	5,200.2	5,200.2	7.4	7.4	89.43	0.3	30.0	30.0	15.2	14.81	2.025		
5,300.0	5,300.0	5,300.2	5,300.2	7.5	7.5	89.43	0.3	30.0	30.0	14.9	15.06	1.993 Advise and Monitor		
5,400.0	5,400.0	5,400.2	5,400.2	7.6	7.6	89.43	0.3	30.0	30.0	14.7	15.30	1.961 Advise and Monitor		
5,500.0	5,500.0	5,500.2	5,500.2	7.8	7.8	89.43	0.3	30.0	30.0	14.5	15.54	1.930 Advise and Monitor		
5,600.0	5,600.0	5,600.2	5,600.2	7.9	7.9	89.43	0.3	30.0	30.0	14.2	15.79	1.901 Advise and Monitor		
5,700.0	5,700.0	5,700.2	5,700.2	8.0	8.0	89.43	0.3	30.0	30.0	14.0	16.03	1.872 Advise and Monitor		
5,800.0	5,800.0	5,800.2	5,800.2	8.1	8.1	89.43	0.3	30.0	30.0	13.7	16.27	1.844 Advise and Monitor		
5,900.0	5,900.0	5,900.2	5,900.2	8.3	8.3	89.43	0.3	30.0	30.0	13.5	16.52	1.816 Advise and Monitor		
6,000.0	6,000.0	6,000.2	6,000.2	8.4	8.4	89.43	0.3	30.0	30.0	13.2	16.77	1.789 Advise and Monitor		
6,100.0	6,100.0	6,100.2	6,100.2	8.5	8.5	89.43	0.3	30.0	30.0	13.0	17.01	1.764 Advise and Monitor		
6,200.0	6,200.0	6,200.2	6,200.2	8.6	8.6	89.43	0.3	30.0	30.0	12.7	17.26	1.738 Advise and Monitor		
6,300.0	6,300.0	6,300.2	6,300.2	8.8	8.8	89.43	0.3	30.0	30.0	12.5	17.51	1.714 Advise and Monitor		
6,400.0	6,400.0	6,400.2	6,400.2	8.9	8.9	89.43	0.3	30.0	30.0	12.2	17.75	1.690 Advise and Monitor		
6,500.0	6,500.0	6,500.2	6,500.2	9.0	9.0	89.43	0.3	30.0	30.0	12.0	18.00	1.666 Advise and Monitor		
6,600.0	6,600.0	6,600.2	6,600.2	9.1	9.1	89.43	0.3	30.0	30.0	11.7	18.25	1.644 Advise and Monitor		
6,700.0	6,700.0	6,700.2	6,700.2	9.3	9.3	89.43	0.3	30.0	30.0	11.5	18.50	1.622 Advise and Monitor		
6,800.0	6,800.0	6,800.2	6,800.2	9.4	9.4	89.43	0.3	30.0	30.0	11.3	18.75	1.600 Advise and Monitor		
6,900.0	6,900.0	6,900.2	6,900.2	9.5	9.5	89.43	0.3	30.0	30.0	11.0	19.00	1.579 Advise and Monitor		

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



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Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
7,000.0	7,000.0	7,000.2	7,000.2	9.6	9.6	89.43	0.3	30.0	30.0	10.8	19.25	1.558 Advise and Monitor	
7,100.0	7,100.0	7,100.2	7,100.2	9.8	9.8	89.43	0.3	30.0	30.0	10.5	19.50	1.538 Advise and Monitor	
7,200.0	7,200.0	7,200.2	7,200.2	9.9	9.9	89.43	0.3	30.0	30.0	10.2	19.75	1.519 Advise and Monitor	
7,300.0	7,300.0	7,300.2	7,300.2	10.0	10.0	89.43	0.3	30.0	30.0	10.0	20.00	1.500 Shut in Produces	
7,400.0	7,400.0	7,400.2	7,400.2	10.1	10.1	89.43	0.3	30.0	30.0	9.7	20.26	1.481 Shut in Produces	
7,500.0	7,500.0	7,500.2	7,500.2	10.3	10.3	89.43	0.3	30.0	30.0	9.5	20.51	1.463 Shut in Produces	
7,600.0	7,600.0	7,600.2	7,600.2	10.4	10.4	89.43	0.3	30.0	30.0	9.2	20.76	1.445 Shut in Produces	
7,700.0	7,700.0	7,700.2	7,700.2	10.5	10.5	89.43	0.3	30.0	30.0	9.0	21.01	1.428 Shut in Produces	
7,800.0	7,800.0	7,800.2	7,800.2	10.6	10.6	89.43	0.3	30.0	30.0	8.7	21.27	1.411 Shut in Produces	
7,900.0	7,900.0	7,900.2	7,900.2	10.8	10.8	89.43	0.3	30.0	30.0	8.5	21.52	1.394 Shut in Produces	
8,000.0	8,000.0	8,000.2	8,000.2	10.9	10.9	89.43	0.3	30.0	30.0	8.2	21.77	1.378 Shut in Produces	
8,100.0	8,100.0	8,100.2	8,100.2	11.0	11.0	89.43	0.3	30.0	30.0	8.0	22.03	1.362 Shut in Produces	
8,200.0	8,200.0	8,200.2	8,200.2	11.1	11.1	89.43	0.3	30.0	30.0	7.7	22.28	1.347 Shut in Produces	
8,300.0	8,300.0	8,300.2	8,300.2	11.3	11.3	89.43	0.3	30.0	30.0	7.5	22.53	1.331 Shut in Produces	
8,400.0	8,400.0	8,400.2	8,400.2	11.4	11.4	89.43	0.3	30.0	30.0	7.2	22.79	1.317 Shut in Produces	
8,500.0	8,500.0	8,500.2	8,500.2	11.5	11.5	89.43	0.3	30.0	30.0	7.0	23.04	1.302 Shut in Produces	
8,600.0	8,600.0	8,600.2	8,600.2	11.6	11.6	89.43	0.3	30.0	30.0	6.7	23.30	1.288 Shut in Produces	
8,700.0	8,700.0	8,700.2	8,700.2	11.8	11.8	89.43	0.3	30.0	30.0	6.4	23.55	1.274 Shut in Produces	
8,705.4	8,705.4	8,705.6	8,705.6	11.8	11.8	89.43	0.3	30.0	30.0	6.4	23.57	1.273 Shut in Produces, CC	
8,717.5	8,717.5	8,717.6	8,717.6	11.8	11.8	89.45	0.3	30.0	30.0	6.4	23.59	1.272 Shut in Produces, ES, SF	
8,725.0	8,725.0	8,725.0	8,725.0	11.8	11.8	-122.00	0.2	30.0	30.1	6.5	23.60	1.274 Shut in Produces	
8,750.0	8,750.0	8,749.5	8,749.5	11.8	11.8	-121.45	-0.9	30.4	31.0	7.4	23.61	1.312 Shut in Produces	
8,775.0	8,774.9	8,774.0	8,773.8	11.8	11.8	-120.65	-3.2	31.1	32.9	9.3	23.61	1.395 Shut in Produces	
8,800.0	8,799.6	8,798.2	8,797.8	11.8	11.8	-119.69	-6.7	32.2	36.0	12.3	23.62	1.522 Advise and Monitor	
8,825.0	8,824.1	8,822.3	8,821.4	11.8	11.8	-118.66	-11.3	33.6	40.0	16.4	23.64	1.694 Advise and Monitor	
8,850.0	8,848.3	8,846.0	8,844.4	11.8	11.8	-117.62	-16.9	35.4	45.1	21.5	23.65	1.908 Advise and Monitor	
8,875.0	8,872.2	8,869.5	8,866.8	11.8	11.8	-116.59	-23.5	37.4	51.2	27.5	23.67	2.163	
8,900.0	8,895.6	8,892.5	8,888.4	11.8	11.8	-115.59	-31.0	39.8	58.3	34.6	23.70	2.459	
8,925.0	8,918.5	8,915.2	8,909.3	11.9	11.9	-114.60	-39.4	42.4	66.3	42.5	23.72	2.793	
8,950.0	8,940.9	8,937.4	8,929.4	11.9	11.9	-113.63	-48.5	45.2	75.2	51.4	23.75	3.164	
8,975.0	8,962.7	8,959.2	8,948.6	11.9	11.9	-112.65	-58.3	48.2	84.9	61.1	23.79	3.569	
9,000.0	8,983.8	8,980.5	8,966.9	11.9	11.9	-111.65	-68.6	51.5	95.5	71.6	23.83	4.006	
9,025.0	9,004.2	9,001.3	8,984.3	11.9	11.9	-110.62	-79.5	54.8	106.8	82.9	23.87	4.474	
9,050.0	9,023.8	9,021.6	9,000.8	12.0	11.9	-109.55	-90.8	58.4	118.9	94.9	23.92	4.969	
9,075.0	9,042.5	9,041.4	9,016.4	12.0	12.0	-108.44	-102.4	62.0	131.6	107.6	23.97	5.490	
9,100.0	9,060.4	9,060.7	9,031.2	12.0	12.0	-107.27	-114.4	65.7	145.0	121.0	24.03	6.034	
9,125.0	9,077.3	9,079.6	9,045.0	12.1	12.0	-106.04	-126.6	69.5	159.0	134.9	24.09	6.600	
9,150.0	9,093.2	9,097.9	9,058.0	12.1	12.0	-104.74	-139.0	73.4	173.5	149.4	24.16	7.183	
9,175.0	9,108.1	9,115.9	9,070.3	12.2	12.0	-103.38	-151.5	77.3	188.6	164.4	24.23	7.783	
9,200.0	9,122.0	9,133.4	9,081.7	12.2	12.1	-101.95	-164.2	81.2	204.1	179.8	24.31	8.397	
9,225.0	9,134.7	9,150.0	9,092.1	12.3	12.1	-100.43	-176.5	85.1	220.1	195.7	24.39	9.022	
9,250.0	9,146.3	9,167.2	9,102.4	12.4	12.1	-98.90	-189.7	89.2	236.4	211.9	24.48	9.655	
9,275.0	9,156.7	9,183.6	9,111.7	12.4	12.1	-97.27	-202.5	93.2	253.1	228.5	24.58	10.295	
9,300.0	9,165.9	9,200.0	9,120.6	12.5	12.2	-95.62	-215.7	97.3	270.1	245.4	24.70	10.938	
9,325.0	9,173.9	9,215.3	9,128.4	12.6	12.2	-93.85	-228.3	101.2	287.4	262.6	24.82	11.581	
9,350.0	9,180.6	9,230.8	9,135.9	12.7	12.2	-92.07	-241.2	105.2	304.9	280.0	24.95	12.222	
9,375.0	9,186.1	9,245.9	9,142.8	12.9	12.2	-90.24	-254.1	109.2	322.7	297.6	25.10	12.856	
9,400.0	9,190.2	9,260.9	9,149.2	13.0	12.3	-88.38	-267.0	113.3	340.6	315.3	25.27	13.481	
9,425.0	9,193.1	9,275.0	9,154.9	13.2	12.3	-86.44	-279.3	117.1	358.7	333.2	25.45	14.094	
9,450.0	9,194.7	9,290.3	9,160.6	13.3	12.3	-84.61	-292.9	121.3	376.9	351.2	25.66	14.689	
9,467.6	9,195.0	9,300.0	9,163.9	13.5	12.3	-83.23	-301.6	124.0	389.7	363.9	25.81	15.097	
9,500.0	9,195.0	9,319.9	9,170.2	13.8	12.4	-84.98	-319.5	129.6	413.3	387.2	26.13	15.817	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 - WINDWARD FEDERAL #12H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104, 8715-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	
9,600.0	9,195.0	9,385.5	9,185.5	14.8	12.5	-88.42	-380.5	148.6	483.9	456.6	27.31	17.719	
9,700.0	9,195.0	9,459.1	9,192.0	16.0	12.8	-89.56	-450.4	170.4	550.2	521.4	28.79	19.112	
9,800.0	9,195.0	9,582.9	9,192.0	17.2	13.9	-89.65	-579.7	204.6	607.8	576.7	31.14	19.516	
9,900.0	9,195.0	9,754.3	9,192.0	18.5	15.9	-89.70	-739.1	229.7	650.4	615.9	34.47	18.869	
10,000.0	9,195.0	9,912.0	9,192.0	19.8	18.1	-89.72	-896.5	236.9	675.7	637.8	37.92	17.820	
10,100.0	9,195.0	10,010.9	9,192.0	21.1	19.5	-89.73	-995.4	237.7	690.7	650.2	40.56	17.029	
10,200.0	9,195.0	10,110.5	9,192.0	22.3	20.9	-89.74	-1,095.0	238.4	698.9	655.6	43.24	16.163	
10,266.8	9,195.0	10,177.3	9,192.0	23.1	21.9	-89.74	-1,161.8	238.9	700.4	655.4	45.04	15.553	
10,300.0	9,195.0	10,210.5	9,192.0	23.5	22.4	-89.74	-1,195.0	239.1	700.4	654.5	45.93	15.249	
10,400.0	9,195.0	10,310.5	9,192.0	24.7	24.0	-89.74	-1,295.0	239.8	700.4	651.7	48.69	14.387	
10,500.0	9,195.0	10,410.5	9,192.0	26.0	25.5	-89.74	-1,395.0	240.6	700.4	648.9	51.52	13.596	
10,600.0	9,195.0	10,510.5	9,192.0	27.3	27.1	-89.74	-1,495.0	241.3	700.4	646.0	54.41	12.874	
10,700.0	9,195.0	10,610.5	9,192.0	28.7	28.6	-89.74	-1,595.0	242.0	700.4	643.1	57.35	12.213	
10,800.0	9,195.0	10,710.5	9,192.0	30.1	30.2	-89.74	-1,695.0	242.8	700.4	640.1	60.34	11.608	
10,900.0	9,195.0	10,810.5	9,192.0	31.6	31.8	-89.74	-1,795.0	243.5	700.4	637.0	63.36	11.054	
11,000.0	9,195.0	10,910.5	9,192.0	33.0	33.4	-89.74	-1,895.0	244.2	700.4	634.0	66.42	10.545	
11,100.0	9,195.0	11,010.5	9,192.0	34.5	35.0	-89.74	-1,995.0	244.9	700.4	630.9	69.51	10.077	
11,200.0	9,195.0	11,110.5	9,192.0	36.0	36.6	-89.74	-2,095.0	245.7	700.4	627.8	72.62	9.645	
11,300.0	9,195.0	11,210.5	9,192.0	37.5	38.2	-89.74	-2,195.0	246.4	700.4	624.6	75.75	9.246	
11,400.0	9,195.0	11,310.5	9,192.0	39.0	39.9	-89.74	-2,295.0	247.1	700.4	621.5	78.89	8.878	
11,500.0	9,195.0	11,410.5	9,192.0	40.6	41.5	-89.74	-2,395.0	247.9	700.4	618.3	82.06	8.535	
11,600.0	9,195.0	11,510.5	9,192.0	42.1	43.1	-89.74	-2,495.0	248.6	700.4	615.1	85.23	8.217	
11,700.0	9,195.0	11,610.5	9,192.0	43.7	44.8	-89.74	-2,595.0	249.3	700.4	611.9	88.42	7.921	
11,800.0	9,195.0	11,710.5	9,192.0	45.2	46.4	-89.74	-2,695.0	250.0	700.4	608.7	91.62	7.644	
11,900.0	9,195.0	11,810.5	9,192.0	46.8	48.0	-89.74	-2,795.0	250.8	700.4	605.5	94.83	7.385	
12,000.0	9,195.0	11,910.5	9,192.0	48.4	49.7	-89.74	-2,895.0	251.5	700.4	602.3	98.05	7.143	
12,100.0	9,195.0	12,010.5	9,192.0	50.0	51.3	-89.74	-2,995.0	252.2	700.3	599.1	101.28	6.915	
12,200.0	9,195.0	12,110.5	9,192.0	51.6	52.9	-89.74	-3,094.9	253.0	700.3	595.8	104.51	6.701	
12,300.0	9,195.0	12,210.5	9,192.0	53.2	54.6	-89.74	-3,194.9	253.7	700.3	592.6	107.75	6.500	
12,400.0	9,195.0	12,310.5	9,192.0	54.8	56.2	-89.74	-3,294.9	254.4	700.3	589.3	110.99	6.310	
12,500.0	9,195.0	12,410.5	9,192.0	56.4	57.9	-89.74	-3,394.9	255.1	700.3	586.1	114.25	6.130	
12,600.0	9,195.0	12,510.5	9,192.0	58.0	59.5	-89.74	-3,494.9	255.9	700.3	582.8	117.50	5.960	
12,700.0	9,195.0	12,610.5	9,192.0	59.6	61.2	-89.74	-3,594.9	256.6	700.3	579.6	120.76	5.799	
12,800.0	9,195.0	12,710.5	9,192.0	61.2	62.8	-89.74	-3,694.9	257.3	700.3	576.3	124.02	5.647	
12,900.0	9,195.0	12,810.5	9,192.0	62.8	64.5	-89.74	-3,794.9	258.1	700.3	573.0	127.29	5.502	
13,000.0	9,195.0	12,910.5	9,192.0	64.4	66.1	-89.74	-3,894.9	258.8	700.3	569.7	130.56	5.364	
13,100.0	9,195.0	13,010.5	9,192.0	66.1	67.8	-89.74	-3,994.9	259.5	700.3	566.5	133.84	5.232	
13,200.0	9,195.0	13,110.5	9,192.0	67.7	69.4	-89.74	-4,094.9	260.2	700.3	563.2	137.11	5.107	
13,300.0	9,195.0	13,210.5	9,192.0	69.3	71.1	-89.74	-4,194.9	261.0	700.3	559.9	140.39	4.988	
13,400.0	9,195.0	13,310.5	9,192.0	71.0	72.7	-89.74	-4,294.9	261.7	700.3	556.6	143.67	4.874	
13,500.0	9,195.0	13,410.5	9,192.0	72.6	74.4	-89.74	-4,394.9	262.4	700.3	553.3	146.96	4.765	
13,600.0	9,195.0	13,510.5	9,192.0	74.2	76.0	-89.74	-4,494.9	263.2	700.3	550.0	150.24	4.661	
13,700.0	9,195.0	13,610.5	9,192.0	75.8	77.7	-89.74	-4,594.9	263.9	700.3	546.7	153.53	4.561	
13,800.0	9,195.0	13,710.5	9,192.0	77.5	79.3	-89.74	-4,694.9	264.6	700.3	543.4	156.82	4.465	
13,900.0	9,195.0	13,810.5	9,192.0	79.1	81.0	-89.74	-4,794.9	265.3	700.2	540.1	160.11	4.373	
14,000.0	9,195.0	13,910.5	9,192.0	80.8	82.7	-89.74	-4,894.9	266.1	700.2	536.8	163.41	4.285	
14,100.0	9,195.0	14,010.5	9,192.0	82.4	84.3	-89.74	-4,994.9	266.8	700.2	533.5	166.70	4.201	
14,200.0	9,195.0	14,110.5	9,192.0	84.0	86.0	-89.74	-5,094.9	267.5	700.2	530.2	170.00	4.119	
14,300.0	9,195.0	14,210.5	9,192.0	85.7	87.6	-89.74	-5,194.9	268.3	700.2	526.9	173.30	4.041	
14,400.0	9,195.0	14,310.5	9,192.0	87.3	89.3	-89.74	-5,294.9	269.0	700.2	523.6	176.60	3.965	
14,500.0	9,195.0	14,410.5	9,192.0	89.0	90.9	-89.74	-5,394.9	269.7	700.2	520.3	179.90	3.892	
14,600.0	9,195.0	14,510.5	9,192.0	90.6	92.6	-89.74	-5,494.9	270.4	700.2	517.0	183.20	3.822	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: QWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 - WINDWARD FEDERAL #12H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104, 8715-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
14,700.0	9,195.0	14,610.5	9,192.0	92.2	94.3	-89.74	-5,594.9	271.2	700.2	513.7	186.50	3.754	
14,800.0	9,195.0	14,710.5	9,192.0	93.9	95.9	-89.74	-5,694.9	271.9	700.2	510.4	189.80	3.689	
14,900.0	9,195.0	14,810.5	9,192.0	95.5	97.6	-89.74	-5,794.9	272.6	700.2	507.1	193.11	3.626	
15,000.0	9,195.0	14,910.5	9,192.0	97.2	99.2	-89.74	-5,894.9	273.4	700.2	503.8	196.41	3.565	
15,100.0	9,195.0	15,010.5	9,192.0	98.8	100.9	-89.74	-5,994.9	274.1	700.2	500.5	199.72	3.506	
15,200.0	9,195.0	15,110.5	9,192.0	100.5	102.5	-89.74	-6,094.9	274.8	700.2	497.2	203.03	3.449	
15,300.0	9,195.0	15,210.5	9,192.0	102.1	104.2	-89.74	-6,194.9	275.5	700.2	493.8	206.34	3.393	
15,400.0	9,195.0	15,310.5	9,192.0	103.8	105.9	-89.74	-6,294.9	276.3	700.2	490.5	209.64	3.340	
15,500.0	9,195.0	15,410.5	9,192.0	105.4	107.5	-89.74	-6,394.9	277.0	700.2	487.2	212.95	3.288	
15,600.0	9,195.0	15,510.5	9,192.0	107.1	109.2	-89.74	-6,494.9	277.7	700.2	483.9	216.26	3.238	
15,700.0	9,195.0	15,610.5	9,192.0	108.7	110.8	-89.74	-6,594.9	278.4	700.2	480.6	219.57	3.189	
15,800.0	9,195.0	15,710.5	9,192.0	110.4	112.5	-89.74	-6,694.9	279.2	700.1	477.3	222.89	3.141	
15,900.0	9,195.0	15,810.5	9,192.0	112.0	114.2	-89.74	-6,794.9	279.9	700.1	473.9	226.20	3.095	
16,000.0	9,195.0	15,910.5	9,192.0	113.7	115.8	-89.74	-6,894.8	280.6	700.1	470.6	229.51	3.051	
16,100.0	9,195.0	16,010.5	9,192.0	115.3	117.5	-89.74	-6,994.8	281.4	700.1	467.3	232.82	3.007	
16,200.0	9,195.0	16,110.5	9,192.0	117.0	119.1	-89.74	-7,094.8	282.1	700.1	464.0	236.14	2.965	
16,300.0	9,195.0	16,210.5	9,192.0	118.6	120.8	-89.74	-7,194.8	282.8	700.1	460.7	239.45	2.924	
16,400.0	9,195.0	16,310.5	9,192.0	120.3	122.5	-89.74	-7,294.8	283.5	700.1	457.3	242.77	2.884	
16,500.0	9,195.0	16,410.5	9,192.0	122.0	124.1	-89.74	-7,394.8	284.3	700.1	454.0	246.08	2.845	
16,600.0	9,195.0	16,510.5	9,192.0	123.6	125.8	-89.74	-7,494.8	285.0	700.1	450.7	249.40	2.807	
16,700.0	9,195.0	16,610.5	9,192.0	125.3	127.5	-89.74	-7,594.8	285.7	700.1	447.4	252.71	2.770	
16,800.0	9,195.0	16,710.5	9,192.0	126.9	129.1	-89.74	-7,694.8	286.5	700.1	444.1	256.03	2.734	
16,900.0	9,195.0	16,810.5	9,192.0	128.6	130.8	-89.74	-7,794.8	287.2	700.1	440.7	259.35	2.699	
17,000.0	9,195.0	16,910.5	9,192.0	130.2	132.4	-89.74	-7,894.8	287.9	700.1	437.4	262.66	2.665	
17,100.0	9,195.0	17,010.5	9,192.0	131.9	134.1	-89.74	-7,994.8	288.6	700.1	434.1	265.98	2.632	
17,200.0	9,195.0	17,110.5	9,192.0	133.5	135.8	-89.74	-8,094.8	289.4	700.1	430.8	269.30	2.600	
17,300.0	9,195.0	17,210.5	9,192.0	135.2	137.4	-89.74	-8,194.8	290.1	700.1	427.5	272.62	2.568	
17,400.0	9,195.0	17,310.5	9,192.0	136.8	139.1	-89.74	-8,294.8	290.8	700.1	424.1	275.93	2.537	
17,500.0	9,195.0	17,410.5	9,192.0	138.5	140.7	-89.74	-8,394.8	291.6	700.1	420.8	279.25	2.507	
17,600.0	9,195.0	17,510.5	9,192.0	140.2	142.4	-89.74	-8,494.8	292.3	700.1	417.5	282.57	2.477	
17,700.0	9,195.0	17,610.5	9,192.0	141.8	144.1	-89.74	-8,594.8	293.0	700.0	414.2	285.89	2.449	
17,800.0	9,195.0	17,710.5	9,192.0	143.5	145.7	-89.74	-8,694.8	293.7	700.0	410.8	289.21	2.421	
17,900.0	9,195.0	17,810.5	9,192.0	145.1	147.4	-89.74	-8,794.8	294.5	700.0	407.5	292.53	2.393	
18,000.0	9,195.0	17,910.5	9,192.0	146.8	149.1	-89.74	-8,894.8	295.2	700.0	404.2	295.85	2.366	
18,100.0	9,195.0	18,010.5	9,192.0	148.4	150.7	-89.74	-8,994.8	295.9	700.0	400.9	299.17	2.340	
18,200.0	9,195.0	18,110.5	9,192.0	150.1	152.4	-89.74	-9,094.8	296.7	700.0	397.5	302.49	2.314	
18,300.0	9,195.0	18,210.5	9,192.0	151.8	154.0	-89.74	-9,194.8	297.4	700.0	394.2	305.81	2.289	
18,400.0	9,195.0	18,310.5	9,192.0	153.4	155.7	-89.74	-9,294.8	298.1	700.0	390.9	309.13	2.264	
18,500.0	9,195.0	18,410.5	9,192.0	155.1	157.4	-89.74	-9,394.8	298.8	700.0	387.6	312.45	2.240	
18,600.0	9,195.0	18,510.5	9,192.0	156.7	159.0	-89.74	-9,494.8	299.6	700.0	384.2	315.77	2.217	
18,700.0	9,195.0	18,610.5	9,192.0	158.4	160.7	-89.74	-9,594.8	300.3	700.0	380.9	319.10	2.194	
18,800.0	9,195.0	18,710.5	9,192.0	160.1	162.4	-89.74	-9,694.8	301.0	700.0	377.6	322.42	2.171	
18,900.0	9,195.0	18,810.5	9,192.0	161.7	164.0	-89.74	-9,794.8	301.8	700.0	374.2	325.74	2.149	
19,000.0	9,195.0	18,910.5	9,192.0	163.4	165.7	-89.74	-9,894.8	302.5	700.0	370.9	329.06	2.127	
19,100.0	9,195.0	19,010.5	9,192.0	165.0	167.4	-89.74	-9,994.8	303.2	700.0	367.6	332.38	2.106	
19,200.0	9,195.0	19,110.5	9,192.0	166.7	169.0	-89.74	-10,094.8	303.9	700.0	364.3	335.71	2.085	
19,300.0	9,195.0	19,210.5	9,192.0	168.4	170.7	-89.74	-10,194.8	304.7	700.0	360.9	339.03	2.065	
19,373.7	9,195.0	19,284.2	9,192.0	169.6	171.9	-89.74	-10,268.5	305.2	700.0	358.5	341.48	2.050	
19,404.3	9,195.0	19,310.8	9,192.0	170.1	172.3	-89.74	-10,295.1	305.4	700.0	357.5	342.43	2.044	
19,404.8	9,195.0	19,310.8	9,192.0	170.1	172.3	-89.74	-10,295.1	305.4	700.0	357.5	342.44	2.044	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DEEP BSS - WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 100-GYRO-NS, 9967-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.0	0.0	2.2	2.2	3.0	3.0	80.69	21.3	130.0	131.7					
100.0	100.0	102.4	102.4	3.0	3.0	80.62	21.5	129.9	131.6	125.6	6.00	21.928		
200.0	200.0	202.5	202.5	3.0	3.0	80.43	21.8	129.6	131.4	125.4	6.05	21.744		
300.0	300.0	302.5	302.4	3.0	3.1	80.22	22.3	129.3	131.2	125.1	6.13	21.403		
400.0	400.0	402.4	402.4	3.0	3.2	79.93	22.9	129.0	131.1	124.8	6.26	20.936		
438.4	438.4	440.6	440.6	3.0	3.3	79.78	23.3	129.0	131.0	124.7	6.32	20.734		
500.0	500.0	501.9	501.9	3.1	3.4	79.51	23.9	128.9	131.1	124.7	6.43	20.400		
600.0	600.0	601.4	601.4	3.1	3.5	79.05	25.0	129.1	131.5	124.9	6.63	19.845		
700.0	700.0	701.4	701.4	3.1	3.7	78.61	26.1	129.5	132.1	125.3	6.86	19.265		
800.0	800.0	801.2	801.2	3.2	4.0	78.18	27.2	130.0	132.8	125.7	7.12	18.668		
900.0	900.0	902.6	902.6	3.2	4.2	77.79	28.1	130.0	133.1	125.7	7.40	17.983		
1,000.0	1,000.0	1,002.6	1,002.6	3.2	4.5	77.68	28.3	129.7	132.8	125.1	7.70	17.248		
1,100.0	1,100.0	1,102.3	1,102.3	3.3	4.7	77.73	28.2	129.6	132.6	124.6	8.01	16.551		
1,200.0	1,200.0	1,202.3	1,202.2	3.4	5.0	77.74	28.1	129.5	132.6	124.2	8.34	15.892		
1,300.0	1,300.0	1,302.3	1,302.2	3.4	5.3	77.75	28.1	129.5	132.5	123.9	8.68	15.262		
1,400.0	1,400.0	1,402.4	1,402.3	3.5	5.6	77.77	28.1	129.5	132.5	123.4	9.04	14.655		
1,500.0	1,500.0	1,502.3	1,502.2	3.5	5.9	77.78	28.0	129.4	132.4	123.0	9.41	14.079		
1,600.0	1,600.0	1,602.3	1,602.3	3.6	6.2	77.79	28.0	129.4	132.4	122.6	9.78	13.536		
1,700.0	1,700.0	1,702.3	1,702.2	3.7	6.5	77.81	28.0	129.4	132.3	122.2	10.16	13.023		
1,800.0	1,800.0	1,802.3	1,802.2	3.8	6.8	77.82	27.9	129.3	132.3	121.8	10.55	12.538		
1,900.0	1,900.0	1,902.3	1,902.3	3.9	7.1	77.83	27.9	129.3	132.3	121.3	10.95	12.081		
2,000.0	2,000.0	2,002.3	2,002.3	3.9	7.4	77.84	27.8	129.2	132.2	120.9	11.35	11.647		
2,097.8	2,097.8	2,100.0	2,100.0	4.0	7.7	77.85	27.8	129.2	132.2	120.4	11.75	11.249		
2,100.0	2,100.0	2,102.2	2,102.2	4.0	7.7	77.85	27.8	129.2	132.2	120.4	11.76	11.240		
2,200.0	2,200.0	2,202.2	2,202.1	4.1	8.1	77.86	27.8	129.2	132.2	120.0	12.17	10.862		
2,300.0	2,300.0	2,302.0	2,302.0	4.2	8.4	77.86	27.8	129.3	132.3	119.7	12.58	10.512		
2,400.0	2,400.0	2,402.2	2,402.2	4.3	8.7	77.85	27.9	129.4	132.4	119.4	13.00	10.179		
2,500.0	2,500.0	2,501.8	2,501.8	4.4	9.0	77.83	27.9	129.6	132.5	119.1	13.43	9.872		
2,600.0	2,600.0	2,602.2	2,602.1	4.5	9.4	77.65	28.4	129.6	132.7	118.9	13.85	9.580		
2,700.0	2,700.0	2,702.3	2,702.3	4.6	9.7	77.38	29.0	129.5	132.7	118.4	14.29	9.290		
2,800.0	2,800.0	2,802.6	2,802.5	4.7	10.0	77.13	29.5	129.2	132.6	117.8	14.72	9.005		
2,900.0	2,900.0	2,902.7	2,902.6	4.8	10.4	76.98	29.8	128.9	132.3	117.1	15.16	8.726		
2,940.1	2,940.1	2,942.3	2,942.3	4.8	10.5	76.98	29.8	128.8	132.2	116.9	15.33	8.623		
3,000.0	3,000.0	3,001.6	3,001.5	4.9	10.7	77.11	29.5	129.0	132.3	116.7	15.59	8.488		
3,100.0	3,100.0	3,100.6	3,100.6	5.0	11.0	77.33	29.2	130.0	133.2	117.2	16.03	8.311		
3,200.0	3,200.0	3,200.9	3,200.8	5.1	11.4	77.25	29.6	131.0	134.3	117.9	16.47	8.156		
3,300.0	3,300.0	3,301.6	3,301.5	5.2	11.7	76.96	30.5	131.6	135.1	118.2	16.92	7.987		
3,400.0	3,400.0	3,402.6	3,402.6	5.3	12.0	76.70	31.1	131.6	135.2	117.8	17.37	7.785		
3,437.3	3,437.3	3,439.6	3,439.5	5.4	12.2	76.65	31.2	131.5	135.1	117.6	17.53	7.709		
3,500.0	3,500.0	3,501.6	3,501.6	5.4	12.4	76.70	31.1	131.7	135.3	117.5	17.81	7.596		
3,600.0	3,600.0	3,600.9	3,600.8	5.5	12.7	76.62	31.5	132.3	136.0	117.8	18.26	7.451		
3,700.0	3,700.0	3,702.1	3,702.0	5.7	13.1	76.22	32.5	132.7	136.6	117.9	18.71	7.300		
3,800.0	3,800.0	3,802.0	3,802.0	5.8	13.4	75.88	33.4	132.6	136.8	117.6	19.16	7.136		
3,900.0	3,900.0	3,902.1	3,902.0	5.9	13.7	75.71	33.8	132.7	136.9	117.3	19.62	6.979		
4,000.0	4,000.0	4,002.0	4,002.0	6.0	14.1	75.61	34.1	132.8	137.1	117.0	20.07	6.829		
4,100.0	4,100.0	4,102.2	4,102.2	6.1	14.4	75.44	34.5	132.8	137.2	116.7	20.53	6.682		
4,200.0	4,200.0	4,202.1	4,202.0	6.2	14.8	75.12	35.3	132.7	137.3	116.3	20.99	6.542		
4,300.0	4,300.0	4,303.0	4,302.9	6.3	15.1	74.95	35.6	132.4	137.1	115.7	21.45	6.394		
4,400.0	4,400.0	4,404.2	4,404.1	6.5	15.5	75.14	34.9	131.6	136.2	114.3	21.91	6.214		
4,500.0	4,500.0	4,502.7	4,502.6	6.6	15.8	75.68	33.5	131.1	135.3	113.0	22.37	6.051		
4,531.2	4,531.2	4,533.6	4,533.4	6.6	15.9	75.91	32.9	131.2	135.3	112.8	22.51	6.011		
4,600.0	4,600.0	4,601.5	4,601.3	6.7	16.1	76.39	31.9	131.7	135.5	112.7	22.82	5.938		

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DEEP BSS - WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 100-GYRO-NS, 9967-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		
4,700.0	4,700.0	4,700.2	4,700.0	6.8	16.5	76.81	31.2	133.0	136.6	113.3	23.28	5.870		
4,800.0	4,800.0	4,801.1	4,800.9	6.9	16.8	76.64	31.9	134.1	137.9	114.1	23.74	5.807		
4,900.0	4,900.0	4,902.4	4,902.3	7.0	17.2	76.08	33.3	134.2	138.3	114.1	24.21	5.712		
5,000.0	5,000.0	5,003.5	5,003.4	7.2	17.5	75.49	34.5	133.4	137.8	113.1	24.68	5.585		
5,100.0	5,100.0	5,103.5	5,103.3	7.3	17.9	74.94	35.6	132.3	137.0	111.9	25.14	5.449		
5,200.0	5,200.0	5,203.6	5,203.4	7.4	18.2	74.36	36.7	131.1	136.1	110.5	25.61	5.317		
5,300.0	5,300.0	5,303.7	5,303.5	7.5	18.5	73.74	37.9	129.8	135.2	109.2	26.07	5.186		
5,400.0	5,400.0	5,403.8	5,403.6	7.6	18.9	73.13	39.0	128.4	134.2	107.7	26.54	5.058		
5,500.0	5,500.0	5,503.7	5,503.5	7.8	19.2	72.52	40.0	127.1	133.2	106.2	27.01	4.933		
5,600.0	5,600.0	5,603.3	5,603.0	7.9	19.6	71.90	41.1	125.9	132.4	104.9	27.47	4.820		
5,700.0	5,700.0	5,703.2	5,702.9	8.0	19.9	71.35	42.2	124.9	131.8	103.9	27.94	4.718		
5,800.0	5,800.0	5,802.7	5,802.4	8.1	20.3	70.81	43.2	124.2	131.5	103.1	28.41	4.628		
5,900.0	5,900.0	5,902.6	5,902.4	8.3	20.6	70.36	44.1	123.7	131.3	102.4	28.88	4.548		
5,988.2	5,988.2	5,990.6	5,990.4	8.4	20.9	70.05	44.8	123.4	131.3	102.0	29.29	4.482		
6,000.0	6,000.0	6,002.5	6,002.2	8.4	21.0	70.01	44.9	123.4	131.3	101.9	29.34	4.473		
6,100.0	6,100.0	6,102.8	6,102.6	8.5	21.3	69.65	45.6	122.9	131.1	101.3	29.81	4.398		
6,200.0	6,200.0	6,203.0	6,202.7	8.6	21.7	69.36	46.1	122.4	130.8	100.5	30.29	4.319		
6,300.0	6,300.0	6,302.9	6,302.6	8.8	22.0	69.15	46.4	121.9	130.5	99.7	30.76	4.242		
6,400.0	6,400.0	6,402.8	6,402.5	8.9	22.3	68.95	46.8	121.5	130.2	99.0	31.23	4.169		
6,500.0	6,500.0	6,503.0	6,502.7	9.0	22.7	68.77	47.0	121.1	129.9	98.2	31.70	4.097		
6,600.0	6,600.0	6,603.1	6,602.8	9.1	23.0	68.65	47.1	120.6	129.4	97.3	32.17	4.024		
6,700.0	6,700.0	6,703.0	6,702.7	9.3	23.4	68.49	47.3	120.0	129.0	96.4	32.64	3.953		
6,800.0	6,800.0	6,803.0	6,802.7	9.4	23.7	68.32	47.5	119.5	128.6	95.5	33.11	3.885		
6,900.0	6,900.0	6,902.6	6,902.3	9.5	24.1	68.12	47.8	119.1	128.4	94.8	33.58	3.823		
7,000.0	7,000.0	7,002.6	7,002.3	9.6	24.4	67.86	48.4	118.8	128.3	94.3	34.06	3.768		
7,100.0	7,100.0	7,102.9	7,102.6	9.8	24.8	67.69	48.6	118.5	128.1	93.6	34.53	3.710		
7,200.0	7,200.0	7,203.1	7,202.8	9.9	25.1	67.55	48.8	118.0	127.7	92.7	35.00	3.648		
7,300.0	7,300.0	7,303.8	7,303.5	10.0	25.5	67.51	48.5	117.2	126.9	91.4	35.48	3.577		
7,400.0	7,400.0	7,403.6	7,403.3	10.1	25.8	67.63	47.9	116.5	125.9	90.0	35.95	3.503		
7,500.0	7,500.0	7,503.7	7,503.4	10.3	26.2	67.73	47.4	115.7	125.0	88.6	36.42	3.433		
7,600.0	7,600.0	7,603.2	7,602.9	10.4	26.5	67.95	46.7	115.2	124.3	87.4	36.89	3.369		
7,700.0	7,700.0	7,703.3	7,703.0	10.5	26.9	68.44	45.5	115.0	123.7	86.3	37.37	3.310		
7,800.0	7,800.0	7,803.4	7,803.1	10.6	27.2	69.15	43.8	114.9	123.0	85.2	37.84	3.250		
7,900.0	7,900.0	7,903.9	7,903.5	10.8	27.6	70.01	41.7	114.7	122.1	83.8	38.31	3.187		
8,000.0	8,000.0	8,004.0	8,003.7	10.9	27.9	70.91	39.5	114.3	120.9	82.2	38.79	3.118		
8,100.0	8,100.0	8,103.9	8,103.5	11.0	28.2	71.75	37.5	113.8	119.8	80.5	39.26	3.051		
8,200.0	8,200.0	8,204.4	8,204.0	11.1	28.6	72.56	35.5	113.0	118.5	78.7	39.73	2.982		
8,300.0	8,300.0	8,304.5	8,304.1	11.3	28.9	73.27	33.7	112.0	116.9	76.7	40.21	2.908		
8,400.0	8,400.0	8,404.4	8,403.9	11.4	29.3	73.99	31.8	110.9	115.4	74.7	40.68	2.836		
8,500.0	8,500.0	8,504.3	8,503.8	11.5	29.6	74.66	30.1	109.9	114.0	72.8	41.16	2.769		
8,600.0	8,600.0	8,605.5	8,605.0	11.6	30.0	74.75	29.4	108.0	112.0	70.3	41.64	2.689		
8,700.0	8,700.0	8,705.2	8,704.6	11.8	30.3	74.52	29.2	105.6	109.6	67.5	42.11	2.603		
8,717.5	8,717.5	8,722.6	8,722.0	11.8	30.4	74.49	29.2	105.2	109.2	67.0	42.19	2.589		
8,725.0	8,725.0	8,730.0	8,729.5	11.8	30.4	-137.11	29.2	105.1	109.1	66.9	42.23	2.584		
8,730.9	8,730.9	8,735.9	8,735.4	11.8	30.4	-137.17	29.2	104.9	109.1	66.8	42.25	2.582 CC, ES, SF		
8,750.0	8,750.0	8,754.9	8,754.3	11.8	30.5	-137.51	29.2	104.5	109.4	67.1	42.31	2.585		
8,775.0	8,774.9	8,779.6	8,779.1	11.8	30.6	-138.29	29.2	104.1	110.6	68.2	42.40	2.610		
8,800.0	8,799.6	8,804.2	8,803.6	11.8	30.7	-139.40	29.2	103.6	113.0	70.5	42.49	2.659		
8,825.0	8,824.1	8,828.5	8,827.9	11.8	30.8	-140.74	29.1	103.2	116.4	73.8	42.58	2.734		
8,850.0	8,848.3	8,852.5	8,851.9	11.8	30.8	-142.24	29.1	102.9	121.0	78.4	42.67	2.836		
8,875.0	8,872.2	8,876.1	8,875.6	11.8	30.9	-143.82	29.0	102.7	126.8	84.1	42.77	2.966		
8,900.0	8,895.6	8,899.4	8,898.8	11.8	31.0	-145.43	28.8	102.6	133.9	91.0	42.86	3.124		

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DEEP BSS - WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft	
Survey Program: 100-GYRO-NS, 9967-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		
8,925.0	8,918.5	8,922.1	8,921.6	11.9	31.1	-147.01	28.7	102.5	142.2	99.2	42.95	3.310		
8,950.0	8,940.9	8,944.4	8,943.8	11.9	31.2	-148.52	28.5	102.4	151.7	108.7	43.05	3.525		
8,975.0	8,962.7	8,966.0	8,965.4	11.9	31.2	-149.92	28.3	102.4	162.6	119.4	43.14	3.768		
9,000.0	8,983.8	8,986.9	8,986.3	11.9	31.3	-151.19	28.2	102.5	174.6	131.3	43.24	4.038		
9,025.0	9,004.2	9,007.2	9,006.6	11.9	31.4	-152.31	28.0	102.6	187.8	144.5	43.33	4.334		
9,050.0	9,023.8	9,026.8	9,026.3	12.0	31.5	-153.28	27.8	102.7	202.2	158.8	43.43	4.656		
9,075.0	9,042.5	9,045.6	9,045.1	12.0	31.5	-154.08	27.6	102.8	217.7	174.1	43.53	5.000		
9,100.0	9,060.4	9,063.6	9,063.0	12.0	31.6	-154.70	27.4	102.9	234.2	190.5	43.63	5.368		
9,125.0	9,077.3	9,080.6	9,080.0	12.1	31.6	-155.14	27.3	103.0	251.7	208.0	43.73	5.756		
9,150.0	9,093.2	9,096.6	9,096.1	12.1	31.7	-155.38	27.1	103.1	270.1	226.3	43.83	6.163		
9,175.0	9,108.1	9,112.0	9,111.4	12.2	31.7	-155.45	26.9	103.2	289.4	245.5	43.93	6.588		
9,200.0	9,122.0	9,126.5	9,125.9	12.2	31.8	-155.30	26.7	103.3	309.5	265.5	44.04	7.029		
9,225.0	9,134.7	9,139.8	9,139.2	12.3	31.8	-154.91	26.5	103.4	330.4	286.2	44.15	7.484		
9,250.0	9,146.3	9,152.1	9,151.5	12.4	31.9	-154.21	26.3	103.5	351.9	307.7	44.26	7.952		
9,275.0	9,156.7	9,163.1	9,162.5	12.4	31.9	-153.14	26.1	103.5	374.1	329.7	44.37	8.430		
9,300.0	9,165.9	9,173.0	9,172.4	12.5	32.0	-151.59	26.0	103.5	396.8	352.3	44.49	8.917		
9,325.0	9,173.9	9,181.7	9,181.1	12.6	32.0	-149.39	25.8	103.6	420.0	375.3	44.62	9.412		
9,350.0	9,180.6	9,189.1	9,188.5	12.7	32.0	-146.27	25.7	103.6	443.6	398.8	44.76	9.911		
9,375.0	9,186.1	9,195.2	9,194.6	12.9	32.0	-141.78	25.6	103.6	467.6	422.7	44.90	10.413		
9,400.0	9,190.2	9,199.9	9,199.3	13.0	32.1	-135.18	25.5	103.6	491.9	446.8	45.06	10.915		
9,425.0	9,193.1	9,203.3	9,202.7	13.2	32.1	-125.20	25.4	103.6	516.4	471.1	45.23	11.416		
9,450.0	9,194.7	9,205.4	9,204.8	13.3	32.1	-110.20	25.4	103.6	541.1	495.6	45.42	11.912		
9,467.6	9,195.0	9,206.0	9,205.4	13.5	32.1	-96.25	25.4	103.6	558.4	512.9	45.56	12.257		
9,500.0	9,195.0	9,206.6	9,206.0	13.8	32.1	-95.69	25.4	103.6	590.5	544.7	45.84	12.882		
9,600.0	9,195.0	9,208.3	9,207.7	14.8	32.1	-94.56	25.3	103.6	689.1	642.2	46.87	14.702		
9,700.0	9,195.0	9,210.1	9,209.5	16.0	32.1	-93.87	25.3	103.6	786.8	738.7	48.07	16.369		
9,800.0	9,195.0	9,212.0	9,211.4	17.2	32.1	-93.42	25.3	103.6	883.6	834.2	49.34	17.907		
9,900.0	9,195.0	9,214.0	9,213.4	18.5	32.1	-93.09	25.2	103.6	979.3	928.6	50.64	19.339		
10,000.0	9,195.0	9,216.0	9,215.4	19.8	32.1	-92.83	25.2	103.6	1,073.8	1,021.9	51.92	20.680		
10,100.0	9,195.0	9,218.1	9,217.5	21.1	32.1	-92.63	25.1	103.6	1,167.0	1,113.9	53.19	21.942		
10,200.0	9,195.0	9,220.2	9,219.6	22.3	32.1	-92.47	25.1	103.6	1,258.9	1,204.5	54.42	23.133		
10,266.8	9,195.0	9,221.6	9,221.0	23.1	32.1	-92.38	25.1	103.6	1,319.4	1,264.2	55.22	23.891		
10,300.0	9,195.0	9,222.3	9,221.7	23.5	32.1	-92.45	25.1	103.6	1,349.3	1,293.7	55.62	24.258		
10,400.0	9,195.0	11,662.4	10,547.7	24.7	41.0	-164.57	-1,314.1	-87.8	1,401.1	1,335.4	65.72	21.319		
10,500.0	9,195.0	11,761.3	10,546.0	26.0	41.9	-164.42	-1,412.9	-83.5	1,400.3	1,332.4	67.87	20.631		
10,600.0	9,195.0	11,856.3	10,543.5	27.3	42.7	-164.23	-1,507.7	-78.7	1,399.0	1,329.0	70.08	19.963		
10,651.1	9,195.0	11,897.0	10,542.8	28.0	43.1	-164.14	-1,548.4	-76.5	1,398.8	1,327.7	71.16	19.656		
10,700.0	9,195.0	11,936.3	10,542.4	28.7	43.5	-164.07	-1,587.6	-74.4	1,399.0	1,326.8	72.22	19.370		
10,800.0	9,195.0	12,029.1	10,542.6	30.1	44.4	-163.93	-1,680.3	-70.1	1,400.3	1,325.7	74.56	18.781		
10,900.0	9,195.0	12,129.7	10,542.4	31.6	45.5	-163.76	-1,780.8	-65.3	1,401.1	1,324.1	77.04	18.188		
11,000.0	9,195.0	12,231.8	10,542.9	33.0	46.6	-163.64	-1,882.9	-61.1	1,402.6	1,323.0	79.60	17.622		
11,100.0	9,195.0	12,336.5	10,542.6	34.5	47.8	-163.49	-1,987.4	-56.8	1,403.2	1,321.0	82.24	17.062		
11,200.0	9,195.0	12,463.0	10,541.7	36.0	49.2	-163.39	-2,113.9	-53.4	1,403.2	1,318.0	85.19	16.471		
11,300.0	9,195.0	12,547.8	10,540.6	37.5	50.2	-163.32	-2,198.7	-51.5	1,402.4	1,314.7	87.71	15.989		
11,310.7	9,195.0	12,557.0	10,540.6	37.7	50.3	-163.32	-2,207.8	-51.3	1,402.4	1,314.4	87.98	15.940		
11,400.0	9,195.0	12,624.0	10,540.8	39.0	51.1	-163.27	-2,274.8	-49.5	1,403.1	1,313.0	90.16	15.563		
11,500.0	9,195.0	12,745.0	10,541.3	40.6	52.6	-163.18	-2,395.8	-46.1	1,404.2	1,311.0	93.18	15.070		
11,600.0	9,195.0	12,823.8	10,541.1	42.1	53.6	-163.10	-2,474.5	-43.6	1,404.8	1,309.1	95.72	14.676		
11,700.0	9,195.0	12,947.3	10,541.1	43.7	55.2	-162.97	-2,598.0	-39.3	1,405.6	1,306.7	98.86	14.218		
11,703.5	9,195.0	12,949.9	10,541.1	43.7	55.2	-162.96	-2,600.6	-39.2	1,405.6	1,306.6	98.95	14.205		
11,800.0	9,195.0	13,027.0	10,541.0	45.2	56.2	-162.85	-2,677.6	-35.7	1,406.5	1,305.0	101.46	13.862		
11,900.0	9,195.0	13,146.6	10,540.0	46.8	57.8	-162.63	-2,796.9	-29.6	1,406.9	1,302.3	104.61	13.449		

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: QWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DEEP BSS - WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-GYRO-NS, 9967-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
12,000.0	9,195.0	13,234.1	10,539.6	48.4	59.0	-162.48	-2,884.4	-25.2	1,407.7	1,300.3	107.37	13.111	
12,100.0	9,195.0	13,349.8	10,537.3	50.0	60.5	-162.25	-2,999.9	-19.0	1,407.2	1,296.6	110.53	12.732	
12,110.5	9,195.0	13,357.3	10,537.2	50.1	60.7	-162.23	-3,007.4	-18.6	1,407.2	1,296.4	110.80	12.700	
12,200.0	9,195.0	13,424.1	10,537.0	51.6	61.6	-162.13	-3,074.1	-15.6	1,407.9	1,294.8	113.14	12.444	
12,300.0	9,195.0	13,510.8	10,538.2	53.2	62.8	-162.04	-3,160.7	-12.1	1,410.2	1,294.3	115.93	12.164	
12,400.0	9,195.0	13,619.2	10,539.1	54.8	64.3	-161.90	-3,269.0	-7.5	1,412.0	1,293.0	119.05	11.860	
12,500.0	9,195.0	13,701.7	10,540.2	56.4	65.5	-161.75	-3,351.4	-2.7	1,414.8	1,293.0	121.82	11.614	
12,600.0	9,195.0	13,813.1	10,540.9	58.0	67.0	-161.53	-3,462.5	4.2	1,417.1	1,292.0	125.02	11.334	
12,700.0	9,195.0	13,905.5	10,542.6	59.6	68.4	-161.39	-3,554.9	9.1	1,420.2	1,292.3	127.97	11.099	
12,800.0	9,195.0	14,013.1	10,543.3	61.2	69.9	-161.22	-3,662.3	14.5	1,422.2	1,291.0	131.14	10.845	
12,900.0	9,195.0	14,101.2	10,545.1	62.8	71.2	-161.12	-3,750.3	18.4	1,425.3	1,291.3	134.04	10.634	
13,000.0	9,195.0	14,216.4	10,546.8	64.4	72.9	-160.95	-3,865.3	24.2	1,428.1	1,290.7	137.35	10.397	
13,100.0	9,195.0	14,330.5	10,547.0	66.1	74.6	-160.76	-3,979.2	30.1	1,429.8	1,289.1	140.67	10.164	
13,200.0	9,195.0	14,453.6	10,545.5	67.7	76.4	-160.52	-4,102.2	37.0	1,430.2	1,286.1	144.13	9.923	
13,300.0	9,195.0	14,558.0	10,542.7	69.3	78.0	-160.29	-4,206.4	42.8	1,429.3	1,281.9	147.32	9.702	
13,338.3	9,195.0	14,586.4	10,542.1	69.9	78.4	-160.23	-4,234.7	44.3	1,429.1	1,280.8	148.37	9.632	
13,400.0	9,195.0	14,636.4	10,541.6	71.0	79.2	-160.14	-4,284.7	46.9	1,429.5	1,279.3	150.13	9.522	
13,500.0	9,195.0	14,745.8	10,540.3	72.6	80.8	-159.97	-4,393.9	51.9	1,429.6	1,276.2	153.41	9.318	
13,600.0	9,195.0	14,824.2	10,540.2	74.2	82.0	-159.87	-4,472.3	55.0	1,430.6	1,274.4	156.24	9.157	
13,700.0	9,195.0	14,928.7	10,540.8	75.8	83.6	-159.77	-4,576.7	58.6	1,432.1	1,272.6	159.46	8.981	
13,800.0	9,195.0	15,026.4	10,541.3	77.5	85.1	-159.67	-4,674.4	62.2	1,433.6	1,271.0	162.59	8.817	
13,900.0	9,195.0	15,126.5	10,541.6	79.1	86.6	-159.55	-4,774.3	66.4	1,435.0	1,269.3	165.76	8.657	
14,000.0	9,195.0	15,224.1	10,542.0	80.8	88.1	-159.42	-4,871.8	70.6	1,436.7	1,267.8	168.90	8.506	
14,100.0	9,195.0	15,324.7	10,542.6	82.4	89.7	-159.31	-4,972.3	74.6	1,438.4	1,266.3	172.09	8.358	
14,200.0	9,195.0	15,422.0	10,543.1	84.0	91.2	-159.18	-5,069.5	78.8	1,440.1	1,264.9	175.24	8.218	
14,300.0	9,195.0	15,524.5	10,543.7	85.7	92.8	-159.06	-5,172.0	83.2	1,442.0	1,263.5	178.48	8.079	
14,400.0	9,195.0	15,616.9	10,544.1	87.3	94.2	-158.93	-5,264.3	87.4	1,443.7	1,262.1	181.56	7.952	
14,500.0	9,195.0	15,724.1	10,545.1	89.0	95.9	-158.78	-5,371.3	92.6	1,446.1	1,261.2	184.88	7.822	
14,600.0	9,195.0	15,827.1	10,545.2	90.6	97.5	-158.65	-5,474.2	97.0	1,447.5	1,259.3	188.14	7.694	
14,700.0	9,195.0	15,946.8	10,545.0	92.2	99.4	-158.51	-5,593.9	101.6	1,448.5	1,256.9	191.66	7.558	
14,800.0	9,195.0	16,058.5	10,544.0	93.9	101.2	-158.42	-5,705.5	104.6	1,448.4	1,253.4	195.06	7.425	
14,900.0	9,195.0	16,216.1	10,538.8	95.5	103.6	-158.25	-5,862.9	108.2	1,446.0	1,246.8	199.18	7.260	
15,000.0	9,195.0	16,297.2	10,534.8	97.2	104.9	-158.15	-5,944.0	109.8	1,441.9	1,239.7	202.11	7.134	
15,100.0	9,195.0	16,378.9	10,532.0	98.8	106.2	-158.07	-6,025.6	111.5	1,439.2	1,234.2	205.04	7.019	
15,200.0	9,195.0	16,453.0	10,530.2	100.5	107.4	-157.98	-6,099.6	113.8	1,437.9	1,230.1	207.86	6.918	
15,210.8	9,195.0	16,460.2	10,530.1	100.7	107.5	-157.97	-6,106.8	114.1	1,437.9	1,229.8	208.15	6.908	
15,300.0	9,195.0	16,522.1	10,529.9	102.1	108.5	-157.88	-6,168.7	116.9	1,438.8	1,228.2	210.61	6.832	
15,400.0	9,195.0	16,606.8	10,530.5	103.8	109.8	-157.75	-6,253.2	121.4	1,441.3	1,227.7	213.61	6.747	
15,500.0	9,195.0	16,709.2	10,531.7	105.4	111.5	-157.58	-6,355.4	127.2	1,444.2	1,227.3	216.90	6.658	
15,600.0	9,195.0	16,826.7	10,531.9	107.1	113.4	-157.34	-6,472.7	134.5	1,446.5	1,226.1	220.44	6.562	
15,700.0	9,195.0	16,936.9	10,530.3	108.7	115.1	-157.08	-6,582.7	141.9	1,447.4	1,223.6	223.86	6.466	
15,800.0	9,195.0	17,017.8	10,529.4	110.4	116.4	-156.89	-6,663.4	147.4	1,448.8	1,222.0	226.82	6.388	
15,900.0	9,195.0	17,095.8	10,529.9	112.0	117.7	-156.71	-6,741.1	153.1	1,452.0	1,222.3	229.73	6.321	
16,000.0	9,195.0	17,203.7	10,530.9	113.7	119.4	-156.45	-6,848.8	161.5	1,455.6	1,222.5	233.13	6.244	
16,100.0	9,195.0	17,317.5	10,530.7	115.3	121.3	-156.16	-6,962.2	170.3	1,458.3	1,221.6	236.63	6.163	
16,200.0	9,195.0	17,406.5	10,530.4	117.0	122.7	-155.94	-7,050.9	176.9	1,460.7	1,221.0	239.73	6.093	
16,300.0	9,195.0	17,494.7	10,531.7	118.6	124.2	-155.78	-7,139.0	182.6	1,464.4	1,221.5	242.81	6.031	
16,400.0	9,195.0	17,594.2	10,533.2	120.3	125.8	-155.60	-7,238.2	189.2	1,468.2	1,222.1	246.08	5.966	
16,500.0	9,195.0	17,699.8	10,534.8	122.0	127.5	-155.40	-7,343.6	196.3	1,472.0	1,222.6	249.46	5.901	
16,600.0	9,195.0	17,797.8	10,536.5	123.6	129.1	-155.27	-7,441.4	201.4	1,475.5	1,222.8	252.70	5.839	
16,700.0	9,195.0	17,908.0	10,538.7	125.3	130.9	-155.15	-7,551.5	206.6	1,479.0	1,222.9	256.14	5.774	
16,800.0	9,195.0	18,046.1	10,538.4	126.9	133.1	-154.95	-7,689.4	213.3	1,480.5	1,220.5	260.04	5.693	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DEEP BSS - WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-GYRO-NS, 9967-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	
16,900.0	9,195.0	18,152.6	10,537.0	128.6	134.9	-154.81	-7,795.8	217.3	1,480.6	1,217.2	263.42	5.621	
16,922.5	9,195.0	18,174.6	10,536.8	128.9	135.2	-154.79	-7,817.8	217.8	1,480.6	1,216.4	264.15	5.605	
17,000.0	9,195.0	18,251.8	10,536.6	130.2	136.5	-154.77	-7,895.0	218.9	1,480.6	1,213.9	266.68	5.552	
17,100.0	9,195.0	18,365.4	10,536.7	131.9	138.3	-154.81	-8,008.7	218.7	1,480.4	1,210.2	270.16	5.480	
17,200.0	9,195.0	18,460.7	10,536.6	133.5	139.8	-154.88	-8,103.9	217.5	1,479.4	1,206.1	273.34	5.412	
17,300.0	9,195.0	18,560.1	10,537.1	135.2	141.4	-154.95	-8,203.3	216.2	1,479.0	1,202.4	276.59	5.347	
17,400.0	9,195.0	18,666.4	10,537.2	136.8	143.1	-155.03	-8,309.6	214.9	1,478.2	1,198.3	279.95	5.280	
17,500.0	9,195.0	18,768.6	10,536.6	138.5	144.7	-155.06	-8,411.7	214.5	1,477.2	1,193.9	283.25	5.215	
17,600.0	9,195.0	18,877.9	10,535.2	140.2	146.5	-155.06	-8,521.1	214.6	1,475.8	1,189.1	286.67	5.148	
17,700.0	9,195.0	18,983.7	10,533.1	141.8	148.2	-155.05	-8,626.9	214.8	1,473.8	1,183.7	290.04	5.081	
17,800.0	9,195.0	19,081.3	10,530.9	143.5	149.8	-155.02	-8,724.5	215.2	1,471.6	1,178.4	293.27	5.018	
17,900.0	9,195.0	19,173.7	10,529.3	145.1	151.3	-155.00	-8,816.9	215.7	1,469.9	1,173.5	296.42	4.959	
18,000.0	9,195.0	19,267.2	10,528.1	146.8	152.8	-154.99	-8,910.3	216.2	1,468.7	1,169.1	299.59	4.902	
18,100.0	9,195.0	19,364.9	10,527.0	148.4	154.4	-154.96	-9,008.0	217.1	1,467.8	1,164.9	302.84	4.847	
18,200.0	9,195.0	19,460.0	10,526.0	150.1	155.9	-154.92	-9,103.0	218.4	1,467.0	1,161.0	306.04	4.794	
18,300.0	9,195.0	19,558.1	10,525.0	151.8	157.5	-154.87	-9,201.1	220.3	1,466.7	1,157.4	309.30	4.742	
18,400.0	9,195.0	19,675.7	10,522.9	153.4	159.5	-154.75	-9,318.7	223.4	1,465.9	1,153.0	312.87	4.685	
18,500.0	9,195.0	19,761.2	10,520.7	155.1	160.8	-154.66	-9,404.1	225.7	1,464.4	1,148.5	315.93	4.635	
18,530.4	9,195.0	19,782.8	10,520.5	155.6	161.2	-154.64	-9,425.7	226.2	1,464.3	1,147.6	316.79	4.622	
18,600.0	9,195.0	19,846.6	10,520.4	156.7	162.2	-154.62	-9,489.5	227.4	1,464.6	1,145.6	318.98	4.592	
18,700.0	9,195.0	19,949.1	10,520.2	158.4	163.9	-154.57	-9,592.0	229.3	1,464.9	1,142.6	322.31	4.545	
18,800.0	9,195.0	20,049.0	10,519.7	160.1	165.5	-154.51	-9,691.9	231.6	1,465.1	1,139.5	325.60	4.500	
18,900.0	9,195.0	20,152.1	10,518.8	161.7	167.2	-154.42	-9,794.9	234.5	1,465.3	1,136.3	328.95	4.454	
19,000.0	9,195.0	20,253.4	10,517.5	163.4	168.9	-154.30	-9,896.2	237.9	1,465.2	1,133.0	332.27	4.410	
19,100.0	9,195.0	20,355.8	10,515.7	165.0	170.6	-154.15	-9,998.4	242.1	1,465.1	1,129.4	335.62	4.365	
19,108.5	9,195.0	20,361.0	10,515.6	165.2	170.7	-154.14	-10,003.6	242.3	1,465.0	1,129.2	335.84	4.362	
19,200.0	9,195.0	20,361.0	10,515.6	166.7	170.7	-154.14	-10,003.6	242.3	1,467.9	1,130.5	337.36	4.351	
19,300.0	9,195.0	20,361.0	10,515.6	168.4	170.7	-154.14	-10,003.6	242.3	1,477.5	1,138.5	339.02	4.358	
19,404.3	9,195.0	20,361.0	10,515.6	170.1	170.7	-154.14	-10,003.6	242.3	1,494.6	1,153.9	340.75	4.386	
19,404.8	9,195.0	20,361.0	10,515.6	170.1	170.7	-154.14	-10,003.6	242.3	1,494.7	1,153.9	340.76	4.386	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DELAWARE - KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH														Offset Site Error:	0.0 usft
Survey Program: 191-GYRO-NS, 4565-MWD														Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Distance									
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
0.0	0.0	0.2	0.2	3.0	3.0	84.44	22.4	229.9	231.0						
100.0	100.0	101.6	101.6	3.0	3.0	84.36	22.7	229.6	230.7	224.7	6.00	38.419			
200.0	200.0	202.4	202.4	3.0	3.0	84.14	23.5	228.6	229.8	223.8	6.02	38.146			
272.2	272.2	272.4	272.4	3.0	3.1	83.97	24.1	228.2	229.5	223.4	6.07	37.812 CC, ES			
300.0	300.0	299.4	299.4	3.0	3.1	83.92	24.3	228.2	229.5	223.4	6.09	37.679			
400.0	400.0	398.4	398.4	3.0	3.2	83.71	25.2	228.8	230.2	224.0	6.20	37.127			
500.0	500.0	499.0	499.0	3.1	3.3	83.43	26.4	229.4	230.9	224.6	6.35	36.346			
600.0	600.0	597.8	597.8	3.1	3.5	83.09	27.9	230.0	231.7	225.1	6.54	35.423			
700.0	700.0	697.1	697.0	3.1	3.6	82.61	30.0	231.0	233.0	226.2	6.76	34.458			
800.0	800.0	798.1	798.0	3.2	3.9	82.11	32.1	231.8	234.1	227.0	7.01	33.376			
900.0	900.0	897.8	897.7	3.2	4.1	81.76	33.7	232.9	235.4	228.1	7.28	32.314			
1,000.0	1,000.0	1,000.7	1,000.6	3.2	4.3	81.64	34.2	233.0	235.5	228.0	7.58	31.065			
1,071.7	1,071.7	1,072.0	1,071.9	3.3	4.5	81.63	34.3	233.0	235.5	227.7	7.80	30.186			
1,100.0	1,100.0	1,100.3	1,100.2	3.3	4.6	81.63	34.3	233.0	235.5	227.6	7.89	29.844			
1,200.0	1,200.0	1,200.4	1,200.2	3.4	4.9	81.59	34.4	233.0	235.5	227.3	8.22	28.663			
1,300.0	1,300.0	1,300.6	1,300.5	3.4	5.1	81.54	34.7	232.9	235.4	226.9	8.56	27.514			
1,373.5	1,373.5	1,373.8	1,373.7	3.5	5.4	81.48	34.8	232.8	235.4	226.5	8.81	26.703			
1,400.0	1,400.0	1,400.0	1,399.9	3.5	5.4	81.47	34.9	232.8	235.4	226.5	8.91	26.425			
1,500.0	1,500.0	1,501.1	1,501.0	3.5	5.7	81.45	35.0	232.8	235.5	226.2	9.27	25.392			
1,600.0	1,600.0	1,601.0	1,600.9	3.6	6.0	81.44	35.0	232.3	235.0	225.3	9.64	24.364			
1,655.1	1,655.1	1,655.4	1,655.3	3.7	6.2	81.45	34.9	232.3	234.9	225.0	9.85	23.846			
1,700.0	1,700.0	1,699.7	1,699.6	3.7	6.3	81.48	34.8	232.3	234.9	224.9	10.02	23.448			
1,800.0	1,800.0	1,799.7	1,799.6	3.8	6.6	81.33	35.4	232.5	235.2	224.8	10.41	22.602			
1,900.0	1,900.0	1,899.7	1,899.6	3.9	6.9	81.20	36.0	232.7	235.5	224.7	10.80	21.800			
2,000.0	2,000.0	1,999.6	1,999.5	3.9	7.3	81.09	36.5	232.9	235.8	224.6	11.20	21.044			
2,100.0	2,100.0	2,099.6	2,099.5	4.0	7.6	81.02	36.8	233.2	236.1	224.4	11.61	20.333			
2,200.0	2,200.0	2,199.4	2,199.3	4.1	7.9	80.99	37.0	233.5	236.4	224.4	12.02	19.666			
2,300.0	2,300.0	2,298.9	2,298.8	4.2	8.2	80.97	37.2	233.9	236.9	224.4	12.43	19.050			
2,400.0	2,400.0	2,298.5	2,298.4	4.3	8.6	80.98	37.2	234.6	237.6	224.7	12.85	18.483			
2,500.0	2,500.0	2,298.4	2,298.2	4.4	8.9	81.04	37.1	235.5	238.4	225.1	13.28	17.956			
2,600.0	2,600.0	2,298.6	2,298.4	4.5	9.2	81.25	36.4	236.4	239.2	225.5	13.70	17.453			
2,700.0	2,700.0	2,298.7	2,298.6	4.6	9.5	81.64	34.9	237.3	239.9	225.8	14.13	16.972			
2,800.0	2,800.0	2,298.7	2,298.5	4.7	9.9	82.12	33.0	238.3	240.6	226.0	14.57	16.514			
2,900.0	2,900.0	2,298.7	2,298.5	4.8	10.2	82.49	31.5	239.2	241.3	226.3	15.00	16.080			
3,000.0	3,000.0	2,298.7	2,298.5	4.9	10.5	82.74	30.6	240.0	242.0	226.5	15.44	15.669			
3,100.0	3,100.0	3,094.1	3,093.9	5.0	10.9	82.85	30.3	241.5	243.5	227.7	15.87	15.347			
3,200.0	3,200.0	3,197.0	3,196.8	5.1	11.2	82.78	30.9	243.7	245.7	229.4	16.32	15.053			
3,300.0	3,300.0	3,299.2	3,299.0	5.2	11.6	82.69	31.4	244.6	246.6	229.8	16.77	14.702			
3,400.0	3,400.0	3,399.9	3,399.7	5.3	11.9	82.71	31.3	244.9	246.9	229.7	17.22	14.339			
3,500.0	3,500.0	3,499.7	3,499.4	5.4	12.2	82.79	31.0	245.2	247.2	229.5	17.67	13.991			
3,600.0	3,600.0	3,599.4	3,599.1	5.5	12.6	82.91	30.6	245.7	247.6	229.4	18.12	13.665			
3,700.0	3,700.0	3,698.7	3,698.5	5.7	12.9	83.00	30.3	246.3	248.1	229.6	18.56	13.365			
3,800.0	3,800.0	3,798.0	3,797.8	5.8	13.2	83.01	30.3	247.1	249.0	229.9	19.01	13.093			
3,900.0	3,900.0	3,897.8	3,897.5	5.9	13.6	82.95	30.7	248.1	250.0	230.6	19.47	12.844			
4,000.0	4,000.0	3,998.9	3,998.6	6.0	13.9	82.92	30.9	249.0	250.9	231.0	19.93	12.591			
4,100.0	4,100.0	4,100.0	4,099.7	6.1	14.3	82.95	30.8	249.4	251.3	230.9	20.38	12.327			
4,200.0	4,200.0	4,200.4	4,200.1	6.2	14.6	83.02	30.6	249.5	251.4	230.5	20.84	12.060			
4,300.0	4,300.0	4,300.4	4,300.1	6.3	15.0	83.04	30.5	249.5	251.4	230.1	21.30	11.803			
4,400.0	4,400.0	4,400.4	4,400.1	6.5	15.3	83.00	30.6	249.6	251.4	229.7	21.76	11.556			
4,500.0	4,500.0	4,500.3	4,500.0	6.6	15.6	82.97	30.8	249.6	251.5	229.3	22.16	11.346			
4,600.0	4,600.0	4,599.5	4,599.2	6.7	15.7	83.02	30.6	249.8	251.6	229.2	22.39	11.237			
4,700.0	4,700.0	4,699.1	4,698.9	6.8	15.7	83.12	30.2	250.3	252.2	229.6	22.52	11.196			

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design DELAWARE - KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 191-GYRO-NS, 4565-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
4,800.0	4,800.0	4,798.8	4,798.5	6.9	15.7	83.25	29.7	251.0	252.7	230.1	22.66	11.154	
4,900.0	4,900.0	4,897.9	4,897.6	7.0	15.8	83.40	29.1	251.9	253.6	230.8	22.81	11.119	
5,000.0	5,000.0	4,997.2	4,997.0	7.2	15.8	83.53	28.7	253.1	254.7	231.8	22.96	11.095	
5,100.0	5,100.0	5,097.2	5,096.9	7.3	15.8	83.68	28.2	254.5	256.0	232.9	23.12	11.073	
5,200.0	5,200.0	5,197.5	5,197.2	7.4	15.9	83.87	27.5	255.8	257.3	234.0	23.29	11.044	
5,300.0	5,300.0	5,297.5	5,297.2	7.5	15.9	84.03	26.9	257.0	258.4	235.0	23.47	11.009	
5,400.0	5,400.0	5,397.7	5,397.3	7.6	16.0	84.16	26.4	258.2	259.6	235.9	23.66	10.970	
5,500.0	5,500.0	5,498.0	5,497.7	7.8	16.1	84.30	25.9	259.3	260.6	236.8	23.86	10.923	
5,600.0	5,600.0	5,598.2	5,597.8	7.9	16.2	84.47	25.2	260.3	261.6	237.5	24.06	10.869	
5,700.0	5,700.0	5,698.4	5,698.0	8.0	16.3	84.66	24.4	261.3	262.4	238.2	24.28	10.811	
5,800.0	5,800.0	5,798.3	5,797.9	8.1	16.4	84.82	23.8	262.2	263.2	238.7	24.50	10.746	
5,900.0	5,900.0	5,897.7	5,897.3	8.3	16.5	84.97	23.2	263.2	264.2	239.5	24.72	10.688	
6,000.0	6,000.0	5,997.0	5,996.6	8.4	16.6	85.13	22.5	264.4	265.4	240.5	24.96	10.635	
6,100.0	6,100.0	6,096.6	6,096.2	8.5	16.7	85.24	22.1	265.9	266.9	241.7	25.20	10.591	
6,200.0	6,200.0	6,196.9	6,196.5	8.6	16.8	85.35	21.8	267.4	268.3	242.9	25.45	10.545	
6,300.0	6,300.0	6,297.0	6,296.6	8.8	16.9	85.43	21.5	268.8	269.7	244.0	25.70	10.492	
6,400.0	6,400.0	6,396.7	6,396.3	8.9	17.1	85.52	21.2	270.2	271.1	245.1	25.96	10.440	
6,500.0	6,500.0	6,495.8	6,495.4	9.0	17.2	85.65	20.7	271.8	272.6	246.4	26.23	10.394	
6,600.0	6,600.0	6,596.1	6,595.7	9.1	17.4	85.78	20.2	273.6	274.4	247.9	26.51	10.351	
6,700.0	6,700.0	6,695.8	6,695.3	9.3	17.5	85.92	19.6	275.3	276.1	249.3	26.79	10.306	
6,800.0	6,800.0	6,796.0	6,795.5	9.4	17.7	86.04	19.2	277.1	277.8	250.7	27.08	10.260	
6,900.0	6,900.0	6,895.8	6,895.3	9.5	17.9	86.09	19.1	278.8	279.5	252.2	27.37	10.213	
7,000.0	7,000.0	6,995.8	6,995.3	9.6	18.0	86.06	19.3	280.6	281.3	253.6	27.67	10.166	
7,100.0	7,100.0	7,096.1	7,095.5	9.8	18.2	86.03	19.6	282.3	283.0	255.0	27.97	10.117	
7,200.0	7,200.0	7,196.8	7,196.2	9.9	18.4	86.03	19.7	283.8	284.5	256.2	28.28	10.058	
7,300.0	7,300.0	7,297.2	7,296.6	10.0	18.6	86.06	19.6	285.1	285.8	257.2	28.60	9.995	
7,400.0	7,400.0	7,397.9	7,397.3	10.1	18.8	86.10	19.5	286.2	286.9	258.0	28.92	9.921	
7,500.0	7,500.0	7,498.1	7,497.5	10.3	19.0	86.18	19.2	287.2	287.9	258.6	29.25	9.843	
7,600.0	7,600.0	7,597.8	7,597.3	10.4	19.2	86.28	18.7	288.2	288.8	259.3	29.58	9.766	
7,700.0	7,700.0	7,697.5	7,696.9	10.5	19.4	86.38	18.3	289.3	289.9	260.0	29.91	9.693	
7,800.0	7,800.0	7,798.1	7,797.5	10.6	19.6	86.47	17.9	290.4	291.0	260.7	30.25	9.619	
7,900.0	7,900.0	7,908.8	7,907.7	10.8	19.9	88.15	9.4	290.2	290.4	259.8	30.62	9.486	
8,000.0	8,000.0	8,015.5	8,010.2	10.9	20.1	93.85	-19.3	286.5	287.3	256.3	30.98	9.275	
8,094.1	8,094.1	8,107.5	8,094.3	11.0	20.3	101.30	-55.9	279.8	285.3	254.0	31.31	9.112	
8,100.0	8,100.0	8,112.7	8,099.0	11.0	20.3	101.78	-58.2	279.3	285.3	254.0	31.33	9.107	
8,200.0	8,200.0	8,191.0	8,165.7	11.1	20.5	109.90	-98.3	271.6	290.9	259.2	31.66	9.189	
8,300.0	8,300.0	8,264.5	8,224.3	11.3	20.7	118.27	-142.1	264.3	309.5	277.6	32.00	9.674	
8,400.0	8,400.0	8,333.0	8,275.5	11.4	21.0	126.17	-186.7	255.4	340.1	307.8	32.35	10.513	
8,500.0	8,500.0	8,389.0	8,313.8	11.5	21.2	132.59	-226.5	246.4	383.1	350.5	32.68	11.723	
8,600.0	8,600.0	8,425.7	8,336.7	11.6	21.3	136.65	-254.5	240.3	438.1	405.1	32.96	13.291	
8,700.0	8,700.0	8,462.9	8,358.2	11.8	21.5	140.53	-284.1	234.0	502.4	469.2	33.25	15.111	
8,717.5	8,717.5	8,469.4	8,361.9	11.8	21.5	141.18	-289.5	232.9	514.4	481.1	33.30	15.448	
8,725.0	8,725.0	8,472.2	8,363.4	11.8	21.5	-69.29	-291.7	232.4	519.6	486.3	33.32	15.595	
8,750.0	8,750.0	8,483.0	8,369.3	11.8	21.6	-65.66	-300.6	230.5	536.9	503.6	33.37	16.091	
8,775.0	8,774.9	8,491.5	8,373.8	11.8	21.6	-62.42	-307.6	229.1	554.2	520.8	33.41	16.586	
8,800.0	8,799.6	8,501.6	8,379.1	11.8	21.7	-59.27	-316.0	227.3	571.4	537.9	33.47	17.072	
8,825.0	8,824.1	8,514.0	8,385.5	11.8	21.7	-56.22	-326.5	225.1	588.3	554.8	33.53	17.544	
8,850.0	8,848.3	8,521.6	8,389.3	11.8	21.8	-53.66	-332.9	223.8	605.0	571.4	33.58	18.017	
8,875.0	8,872.2	8,531.2	8,394.0	11.8	21.8	-51.22	-341.1	222.2	621.4	587.8	33.64	18.473	
8,900.0	8,895.6	8,545.0	8,400.7	11.8	21.9	-48.86	-353.0	219.9	637.5	603.8	33.72	18.906	
8,925.0	8,918.5	8,545.0	8,400.7	11.9	21.9	-47.05	-353.0	219.9	653.3	619.6	33.74	19.365	
8,950.0	8,940.9	8,559.8	8,407.5	11.9	22.0	-45.09	-365.9	217.5	668.6	634.8	33.83	19.762	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DELAWARE - KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 191-GYRO-NS, 4565-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
8,975.0	8,962.7	8,577.0	8,415.1	11.9	22.0	-43.33	-381.1	214.8	683.6	649.7	33.95	20.139	
9,000.0	8,983.8	8,577.0	8,415.1	11.9	22.0	-41.90	-381.1	214.8	698.0	664.0	33.97	20.549	
9,025.0	9,004.2	8,587.0	8,419.2	11.9	22.1	-40.53	-390.1	213.2	712.0	678.0	34.05	20.911	
9,050.0	9,023.8	8,595.4	8,422.6	12.0	22.2	-39.28	-397.7	212.0	725.6	691.5	34.13	21.261	
9,075.0	9,042.5	8,608.0	8,427.3	12.0	22.2	-38.16	-409.2	210.1	738.7	704.4	34.23	21.579	
9,100.0	9,060.4	8,608.0	8,427.3	12.0	22.2	-37.10	-409.2	210.1	751.2	717.0	34.27	21.922	
9,125.0	9,077.3	8,620.3	8,431.6	12.1	22.3	-36.19	-420.6	208.1	763.3	728.9	34.38	22.199	
9,150.0	9,093.2	8,628.5	8,434.2	12.1	22.3	-35.35	-428.2	206.8	774.8	740.3	34.48	22.472	
9,175.0	9,108.1	8,639.0	8,437.3	12.2	22.4	-34.61	-438.1	205.0	785.8	751.2	34.59	22.717	
9,200.0	9,122.0	8,646.8	8,439.5	12.2	22.5	-33.93	-445.5	203.7	796.2	761.5	34.69	22.948	
9,225.0	9,134.7	8,663.0	8,443.7	12.3	22.6	-33.43	-460.8	200.9	806.0	771.1	34.86	23.122	
9,250.0	9,146.3	8,663.0	8,443.7	12.4	22.6	-32.79	-460.8	200.9	815.1	780.1	34.93	23.336	
9,275.0	9,156.7	8,680.4	8,447.8	12.4	22.7	-32.48	-477.5	197.8	823.4	788.3	35.12	23.449	
9,300.0	9,165.9	8,694.0	8,450.8	12.5	22.8	-32.18	-490.5	195.5	831.2	795.9	35.29	23.553	
9,325.0	9,173.9	8,703.3	8,452.6	12.6	22.8	-31.88	-499.5	193.8	838.2	802.8	35.45	23.645	
9,350.0	9,180.6	8,714.6	8,454.7	12.7	22.9	-31.67	-510.4	191.8	844.6	808.9	35.64	23.699	
9,375.0	9,186.1	8,726.0	8,456.6	12.9	23.0	-31.53	-521.5	189.7	850.2	814.4	35.84	23.724	
9,400.0	9,190.2	8,735.6	8,458.1	13.0	23.0	-31.42	-530.8	188.0	855.2	819.1	36.05	23.725	
9,425.0	9,193.1	8,745.3	8,459.4	13.2	23.1	-31.36	-540.3	186.4	859.5	823.2	36.27	23.696	
9,450.0	9,194.7	8,757.0	8,460.8	13.3	23.2	-31.40	-551.7	184.4	863.2	826.6	36.53	23.628	
9,467.6	9,195.0	8,764.2	8,461.6	13.5	23.2	-31.44	-558.8	183.2	865.3	828.6	36.72	23.564	
9,500.0	9,195.0	8,788.0	8,464.0	13.8	23.4	-32.15	-582.1	179.5	869.1	831.9	37.17	23.379	
9,600.0	9,195.0	8,835.8	8,467.5	14.8	23.8	-33.58	-629.2	172.4	881.6	843.1	38.55	22.869	
9,700.0	9,195.0	8,894.4	8,468.8	16.0	24.2	-34.98	-687.3	164.3	895.9	855.7	40.21	22.284	
9,800.0	9,195.0	8,986.1	8,471.3	17.2	25.0	-36.70	-778.5	155.3	908.7	866.5	42.25	21.511	
9,900.0	9,195.0	9,071.0	8,475.3	18.5	25.8	-38.16	-863.2	151.0	919.2	874.9	44.31	20.747	
10,000.0	9,195.0	9,138.0	8,477.9	19.8	26.4	-39.15	-930.1	149.5	928.1	881.8	46.23	20.073	
10,100.0	9,195.0	9,207.4	8,478.9	21.1	27.1	-39.88	-999.5	149.0	935.7	887.5	48.18	19.420	
10,200.0	9,195.0	9,280.5	8,478.8	22.3	27.9	-40.41	-1,072.6	150.9	942.2	892.0	50.16	18.783	
10,266.8	9,195.0	9,340.3	8,478.5	23.1	28.5	-40.65	-1,132.4	153.6	945.1	893.5	51.61	18.313	
10,300.0	9,195.0	9,373.2	8,478.3	23.5	28.9	-40.71	-1,165.2	155.2	946.2	893.8	52.37	18.068	
10,400.0	9,195.0	9,483.0	8,476.8	24.7	30.1	-40.78	-1,274.9	159.0	949.0	894.2	54.85	17.301	
10,500.0	9,195.0	9,607.3	8,474.9	26.0	31.6	-40.69	-1,399.2	159.6	950.0	892.4	57.63	16.486	
10,600.0	9,195.0	9,707.7	8,475.1	27.3	32.9	-40.66	-1,499.6	159.5	949.3	889.1	60.21	15.767	
10,634.9	9,195.0	9,738.6	8,475.4	27.8	33.3	-40.68	-1,530.5	159.9	949.2	888.1	61.07	15.542	
10,700.0	9,195.0	9,790.8	8,475.4	28.7	33.9	-40.71	-1,582.7	160.8	949.7	887.0	62.64	15.161	
10,800.0	9,195.0	9,877.4	8,474.1	30.1	35.1	-40.72	-1,669.2	162.9	951.9	886.7	65.18	14.604	
10,900.0	9,195.0	9,969.2	8,472.0	31.6	36.3	-40.74	-1,761.0	165.7	955.1	887.2	67.83	14.080	
11,000.0	9,195.0	10,086.0	8,469.8	33.0	37.9	-40.80	-1,877.7	169.8	958.4	887.5	70.88	13.521	
11,100.0	9,195.0	10,199.0	8,469.1	34.5	39.4	-40.80	-1,990.7	171.3	959.2	885.3	73.92	12.976	
11,200.0	9,195.0	10,293.0	8,466.9	36.0	40.8	-40.65	-2,084.6	170.5	959.9	883.2	76.74	12.509	
11,300.0	9,195.0	10,422.6	8,465.9	37.5	42.6	-40.44	-2,214.1	167.8	958.5	878.4	80.10	11.966	
11,400.0	9,195.0	10,521.8	8,465.4	39.0	44.0	-40.32	-2,313.4	166.3	957.3	874.3	83.06	11.526	
11,500.0	9,195.0	10,638.9	8,467.3	40.6	45.7	-40.22	-2,430.4	163.3	953.9	867.6	86.30	11.053	
11,600.0	9,195.0	10,730.7	8,469.1	42.1	47.1	-40.17	-2,522.2	161.4	950.6	861.4	89.20	10.656	
11,700.0	9,195.0	10,815.8	8,469.7	43.7	48.4	-40.10	-2,607.3	160.0	948.5	856.5	92.02	10.307	
11,800.0	9,195.0	10,915.3	8,469.1	45.2	49.8	-39.99	-2,706.7	158.8	947.7	852.7	95.08	9.968	
11,900.0	9,195.0	11,016.1	8,469.9	46.8	51.4	-39.96	-2,807.6	158.2	946.3	848.1	98.17	9.639	
12,000.0	9,195.0	11,108.1	8,470.7	48.4	52.7	-39.97	-2,899.5	158.5	945.4	844.2	101.14	9.347	
12,100.0	9,195.0	11,207.4	8,470.4	50.0	54.3	-39.93	-2,998.8	158.6	945.2	840.9	104.24	9.067	
12,170.9	9,195.0	11,275.0	8,470.1	51.1	55.3	-39.89	-3,066.4	158.4	945.0	838.6	106.40	8.881	
12,200.0	9,195.0	11,301.6	8,470.0	51.6	55.7	-39.88	-3,093.0	158.5	945.0	837.7	107.27	8.809	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DELAWARE - KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 191-GYRO-NS, 4565-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	
12,300.0	9,195.0	11,402.5	8,469.4	53.2	57.3	-39.85	-3,193.9	159.1	945.4	835.0	110.42	8.562	
12,400.0	9,195.0	11,496.1	8,469.2	54.8	58.7	-39.86	-3,287.5	160.2	945.8	832.3	113.47	8.335	
12,500.0	9,195.0	11,592.3	8,468.9	56.4	60.2	-39.91	-3,383.7	162.2	946.9	830.3	116.57	8.123	
12,600.0	9,195.0	11,679.6	8,468.5	58.0	61.6	-39.99	-3,471.0	164.8	948.7	829.2	119.54	7.936	
12,700.0	9,195.0	11,809.3	8,466.9	59.6	63.6	-39.97	-3,600.6	166.8	950.3	827.1	123.18	7.715	
12,800.0	9,195.0	11,924.6	8,467.0	61.2	65.4	-39.85	-3,715.9	165.0	948.7	822.1	126.60	7.494	
12,900.0	9,195.0	12,021.5	8,467.7	62.8	66.9	-39.77	-3,812.8	163.3	946.6	816.9	129.74	7.296	
13,000.0	9,195.0	12,117.9	8,467.9	64.4	68.4	-39.69	-3,909.2	162.1	945.2	812.3	132.87	7.114	
13,100.0	9,195.0	12,215.1	8,468.9	66.1	70.0	-39.67	-4,006.4	161.7	943.6	807.6	136.03	6.937	
13,200.0	9,195.0	12,313.2	8,469.1	67.7	71.5	-39.64	-4,104.4	161.6	943.0	803.8	139.21	6.774	
13,300.0	9,195.0	12,411.4	8,470.2	69.3	73.1	-39.66	-4,202.7	161.8	941.7	799.3	142.40	6.613	
13,350.6	9,195.0	12,455.0	8,470.2	70.1	73.8	-39.64	-4,246.3	161.8	941.5	797.6	143.91	6.542	
13,400.0	9,195.0	12,499.1	8,469.7	71.0	74.5	-39.61	-4,290.3	161.8	941.7	796.3	145.42	6.476	
13,500.0	9,195.0	12,605.6	8,468.3	72.6	76.2	-39.52	-4,396.8	161.9	942.4	793.6	148.75	6.336	
13,585.8	9,195.0	12,690.1	8,468.3	74.0	77.5	-39.50	-4,481.3	161.9	942.0	790.5	151.50	6.218	
13,600.0	9,195.0	12,702.0	8,468.3	74.2	77.7	-39.50	-4,493.2	162.0	942.0	790.1	151.92	6.201	
13,700.0	9,195.0	12,821.6	8,469.6	75.8	79.6	-39.61	-4,612.8	164.2	942.0	786.5	155.47	6.059	
13,800.0	9,195.0	12,919.8	8,472.7	77.5	81.2	-39.77	-4,710.9	165.8	940.1	781.4	158.68	5.924	
13,900.0	9,195.0	13,030.3	8,474.9	79.1	83.0	-39.81	-4,821.4	165.5	938.0	775.9	162.09	5.787	
14,000.0	9,195.0	13,136.1	8,475.7	80.8	84.7	-39.63	-4,927.1	161.9	934.7	769.3	165.42	5.651	
14,100.0	9,195.0	13,232.5	8,475.5	82.4	86.2	-39.39	-5,023.5	157.8	931.7	763.1	168.59	5.526	
14,200.0	9,195.0	13,337.3	8,474.8	84.0	87.9	-39.07	-5,128.1	152.4	928.4	756.5	171.90	5.401	
14,300.0	9,195.0	13,438.1	8,473.9	85.7	89.5	-38.70	-5,228.7	146.2	924.8	749.7	175.14	5.280	
14,400.0	9,195.0	13,536.3	8,472.7	87.3	91.0	-38.31	-5,326.7	139.9	921.4	743.0	178.35	5.166	
14,500.0	9,195.0	13,646.3	8,473.4	89.0	92.8	-38.07	-5,436.6	135.2	917.7	736.0	181.75	5.050	
14,600.0	9,195.0	13,755.8	8,478.5	90.6	94.6	-38.14	-5,546.0	133.4	912.6	727.5	185.16	4.929	
14,700.0	9,195.0	13,834.7	8,482.0	92.2	95.8	-38.20	-5,624.8	132.5	908.1	720.0	188.08	4.828	
14,800.0	9,195.0	13,925.0	8,483.5	93.9	97.3	-38.19	-5,715.1	131.8	905.8	714.6	191.18	4.738	
14,900.0	9,195.0	14,016.5	8,484.6	95.5	98.8	-38.17	-5,806.6	131.1	903.9	709.6	194.31	4.652	
15,000.0	9,195.0	14,107.1	8,484.9	97.2	100.2	-38.16	-5,897.2	131.3	903.4	706.0	197.43	4.576	
15,021.5	9,195.0	14,127.3	8,484.8	97.5	100.6	-38.16	-5,917.3	131.4	903.4	705.3	198.11	4.560	
15,100.0	9,195.0	14,196.2	8,484.3	98.8	101.7	-38.13	-5,986.3	131.8	903.7	703.2	200.52	4.507	
15,200.0	9,195.0	14,285.1	8,482.1	100.5	103.1	-38.03	-6,075.1	132.2	905.5	701.9	203.61	4.447	
15,300.0	9,195.0	14,386.3	8,478.6	102.1	104.8	-37.87	-6,176.3	132.5	908.0	701.1	206.91	4.388	
15,400.0	9,195.0	14,489.9	8,477.1	103.8	106.5	-37.87	-6,279.8	134.4	909.8	699.5	210.25	4.327	
15,500.0	9,195.0	14,585.2	8,475.7	105.4	108.0	-37.88	-6,375.0	136.3	911.7	698.3	213.45	4.271	
15,600.0	9,195.0	14,694.7	8,473.7	107.1	109.8	-37.85	-6,484.5	138.2	913.8	696.9	216.89	4.213	
15,700.0	9,195.0	14,790.3	8,472.9	108.7	111.4	-37.87	-6,580.1	139.9	915.1	695.0	220.10	4.158	
15,800.0	9,195.0	14,880.5	8,471.8	110.4	112.9	-37.92	-6,670.3	142.4	917.4	694.1	223.23	4.109	
15,900.0	9,195.0	15,001.2	8,470.5	112.0	114.8	-37.97	-6,791.0	145.4	919.3	692.5	226.86	4.052	
16,000.0	9,195.0	15,121.7	8,472.0	113.7	116.8	-38.04	-6,911.4	146.5	918.4	687.9	230.49	3.985	
16,100.0	9,195.0	15,215.9	8,474.4	115.3	118.3	-38.16	-7,005.6	147.8	916.8	683.1	233.68	3.923	
16,167.9	9,195.0	15,274.0	8,475.4	116.5	119.3	-38.24	-7,063.7	149.0	916.5	680.7	235.76	3.887	
16,200.0	9,195.0	15,303.3	8,475.7	117.0	119.8	-38.27	-7,093.0	149.7	916.5	679.7	236.77	3.871	
16,300.0	9,195.0	15,396.6	8,475.8	118.6	121.3	-38.33	-7,186.2	151.5	917.2	677.2	239.95	3.822	
16,400.0	9,195.0	15,490.3	8,475.0	120.3	122.8	-38.36	-7,279.9	153.4	918.6	675.5	243.15	3.778	
16,500.0	9,195.0	15,588.9	8,474.2	122.0	124.5	-38.42	-7,378.5	155.9	920.4	674.0	246.42	3.735	
16,600.0	9,195.0	15,695.1	8,474.3	123.6	126.2	-38.57	-7,484.6	159.8	922.2	672.4	249.83	3.691	
16,700.0	9,195.0	15,809.1	8,475.4	125.3	128.1	-38.72	-7,598.6	162.7	922.6	669.2	253.36	3.641	
16,800.0	9,195.0	15,929.6	8,476.3	126.9	130.1	-38.68	-7,719.1	162.2	921.3	664.3	256.98	3.585	
16,900.0	9,195.0	16,052.5	8,479.3	128.6	132.1	-38.60	-7,841.9	158.8	917.1	656.4	260.64	3.519	
17,000.0	9,195.0	16,148.4	8,482.4	130.2	133.6	-38.54	-7,937.7	155.9	912.3	648.4	263.86	3.457	

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



COG Operating LLC

Anticollision Report

Company: COG OPERATING LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #11H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
MD Reference: RKB=3547.8+26 @ 3573.8usft (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 DELAWARE - KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 191-GYRO-NS, 4565-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Distance								
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
17,100.0	9,195.0	16,242.0	8,484.8	131.9	135.2	-38.47	-8,031.2	153.2	908.0	640.9	267.04	3.400		
17,200.0	9,195.0	16,333.4	8,486.8	133.5	136.7	-38.42	-8,122.6	151.4	904.5	634.4	270.19	3.348		
17,300.0	9,195.0	16,425.0	8,488.5	135.2	138.2	-38.40	-8,214.1	150.3	902.0	628.7	273.34	3.300		
17,400.0	9,195.0	16,514.3	8,488.9	136.8	139.6	-38.35	-8,303.4	149.6	900.6	624.1	276.46	3.258		
17,497.2	9,195.0	16,603.9	8,488.4	138.5	141.1	-38.26	-8,393.0	148.9	900.2	620.6	279.54	3.220		
17,500.0	9,195.0	16,606.4	8,488.4	138.5	141.1	-38.26	-8,395.5	148.9	900.2	620.5	279.63	3.219		
17,600.0	9,195.0	16,694.7	8,487.0	140.2	142.6	-38.17	-8,483.8	148.8	900.8	618.1	282.73	3.186		
17,700.0	9,195.0	16,783.3	8,484.7	141.8	144.0	-38.07	-8,572.4	149.4	902.9	617.0	285.85	3.159		
17,800.0	9,195.0	16,895.8	8,482.9	143.5	145.9	-38.06	-8,664.9	151.3	904.7	615.3	289.36	3.127		
17,900.0	9,195.0	16,996.6	8,482.9	145.1	147.5	-38.13	-8,765.6	153.6	905.6	613.0	292.68	3.094		
18,000.0	9,195.0	17,087.2	8,482.3	146.8	149.0	-38.20	-8,876.1	156.1	907.4	611.5	295.83	3.067		
18,100.0	9,195.0	17,189.5	8,480.4	148.4	150.7	-38.19	-8,978.4	158.1	909.6	610.4	299.18	3.040		
18,200.0	9,195.0	17,299.7	8,478.9	150.1	152.5	-38.15	-9,088.6	159.2	910.8	608.2	302.65	3.009		
18,300.0	9,195.0	17,402.6	8,477.8	151.8	154.2	-38.08	-9,191.5	159.4	911.4	605.4	306.01	2.978		
18,400.0	9,195.0	17,509.4	8,476.0	153.4	156.0	-37.92	-9,298.3	158.3	911.6	602.2	309.42	2.946		
18,500.0	9,195.0	17,616.6	8,475.4	155.1	157.8	-37.79	-9,405.5	157.0	910.9	598.1	312.83	2.912		
18,600.0	9,195.0	17,734.5	8,476.9	156.7	159.7	-37.75	-9,523.4	156.0	908.9	592.5	316.43	2.872		
18,700.0	9,195.0	17,839.0	8,480.7	158.4	161.4	-37.82	-9,627.8	155.3	905.1	585.3	319.81	2.830		
18,800.0	9,195.0	17,917.4	8,482.6	160.1	162.7	-37.87	-9,706.2	155.3	902.8	580.0	322.76	2.797		
18,842.6	9,195.0	17,950.6	8,482.8	160.8	163.2	-37.87	-9,739.4	155.5	902.5	578.5	324.01	2.785		
18,900.0	9,195.0	18,001.0	8,482.4	161.7	164.1	-37.86	-9,789.8	155.8	902.9	577.1	325.79	2.771		
19,000.0	9,195.0	18,080.0	8,480.6	163.4	165.4	-37.82	-9,868.7	157.0	905.0	576.3	328.76	2.753		
19,100.0	9,195.0	18,165.4	8,477.7	165.0	166.8	-37.78	-9,954.1	159.2	908.8	577.0	331.83	2.739		
19,200.0	9,195.0	18,222.0	8,475.3	166.7	167.7	-37.76	-10,010.6	160.9	914.5	580.1	334.43	2.735 SF		
19,300.0	9,195.0	18,222.0	8,475.3	168.4	167.7	-37.76	-10,010.6	160.9	929.2	593.1	336.09	2.765		
19,404.3	9,195.0	18,222.0	8,475.3	170.1	167.7	-37.76	-10,010.6	160.9	955.5	617.7	337.82	2.828		
19,404.8	9,195.0	18,222.0	8,475.3	170.1	167.7	-37.76	-10,010.6	160.9	955.6	617.8	337.83	2.829		

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



COG Operating LLC

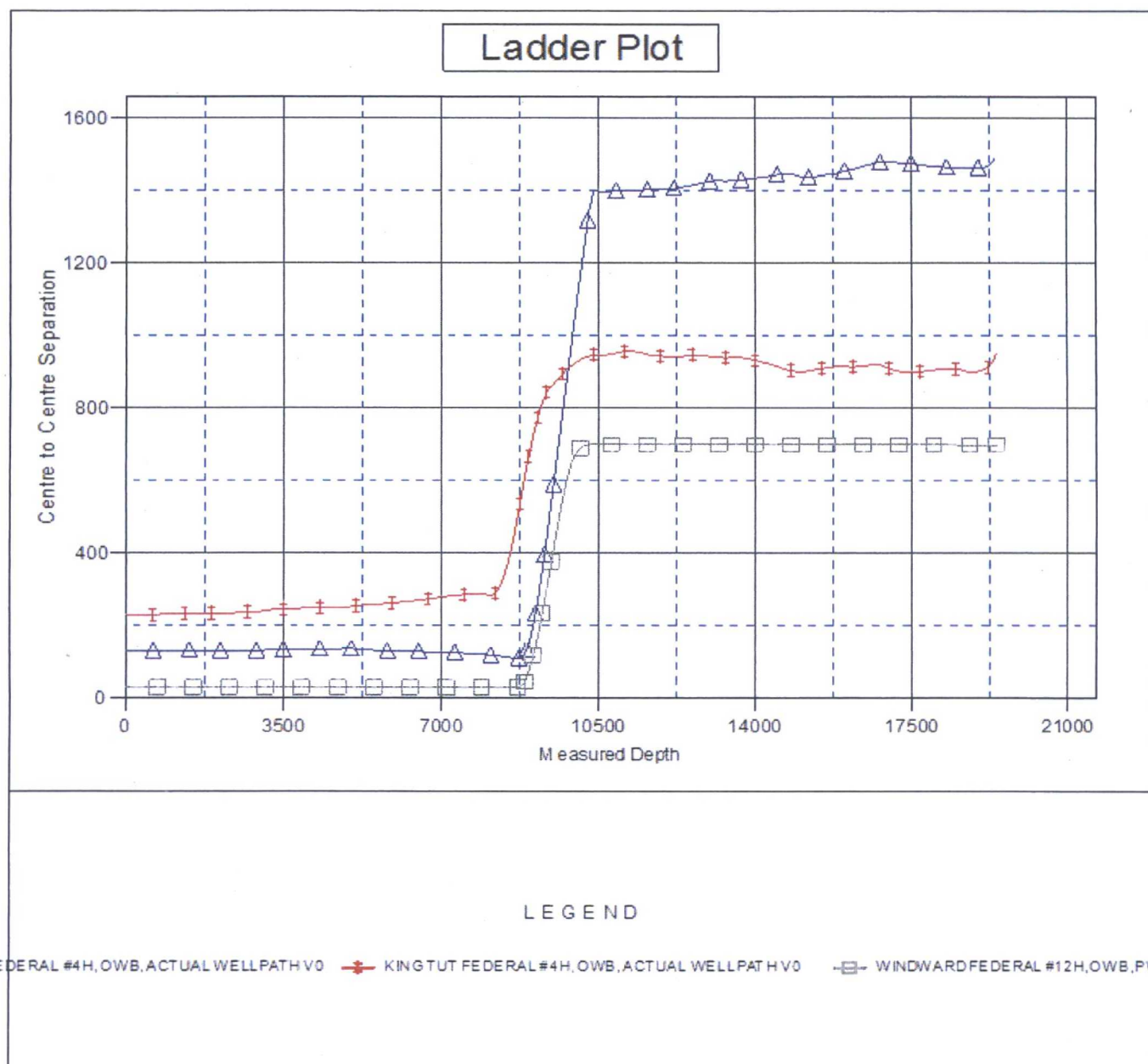
Anticollision Report

Company: COG OPERATING LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: WINDWARD FEDERAL #11H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #11H
 TVD Reference: RKB=3547.8+26 @ 3573.8usft (McVay 8)
 MD Reference: RKB=3547.8+26 @ 3573.8usft (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=3547.8+26 @ 3573.8usft (McVa
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: WINDWARD FEDERAL #11H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.33°



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



COG Operating LLC

Anticollision Report

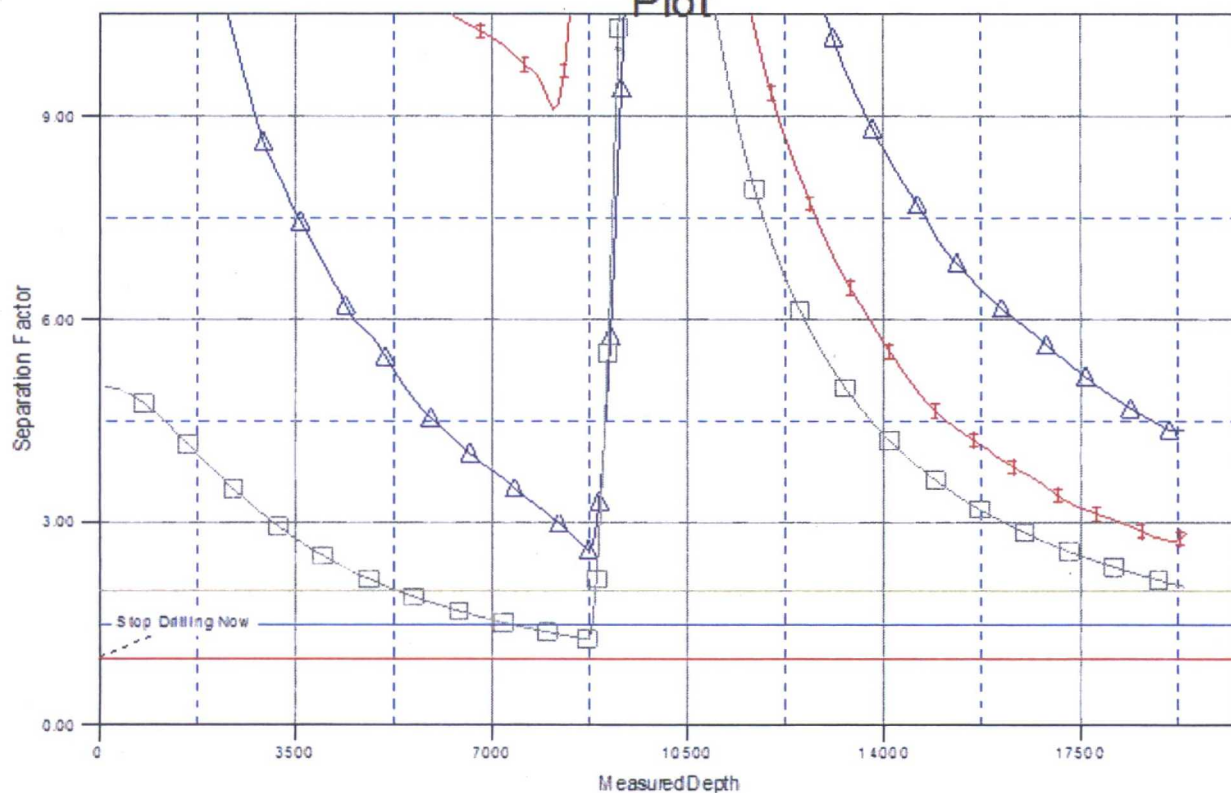
Company: COG OPERATING LLC
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Central Meridian is 104° 20' 0.000 W

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Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.33°

Separation Factor Plot



LEGEND

FEDERAL #4H,OWB,ACTUAL WELLPATH V0 KINGTUT FEDERAL #4H,OWB,ACTUAL WELLPATH V0 WINDWARD FEDERAL #12H,OWB,PWP0