

CONCHO

COG OPERATING LLC

LEA COUNTY, NM

AVALON SHALE

WINDWARD FEDERAL #9H

OWB

PWP0

Anticollision Report

01 September, 2016

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #9H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #9H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Reference	PWP0		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.0 usft	Error Surface:	Circular Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 9/1/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	8,727.5	PWP0 (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
8,727.5	19,394.7	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						
PADUCA 30 FEDERAL #1 - OWB - ACUTUAL WELLPAT	10,859.9	9,168.6	428.7	160.2	1.597	Advise and Monitor, CC,
WINDWARD FEDERAL #10H - OWB - PWP0	8,716.4	8,716.2	50.0	26.4	2.119	CC
WINDWARD FEDERAL #10H - OWB - PWP0	8,727.5	8,727.1	50.0	26.4	2.118	ES
WINDWARD FEDERAL #10H - OWB - PWP0	19,394.7	19,330.2	690.0	347.1	2.013	SF
DEEP BSS						
WINDWARD FEDERAL #3H - OWB - ACTUAL WELLPA	0.0	0.9	101.5			
WINDWARD FEDERAL #3H - OWB - ACTUAL WELLPA	8,900.0	8,897.4	106.1	90.7	6.859	ES
WINDWARD FEDERAL #3H - OWB - ACTUAL WELLPA	19,200.0	20,366.0	1,557.0	1,220.6	4.629	SF

Offset Design AVALON SHALE - PADUCA 30 FEDERAL #1 - OWB - ACUTUAL WELLPATH												Offset Site Error:	0.0 usft
Survey Program: 285-INC-ONLY												Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)				Between Centres (usft)	Between Ellipses (usft)			
0.0	0.0	0.0	0.0	3.0	3.0	178.96	-1,769.7	32.1	1,770.4				
100.0	100.0	63.0	63.0	3.0	3.1	178.96	-1,769.7	32.1	1,770.0	1,764.0	6.05	292.477	
200.0	200.0	163.0	163.0	3.0	3.3	178.96	-1,769.7	32.1	1,770.0	1,763.7	6.33	279.411	
300.0	300.0	263.0	263.0	3.0	3.8	178.96	-1,769.7	32.1	1,770.0	1,763.2	6.81	259.738	
400.0	400.0	363.0	363.0	3.0	5.0	178.96	-1,769.7	32.1	1,770.0	1,762.0	8.00	221.189	
500.0	500.0	463.0	463.0	3.1	6.5	178.96	-1,769.7	32.1	1,770.0	1,760.4	9.59	184.593	
600.0	600.0	563.0	563.0	3.1	8.2	178.96	-1,769.7	32.1	1,770.0	1,758.7	11.30	156.681	
700.0	700.0	663.0	663.0	3.1	10.0	178.96	-1,769.7	32.1	1,770.0	1,757.0	13.07	135.446	
800.0	800.0	763.0	763.0	3.2	11.8	178.96	-1,769.7	32.1	1,770.0	1,755.1	14.94	118.440	
900.0	900.0	863.0	863.0	3.2	13.7	178.96	-1,769.7	32.1	1,770.0	1,753.1	16.94	104.503	
1,000.0	1,000.0	963.0	963.0	3.2	15.7	178.96	-1,769.7	32.1	1,770.0	1,751.1	18.95	93.407	
1,100.0	1,100.0	1,070.0	1,070.0	3.3	17.8	178.96	-1,769.7	32.1	1,770.1	1,748.9	21.11	83.831	
1,135.8	1,135.8	1,098.8	1,098.8	3.3	18.4	178.96	-1,769.7	32.1	1,770.0	1,748.3	21.73	81.453	
1,200.0	1,200.0	1,163.0	1,163.0	3.4	19.7	178.96	-1,769.7	32.1	1,770.0	1,746.9	23.10	76.639	
1,300.0	1,300.0	1,263.0	1,263.0	3.4	21.8	178.96	-1,769.7	32.1	1,770.0	1,744.8	25.23	70.153	
1,400.0	1,400.0	1,363.0	1,363.0	3.5	23.9	178.96	-1,769.7	32.1	1,770.0	1,742.7	27.37	64.661	
1,500.0	1,500.0	1,463.0	1,463.0	3.5	26.0	178.96	-1,769.7	32.1	1,770.0	1,740.5	29.52	59.952	
1,600.0	1,600.0	1,563.0	1,563.0	3.6	28.1	178.96	-1,769.7	32.1	1,770.0	1,738.3	31.70	55.844	

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 - PADUCA 30 FEDERAL #1 - OWB - ACUTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 285-INC-ONLY													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		
1,700.0	1,700.0	1,663.0	1,663.0	3.7	30.2	178.96	-1,769.7	32.1	1,770.0	1,736.2	33.87	52.256		
1,800.0	1,800.0	1,763.0	1,763.0	3.8	32.3	178.96	-1,769.7	32.1	1,770.0	1,734.0	36.05	49.094		
1,900.0	1,900.0	1,863.0	1,863.0	3.9	34.4	178.96	-1,769.7	32.1	1,770.0	1,731.8	38.24	46.288		
2,000.0	2,000.0	1,990.0	1,989.9	3.9	37.1	178.96	-1,769.7	32.1	1,770.2	1,729.2	41.05	43.128		
2,045.6	2,045.6	2,008.7	2,008.6	4.0	37.6	178.96	-1,769.7	32.1	1,770.0	1,728.4	41.62	42.529		
2,100.0	2,100.0	2,063.1	2,063.0	4.0	39.2	178.96	-1,769.7	32.1	1,770.0	1,726.8	43.22	40.951		
2,200.0	2,200.0	2,163.1	2,163.0	4.1	42.1	178.96	-1,769.7	32.1	1,770.0	1,723.9	46.17	38.334		
2,300.0	2,300.0	2,263.1	2,263.0	4.2	44.9	178.96	-1,769.7	32.1	1,770.0	1,720.9	49.13	36.029		
2,400.0	2,400.0	2,390.0	2,389.9	4.3	48.6	178.96	-1,769.7	32.1	1,770.2	1,717.4	52.86	33.491		
2,445.6	2,445.6	2,408.7	2,408.6	4.3	49.2	178.96	-1,769.7	32.1	1,770.0	1,716.5	53.58	33.034		
2,500.0	2,500.0	2,463.1	2,463.0	4.4	51.2	178.96	-1,769.7	32.1	1,770.0	1,714.4	55.62	31.824		
2,600.0	2,600.0	2,563.1	2,563.0	4.5	54.9	178.96	-1,769.7	32.1	1,770.0	1,710.7	59.36	29.816		
2,700.0	2,700.0	2,700.0	2,699.8	4.6	59.9	178.96	-1,769.7	32.1	1,770.4	1,706.0	64.46	27.466		
2,748.8	2,748.8	2,712.0	2,711.8	4.6	60.4	178.96	-1,769.7	32.1	1,770.0	1,705.0	64.99	27.234		
2,800.0	2,800.0	2,768.0	2,767.7	4.7	62.6	178.96	-1,769.7	32.1	1,770.0	1,702.7	67.31	26.295		
2,835.0	2,835.0	2,798.3	2,798.0	4.7	63.9	178.96	-1,769.7	32.1	1,770.0	1,701.4	68.65	25.782		
2,900.0	2,900.0	2,863.3	2,863.0	4.8	66.7	178.96	-1,769.7	32.1	1,770.0	1,698.5	71.52	24.750		
3,000.0	3,000.0	2,963.4	2,963.0	4.9	70.9	178.96	-1,769.7	32.1	1,770.0	1,694.2	75.82	23.346		
3,100.0	3,100.0	3,063.4	3,063.0	5.0	75.3	178.96	-1,769.7	32.1	1,770.0	1,689.8	80.27	22.052		
3,200.0	3,200.0	3,190.0	3,189.5	5.1	80.7	178.96	-1,769.7	32.1	1,770.2	1,684.4	85.85	20.621		
3,245.3	3,245.3	3,208.9	3,208.3	5.2	81.5	178.96	-1,769.7	32.1	1,770.0	1,683.3	86.70	20.417		
3,300.0	3,300.0	3,263.6	3,263.0	5.2	83.9	178.96	-1,769.7	32.1	1,770.0	1,681.0	89.08	19.871		
3,400.0	3,400.0	3,363.6	3,363.0	5.3	88.1	178.96	-1,769.7	32.1	1,770.0	1,676.6	93.43	18.944		
3,500.0	3,500.0	3,463.7	3,463.0	5.4	92.3	178.96	-1,769.7	32.1	1,770.0	1,672.3	97.75	18.108		
3,600.0	3,600.0	3,563.7	3,563.0	5.5	96.6	178.96	-1,769.7	32.1	1,770.0	1,667.9	102.16	17.326		
3,700.0	3,700.0	3,663.8	3,663.0	5.7	100.9	178.96	-1,769.7	32.1	1,770.0	1,663.5	106.59	16.606		
3,800.0	3,800.0	3,763.9	3,763.0	5.8	105.3	178.96	-1,769.7	32.1	1,770.0	1,659.0	111.03	15.942		
3,900.0	3,900.0	3,885.0	3,884.1	5.9	110.7	178.96	-1,769.7	32.1	1,770.2	1,653.6	116.55	15.188		
3,925.9	3,925.9	3,889.8	3,888.9	5.9	110.9	178.96	-1,769.7	32.1	1,770.0	1,653.2	116.79	15.155		
4,000.0	4,000.0	3,979.0	3,978.0	6.0	114.9	178.96	-1,769.7	32.1	1,770.1	1,649.2	120.87	14.645		
4,014.1	4,014.1	3,979.0	3,978.0	6.0	114.9	178.96	-1,769.7	32.1	1,770.0	1,649.2	120.88	14.643		
4,100.0	4,100.0	4,105.0	4,103.9	6.1	120.2	178.96	-1,769.7	32.1	1,770.5	1,644.2	126.32	14.017		
4,156.4	4,156.4	4,120.5	4,119.4	6.2	120.8	178.96	-1,769.7	32.1	1,770.0	1,643.1	126.98	13.939		
4,200.0	4,200.0	4,164.1	4,163.0	6.2	122.5	178.96	-1,769.7	32.1	1,770.0	1,641.3	128.72	13.751		
4,300.0	4,300.0	4,264.1	4,263.0	6.3	126.3	178.96	-1,769.7	32.1	1,770.0	1,637.4	132.69	13.340		
4,400.0	4,400.0	4,385.0	4,383.8	6.5	130.4	178.96	-1,769.7	32.1	1,770.2	1,633.3	136.88	12.932		
4,442.1	4,442.1	4,406.3	4,405.1	6.5	131.1	178.96	-1,769.7	32.1	1,770.0	1,632.4	137.62	12.862		
4,500.0	4,500.0	4,464.2	4,463.0	6.6	133.0	178.96	-1,769.7	32.1	1,770.0	1,630.5	139.56	12.683		
4,600.0	4,600.0	4,573.0	4,571.8	6.7	136.5	178.96	-1,769.7	32.1	1,770.1	1,626.8	143.21	12.360		
4,636.5	4,636.5	4,600.8	4,599.5	6.7	137.4	178.96	-1,769.7	32.1	1,770.0	1,625.9	144.16	12.278		
4,700.0	4,700.0	4,664.2	4,663.0	6.8	139.5	178.96	-1,769.7	32.1	1,770.0	1,623.7	146.29	12.099		
4,800.0	4,800.0	4,810.0	4,808.7	6.9	144.2	178.96	-1,769.7	32.1	1,770.6	1,619.5	151.14	11.715		
4,861.4	4,861.4	4,825.7	4,824.4	7.0	144.7	178.96	-1,769.7	32.1	1,770.0	1,618.4	151.67	11.671		
4,900.0	4,900.0	4,864.3	4,863.0	7.0	145.8	178.96	-1,769.7	32.1	1,770.0	1,617.2	152.82	11.582		
5,000.0	5,000.0	4,964.3	4,963.0	7.2	148.6	178.96	-1,769.7	32.1	1,770.0	1,614.2	155.81	11.360		
5,100.0	5,100.0	5,064.4	5,063.0	7.3	151.5	178.96	-1,769.7	32.1	1,770.0	1,611.2	158.80	11.147		
5,200.0	5,200.0	5,164.4	5,163.0	7.4	154.3	178.96	-1,769.7	32.1	1,770.0	1,608.4	161.66	10.949		
5,300.0	5,300.0	5,264.4	5,263.0	7.5	157.0	178.96	-1,769.7	32.1	1,770.0	1,605.5	164.53	10.758		
5,400.0	5,400.0	5,364.4	5,363.0	7.6	159.7	178.96	-1,769.7	32.1	1,770.0	1,602.6	167.39	10.574		
5,500.0	5,500.0	5,464.4	5,463.0	7.8	162.5	178.96	-1,769.7	32.1	1,770.0	1,599.8	170.26	10.396		
5,600.0	5,600.0	5,564.4	5,563.0	7.9	165.1	178.96	-1,769.7	32.1	1,770.0	1,597.0	173.00	10.231		
5,700.0	5,700.0	5,664.4	5,663.0	8.0	167.7	178.96	-1,769.7	32.1	1,770.0	1,594.3	175.75	10.072		

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWPO

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 - PADUCA 30 FEDERAL #1 - OWB - ACUTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 285-INC-ONLY													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
5,800.0	5,800.0	5,764.4	5,763.0	8.1	170.4	178.96	-1,769.7	32.1	1,770.0	1,591.5	178.49	9.917	
5,900.0	5,900.0	5,864.4	5,863.0	8.3	173.0	178.96	-1,769.7	32.1	1,770.0	1,588.8	181.24	9.767	
6,000.0	6,000.0	5,964.5	5,963.0	8.4	175.5	178.96	-1,769.7	32.1	1,770.0	1,586.2	183.89	9.626	
6,100.0	6,100.0	6,064.5	6,063.0	8.5	177.9	178.96	-1,769.7	32.1	1,770.0	1,583.7	186.39	9.497	
6,200.0	6,200.0	6,164.5	6,163.0	8.6	180.3	178.96	-1,769.7	32.1	1,770.0	1,581.2	188.89	9.371	
6,300.0	6,300.0	6,264.5	6,263.0	8.8	182.6	178.96	-1,769.7	32.1	1,770.0	1,578.7	191.39	9.248	
6,400.0	6,400.0	6,364.5	6,363.0	8.9	185.0	178.96	-1,769.7	32.1	1,770.0	1,576.1	193.89	9.129	
6,500.0	6,500.0	6,464.5	6,463.0	9.0	187.4	178.96	-1,769.7	32.1	1,770.0	1,573.6	196.40	9.012	
6,600.0	6,600.0	6,564.5	6,563.0	9.1	189.8	178.96	-1,769.7	32.1	1,770.0	1,571.1	198.90	8.899	
6,700.0	6,700.0	6,664.6	6,663.0	9.3	192.2	178.96	-1,769.7	32.1	1,770.0	1,568.6	201.41	8.788	
6,800.0	6,800.0	6,764.6	6,763.0	9.4	194.5	178.96	-1,769.7	32.1	1,770.0	1,566.1	203.92	8.680	
6,900.0	6,900.0	6,864.6	6,863.0	9.5	196.9	178.96	-1,769.7	32.1	1,770.0	1,563.6	206.43	8.575	
7,000.0	7,000.0	6,964.6	6,963.0	9.6	199.3	178.96	-1,769.7	32.1	1,770.0	1,561.1	208.94	8.472	
7,100.0	7,100.0	7,064.6	7,063.0	9.8	201.7	178.96	-1,769.7	32.1	1,770.0	1,558.6	211.43	8.372	
7,200.0	7,200.0	7,164.6	7,163.0	9.9	203.7	178.96	-1,769.7	32.1	1,770.0	1,556.5	213.58	8.287	
7,300.0	7,300.0	7,264.6	7,263.0	10.0	205.7	178.96	-1,769.7	32.1	1,770.0	1,554.3	215.73	8.205	
7,400.0	7,400.0	7,364.6	7,363.0	10.1	207.8	178.96	-1,769.7	32.1	1,770.0	1,552.2	217.88	8.124	
7,500.0	7,500.0	7,464.6	7,463.0	10.3	209.8	178.96	-1,769.7	32.1	1,770.0	1,550.0	220.01	8.045	
7,600.0	7,600.0	7,564.6	7,563.0	10.4	211.6	178.96	-1,769.7	32.1	1,770.0	1,548.1	221.93	7.976	
7,700.0	7,700.0	7,664.6	7,663.0	10.5	213.3	178.96	-1,769.7	32.1	1,770.0	1,546.2	223.85	7.907	
7,800.0	7,800.0	7,764.6	7,763.0	10.6	215.1	178.96	-1,769.7	32.1	1,770.0	1,544.3	225.77	7.840	
7,900.0	7,900.0	7,864.6	7,863.0	10.8	216.9	178.96	-1,769.7	32.1	1,770.0	1,542.3	227.70	7.774	
8,000.0	8,000.0	7,964.7	7,963.0	10.9	218.7	178.96	-1,769.7	32.1	1,770.0	1,540.5	229.57	7.710	
8,100.0	8,100.0	8,064.7	8,063.0	11.0	220.4	178.96	-1,769.7	32.1	1,770.0	1,538.7	231.38	7.650	
8,200.0	8,200.0	8,164.7	8,163.0	11.1	222.1	178.96	-1,769.7	32.1	1,770.0	1,536.8	233.20	7.590	
8,300.0	8,300.0	8,264.7	8,263.0	11.3	223.7	178.96	-1,769.7	32.1	1,770.0	1,535.0	235.02	7.532	
8,400.0	8,400.0	8,364.7	8,363.0	11.4	225.4	178.96	-1,769.7	32.1	1,770.0	1,533.3	236.78	7.476	
8,500.0	8,500.0	8,464.7	8,463.0	11.5	227.0	178.96	-1,769.7	32.1	1,770.0	1,531.5	238.49	7.422	
8,600.0	8,600.0	8,564.7	8,563.0	11.6	228.6	178.96	-1,769.7	32.1	1,770.0	1,529.8	240.20	7.369	
8,700.0	8,700.0	8,664.7	8,663.0	11.8	230.1	178.96	-1,769.7	32.1	1,770.0	1,528.1	241.92	7.317	
8,727.5	8,727.5	8,692.2	8,690.5	11.8	230.6	178.96	-1,769.7	32.1	1,770.0	1,527.7	242.39	7.302	
8,750.0	8,750.0	8,720.0	8,718.3	11.8	231.0	-29.58	-1,769.7	32.1	1,769.6	1,526.7	242.85	7.287	
8,775.0	8,774.9	8,739.6	8,737.9	11.8	231.3	-29.70	-1,769.7	32.1	1,768.0	1,524.8	243.14	7.271	
8,800.0	8,799.7	8,764.4	8,762.7	11.8	231.7	-29.91	-1,769.7	32.1	1,765.3	1,521.7	243.51	7.249	
8,825.0	8,824.3	8,789.0	8,787.3	11.8	232.0	-30.22	-1,769.7	32.1	1,761.4	1,517.5	243.89	7.222	
8,850.0	8,848.7	8,813.3	8,811.7	11.8	232.4	-30.62	-1,769.7	32.1	1,756.5	1,512.2	244.26	7.191	
8,875.0	8,872.7	8,837.3	8,835.7	11.9	232.8	-31.12	-1,769.7	32.1	1,750.4	1,505.8	244.62	7.156	
8,900.0	8,896.3	8,860.9	8,859.3	11.9	233.1	-31.72	-1,769.7	32.1	1,743.3	1,498.3	244.99	7.116	
8,925.0	8,919.4	8,884.1	8,882.4	11.9	233.5	-32.44	-1,769.7	32.1	1,735.1	1,489.8	245.34	7.072	
8,950.0	8,942.0	8,906.7	8,905.0	11.9	233.8	-33.27	-1,769.7	32.1	1,725.9	1,480.2	245.70	7.025	
8,975.0	8,964.1	8,928.7	8,927.1	11.9	234.1	-34.22	-1,769.7	32.1	1,715.8	1,469.7	246.04	6.973	
9,000.0	8,985.4	8,950.1	8,948.4	11.9	234.4	-35.31	-1,769.7	32.1	1,704.6	1,458.2	246.38	6.919	
9,025.0	9,006.1	8,970.8	8,969.1	12.0	234.8	-36.54	-1,769.7	32.1	1,692.6	1,445.8	246.72	6.860	
9,050.0	9,026.0	8,990.7	8,989.0	12.0	235.1	-37.92	-1,769.7	32.1	1,679.6	1,432.6	247.04	6.799	
9,075.0	9,045.1	9,009.8	9,008.1	12.0	235.3	-39.48	-1,769.7	32.1	1,665.9	1,418.5	247.35	6.735	
9,100.0	9,063.4	9,028.0	9,026.4	12.1	235.6	-41.21	-1,769.7	32.1	1,651.3	1,403.7	247.66	6.668	
9,125.0	9,080.7	9,045.3	9,043.7	12.1	235.9	-43.14	-1,769.7	32.1	1,636.0	1,388.1	247.95	6.598	
9,150.0	9,097.0	9,061.7	9,060.0	12.1	236.1	-45.27	-1,769.7	32.1	1,620.1	1,371.8	248.23	6.526	
9,175.0	9,112.3	9,077.0	9,075.3	12.2	236.3	-47.62	-1,769.7	32.1	1,603.5	1,354.9	248.51	6.452	
9,200.0	9,126.6	9,091.2	9,089.6	12.2	236.5	-50.19	-1,769.7	32.1	1,586.3	1,337.5	248.77	6.377	
9,225.0	9,139.8	9,104.4	9,102.8	12.3	236.7	-53.00	-1,769.7	32.1	1,568.6	1,319.6	249.02	6.299	
9,250.0	9,151.8	9,116.5	9,114.8	12.3	236.9	-56.04	-1,769.7	32.1	1,550.4	1,301.2	249.25	6.220	

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	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #9H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #9H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - PADUCA 30 FEDERAL #1 - OWB - ACUTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 285-INC-ONLY													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		
9,275.0	9,162.7	9,127.3	9,125.7	12.4	237.1	-59.30	-1,769.7	32.1	1,531.9	1,282.4	249.48	6.140		
9,300.0	9,172.4	9,137.0	9,135.4	12.5	237.2	-62.77	-1,769.7	32.1	1,513.0	1,263.3	249.69	6.059		
9,325.0	9,180.8	9,145.5	9,143.8	12.5	237.4	-66.43	-1,769.7	32.1	1,493.8	1,243.9	249.90	5.978		
9,350.0	9,188.1	9,152.7	9,151.1	12.6	237.5	-70.23	-1,769.7	32.1	1,474.5	1,224.4	250.10	5.896		
9,375.0	9,194.0	9,158.7	9,157.0	12.7	237.6	-74.13	-1,769.7	32.1	1,455.0	1,204.7	250.29	5.813		
9,400.0	9,198.7	9,163.4	9,161.7	12.8	237.6	-78.08	-1,769.7	32.1	1,435.4	1,184.9	250.47	5.731		
9,425.0	9,202.1	9,166.8	9,165.1	13.0	237.7	-82.01	-1,769.7	32.1	1,415.8	1,165.2	250.65	5.649		
9,450.0	9,204.2	9,168.9	9,167.2	13.1	237.7	-85.88	-1,769.7	32.1	1,396.3	1,145.5	250.82	5.567		
9,475.0	9,205.0	9,169.7	9,168.0	13.3	237.7	-89.63	-1,769.7	32.1	1,376.9	1,125.9	251.00	5.486		
9,477.6	9,205.0	9,169.7	9,168.0	13.3	237.7	-90.00	-1,769.7	32.1	1,374.9	1,123.9	251.02	5.477		
9,500.0	9,205.0	9,169.7	9,168.0	13.5	237.7	-90.00	-1,769.7	32.1	1,357.5	1,106.3	251.18	5.405		
9,600.0	9,205.0	9,169.7	9,168.0	14.4	237.7	-90.01	-1,769.7	32.1	1,279.2	1,027.1	252.09	5.074		
9,700.0	9,205.0	9,169.6	9,168.0	15.5	237.7	-90.03	-1,769.7	32.1	1,199.5	946.3	253.20	4.738		
9,800.0	9,204.9	9,169.6	9,167.9	16.7	237.7	-90.04	-1,769.7	32.1	1,118.7	864.3	254.41	4.397		
9,900.0	9,204.9	9,169.5	9,167.9	17.9	237.7	-90.05	-1,769.7	32.1	1,036.8	781.1	255.66	4.055		
10,000.0	9,204.8	9,169.5	9,167.8	19.2	237.7	-90.07	-1,769.7	32.1	954.0	697.1	256.92	3.713		
10,100.0	9,204.7	9,169.4	9,167.7	20.5	237.7	-90.08	-1,769.7	32.1	870.6	612.5	258.17	3.372		
10,200.6	9,204.6	9,169.3	9,167.6	21.7	237.7	-90.09	-1,769.7	32.1	786.3	526.9	259.41	3.031		
10,300.0	9,204.5	9,169.2	9,167.5	22.9	237.7	-90.08	-1,769.7	32.1	705.1	444.5	260.65	2.705		
10,400.0	9,204.4	9,169.1	9,167.4	24.2	237.7	-90.06	-1,769.7	32.1	628.7	366.7	261.95	2.400		
10,500.0	9,204.3	9,169.0	9,167.3	25.6	237.7	-90.05	-1,769.7	32.1	559.7	296.4	263.30	2.126		
10,600.0	9,204.2	9,168.9	9,167.2	27.0	237.7	-90.04	-1,769.7	32.1	501.3	236.6	264.69	1.894 Advise and Monitor		
10,700.0	9,204.1	9,168.8	9,167.1	28.4	237.7	-90.02	-1,769.7	32.1	457.5	191.4	266.12	1.719 Advise and Monitor		
10,800.0	9,204.0	9,168.7	9,167.0	29.9	237.7	-90.01	-1,769.7	32.1	432.8	165.3	267.57	1.618 Advise and Monitor		
10,859.9	9,203.9	9,168.6	9,166.9	30.8	237.7	-90.00	-1,769.7	32.1	428.7	160.2	268.45	1.597 Advise and Monitor, CC, ES, SF		
10,900.0	9,203.9	9,168.6	9,166.9	31.3	237.7	-89.99	-1,769.7	32.1	430.5	161.5	269.04	1.600 Advise and Monitor		
11,000.0	9,203.8	9,168.4	9,166.8	32.8	237.7	-89.98	-1,769.7	32.1	451.0	180.4	270.54	1.667 Advise and Monitor		
11,100.0	9,203.7	9,168.3	9,166.7	34.4	237.7	-89.97	-1,769.7	32.1	491.3	219.3	272.06	1.806 Advise and Monitor		
11,200.0	9,203.6	9,168.2	9,166.6	35.9	237.7	-89.95	-1,769.7	32.1	547.2	273.6	273.58	2.000		
11,300.0	9,203.5	9,168.1	9,166.5	37.4	237.7	-89.94	-1,769.7	32.1	614.4	339.3	275.12	2.233		
11,400.0	9,203.4	9,168.0	9,166.4	39.0	237.7	-89.92	-1,769.7	32.1	689.6	412.9	276.68	2.492		
11,500.0	9,203.3	9,167.9	9,166.3	40.5	237.7	-89.91	-1,769.7	32.1	770.4	492.2	278.24	2.769		
11,600.0	9,203.2	9,167.8	9,166.2	42.1	237.7	-89.90	-1,769.7	32.1	855.3	575.5	279.81	3.057		
11,700.0	9,203.0	9,167.7	9,166.0	43.7	237.7	-89.88	-1,769.7	32.1	943.2	661.8	281.39	3.352		
11,800.0	9,202.9	9,167.6	9,165.9	45.3	237.7	-89.87	-1,769.7	32.1	1,033.2	750.3	282.97	3.651		
11,900.0	9,202.8	9,167.5	9,165.8	46.9	237.7	-89.85	-1,769.7	32.1	1,125.0	840.4	284.56	3.953		
12,000.0	9,202.7	9,167.4	9,165.7	48.5	237.7	-89.84	-1,769.7	32.1	1,218.0	931.9	286.16	4.257		
12,100.0	9,202.6	9,167.3	9,165.6	50.1	237.7	-89.83	-1,769.7	32.1	1,312.1	1,024.4	287.76	4.560		
12,200.0	9,202.5	9,167.2	9,165.5	51.7	237.7	-89.81	-1,769.7	32.1	1,407.0	1,117.7	289.36	4.862		
12,300.0	9,202.4	9,167.1	9,165.4	53.3	237.7	-89.80	-1,769.7	32.1	1,502.6	1,211.6	290.97	5.164		
12,400.0	9,202.3	9,167.0	9,165.3	54.9	237.7	-89.78	-1,769.7	32.1	1,598.7	1,306.1	292.58	5.464		
12,500.0	9,202.2	9,166.9	9,165.2	56.5	237.7	-89.77	-1,769.7	32.1	1,695.2	1,401.0	294.20	5.762		
12,600.0	9,202.1	9,166.8	9,165.1	58.1	237.7	-89.76	-1,769.7	32.1	1,792.1	1,496.3	295.82	6.058		
12,700.0	9,202.0	9,166.7	9,165.0	59.8	237.7	-89.74	-1,769.7	32.1	1,889.4	1,592.0	297.44	6.352		
12,800.0	9,201.9	9,166.6	9,164.9	61.4	237.7	-89.73	-1,769.7	32.1	1,986.9	1,687.9	299.06	6.644		
12,900.0	9,201.8	9,166.5	9,164.8	63.0	237.7	-89.71	-1,769.7	32.1	2,084.7	1,784.0	300.68	6.933		
13,000.0	9,201.7	9,166.4	9,164.7	64.6	237.7	-89.70	-1,769.7	32.1	2,182.6	1,880.3	302.31	7.220		
13,100.0	9,201.6	9,166.2	9,164.6	66.3	237.7	-89.69	-1,769.7	32.1	2,280.8	1,976.8	303.94	7.504		
13,200.0	9,201.5	9,166.1	9,164.5	67.9	237.7	-89.67	-1,769.7	32.1	2,379.1	2,073.5	305.57	7.786		
13,300.0	9,201.4	9,166.0	9,164.4	69.5	237.7	-89.66	-1,769.7	32.1	2,477.5	2,170.3	307.21	8.065		
13,400.0	9,201.3	9,165.9	9,164.3	71.2	237.7	-89.64	-1,769.7	32.1	2,576.0	2,267.2	308.84	8.341		
13,500.0	9,201.2	9,165.8	9,164.2	72.8	237.7	-89.63	-1,769.7	32.1	2,674.7	2,364.2	310.47	8.615		

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 - PADUCA 30 FEDERAL #1 - OWB - ACUTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 285-INC-ONLY													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance				Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)		Minimum Separation (usft)	Separation Factor	
13,600.0	9,201.1	9,165.7	9,164.1	74.5	237.7	-89.62	-1,769.7	32.1	2,773.5	2,461.3	312.11	8.886		
13,700.0	9,201.0	9,165.6	9,164.0	76.1	237.7	-89.60	-1,769.7	32.1	2,872.3	2,558.5	313.75	9.155		
13,800.0	9,200.8	9,165.5	9,163.8	77.7	237.7	-89.59	-1,769.7	32.1	2,971.2	2,655.8	315.39	9.421		
13,900.0	9,200.7	9,165.4	9,163.7	79.4	237.7	-89.58	-1,769.7	32.1	3,070.2	2,753.2	317.03	9.684		
14,000.0	9,200.6	9,165.3	9,163.6	81.0	237.7	-89.56	-1,769.7	32.1	3,169.2	2,850.6	318.67	9.945		
14,100.0	9,200.5	9,165.2	9,163.5	82.7	237.6	-89.55	-1,769.7	32.1	3,268.4	2,948.0	320.31	10.204		
14,200.0	9,200.4	9,165.1	9,163.4	84.3	237.6	-89.53	-1,769.7	32.1	3,367.5	3,045.6	321.96	10.460		
14,300.0	9,200.3	9,165.0	9,163.3	86.0	237.6	-89.52	-1,769.7	32.1	3,466.7	3,143.1	323.60	10.713		
14,400.0	9,200.2	9,164.9	9,163.2	87.6	237.6	-89.51	-1,769.7	32.1	3,566.0	3,240.7	325.24	10.964		
14,500.0	9,200.1	9,164.8	9,163.1	89.2	237.6	-89.49	-1,769.7	32.1	3,665.3	3,338.4	326.89	11.213		
14,600.0	9,200.0	9,164.7	9,163.0	90.9	237.6	-89.48	-1,769.7	32.1	3,764.6	3,436.1	328.54	11.459		
14,700.0	9,199.9	9,164.6	9,162.9	92.5	237.6	-89.46	-1,769.7	32.1	3,864.0	3,533.8	330.18	11.703		
14,800.0	9,199.8	9,164.5	9,162.8	94.2	237.6	-89.45	-1,769.7	32.1	3,963.4	3,631.5	331.83	11.944		
14,900.0	9,199.7	9,164.4	9,162.7	95.8	237.6	-89.44	-1,769.7	32.1	4,062.8	3,729.3	333.48	12.183		
15,000.0	9,199.6	9,164.3	9,162.6	97.5	237.6	-89.42	-1,769.7	32.1	4,162.3	3,827.1	335.13	12.420		
15,100.0	9,199.5	9,164.2	9,162.5	99.1	237.6	-89.41	-1,769.7	32.1	4,261.7	3,925.0	336.78	12.655		
15,200.0	9,199.4	9,164.1	9,162.4	100.8	237.6	-89.39	-1,769.7	32.1	4,361.2	4,022.8	338.43	12.887		
15,300.0	9,199.3	9,163.9	9,162.3	102.4	237.6	-89.38	-1,769.7	32.1	4,460.8	4,120.7	340.08	13.117		
15,400.0	9,199.2	9,163.8	9,162.2	104.1	237.6	-89.37	-1,769.7	32.1	4,560.3	4,218.6	341.73	13.345		
15,500.0	9,199.1	9,163.7	9,162.1	105.7	237.6	-89.35	-1,769.7	32.1	4,659.9	4,316.5	343.38	13.571		
15,600.0	9,199.0	9,163.6	9,162.0	107.4	237.6	-89.34	-1,769.7	32.1	4,759.5	4,414.4	345.03	13.794		
15,700.0	9,198.9	9,163.5	9,161.9	109.1	237.6	-89.32	-1,769.7	32.1	4,859.1	4,512.4	346.68	14.016		
15,800.0	9,198.8	9,163.4	9,161.8	110.7	237.6	-89.31	-1,769.7	32.1	4,958.7	4,610.4	348.33	14.236		
15,900.0	9,198.7	9,163.3	9,161.7	112.4	237.6	-89.30	-1,769.7	32.1	5,058.3	4,708.3	349.98	14.453		
16,000.0	9,198.5	9,163.2	9,161.5	114.0	237.6	-89.28	-1,769.7	32.1	5,158.0	4,806.3	351.64	14.668		
16,100.0	9,198.4	9,163.1	9,161.4	115.7	237.6	-89.27	-1,769.7	32.1	5,257.6	4,904.3	353.29	14.882		
16,200.0	9,198.3	9,163.0	9,161.3	117.3	237.6	-89.25	-1,769.7	32.1	5,357.3	5,002.4	354.94	15.093		
16,300.0	9,198.2	9,162.9	9,161.2	119.0	237.6	-89.24	-1,769.7	32.1	5,457.0	5,100.4	356.60	15.303		
16,400.0	9,198.1	9,162.8	9,161.1	120.6	237.6	-89.23	-1,769.7	32.1	5,556.7	5,198.4	358.25	15.511		
16,500.0	9,198.0	9,162.7	9,161.0	122.3	237.6	-89.21	-1,769.7	32.1	5,656.4	5,296.5	359.91	15.716		
16,600.0	9,197.9	9,162.6	9,160.9	124.0	237.6	-89.20	-1,769.7	32.1	5,756.1	5,394.5	361.56	15.920		
16,700.0	9,197.8	9,162.5	9,160.8	125.6	237.6	-89.18	-1,769.7	32.1	5,855.8	5,492.6	363.22	16.122		
16,800.0	9,197.7	9,162.4	9,160.7	127.3	237.6	-89.17	-1,769.7	32.1	5,955.6	5,590.7	364.87	16.322		
16,900.0	9,197.6	9,162.3	9,160.6	128.9	237.6	-89.16	-1,769.7	32.1	6,055.3	5,688.8	366.53	16.521		
17,000.0	9,197.5	9,162.2	9,160.5	130.6	237.6	-89.14	-1,769.7	32.1	6,155.1	5,786.9	368.18	16.717		
17,100.0	9,197.4	9,162.1	9,160.4	132.2	237.6	-89.13	-1,769.7	32.1	6,254.8	5,885.0	369.84	16.912		
17,200.0	9,197.3	9,162.0	9,160.3	133.9	237.6	-89.11	-1,769.7	32.1	6,354.6	5,983.1	371.49	17.106		
17,300.0	9,197.2	9,161.9	9,160.2	135.6	237.6	-89.10	-1,769.7	32.1	6,454.4	6,081.2	373.15	17.297		
17,400.0	9,197.1	9,161.8	9,160.1	137.2	237.6	-89.09	-1,769.7	32.1	6,554.2	6,179.4	374.81	17.487		
17,500.0	9,197.0	9,161.6	9,160.0	138.9	237.6	-89.07	-1,769.7	32.1	6,653.9	6,277.5	376.46	17.675		
17,600.0	9,196.9	9,161.5	9,159.9	140.5	237.6	-89.06	-1,769.7	32.1	6,753.7	6,375.6	378.12	17.861		
17,700.0	9,196.8	9,161.4	9,159.8	142.2	237.6	-89.04	-1,769.7	32.1	6,853.5	6,473.8	379.78	18.046		
17,800.0	9,196.7	9,161.3	9,159.7	143.8	237.6	-89.03	-1,769.7	32.1	6,953.4	6,571.9	381.43	18.230		
17,900.0	9,196.6	9,161.2	9,159.6	145.5	237.6	-89.02	-1,769.7	32.1	7,053.2	6,670.1	383.09	18.411		
18,000.0	9,196.5	9,161.1	9,159.5	147.2	237.6	-89.00	-1,769.7	32.1	7,153.0	6,768.2	384.75	18.591		
18,100.0	9,196.4	9,161.0	9,159.4	148.8	237.6	-88.99	-1,769.7	32.1	7,252.8	6,866.4	386.40	18.770		
18,200.0	9,196.2	9,160.9	9,159.2	150.5	237.6	-88.97	-1,769.7	32.1	7,352.6	6,964.6	388.06	18.947		
18,300.0	9,196.1	9,160.8	9,159.1	152.1	237.6	-88.96	-1,769.7	32.1	7,452.5	7,062.7	389.72	19.123		
18,400.0	9,196.0	9,160.7	9,159.0	153.8	237.6	-88.95	-1,769.7	32.1	7,552.3	7,160.9	391.38	19.297		
18,500.0	9,195.9	9,160.6	9,158.9	155.5	237.6	-88.93	-1,769.7	32.1	7,652.1	7,259.1	393.04	19.469		
18,600.0	9,195.8	9,160.5	9,158.8	157.1	237.6	-88.92	-1,769.7	32.1	7,752.0	7,357.3	394.69	19.640		
18,700.0	9,195.7	9,160.4	9,158.7	158.8	237.6	-88.90	-1,769.7	32.1	7,851.8	7,455.5	396.35	19.810		

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 - PADUCA 30 FEDERAL #1 - OWB - ACUTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 285-INC-ONLY													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	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)			
18,800.0	9,195.6	9,160.3	9,158.6	160.4	237.6	-88.89	-1,769.7	32.1	7,951.7	7,553.7	398.01	19.979	
18,900.0	9,195.5	9,160.2	9,158.5	162.1	237.6	-88.88	-1,769.7	32.1	8,051.5	7,651.9	399.67	20.146	
19,000.0	9,195.4	9,160.1	9,158.4	163.8	237.6	-88.86	-1,769.7	32.1	8,151.4	7,750.1	401.33	20.311	
19,100.0	9,195.3	9,160.0	9,158.3	165.4	237.6	-88.85	-1,769.7	32.1	8,251.3	7,848.3	402.99	20.475	
19,200.0	9,195.2	9,159.9	9,158.2	167.1	237.6	-88.83	-1,769.7	32.1	8,351.1	7,946.5	404.65	20.638	
19,300.0	9,195.1	9,159.8	9,158.1	168.7	237.6	-88.82	-1,769.7	32.1	8,451.0	8,044.7	406.30	20.800	
19,394.7	9,195.0	9,159.7	9,158.0	170.3	237.6	-88.81	-1,769.7	32.1	8,545.6	8,137.7	407.88	20.951	

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #9H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #9H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #10H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-Standard Keeper 104, 8723-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	0.0	0.0	3.0	3.0	89.43	0.5	50.0	50.0					
100.0	100.0	99.8	99.8	3.0	3.0	89.43	0.5	50.0	50.0	44.0	6.00	8.333		
200.0	200.0	199.8	199.8	3.0	3.0	89.43	0.5	50.0	50.0	44.0	6.01	8.319		
300.0	300.0	299.8	299.8	3.0	3.0	89.43	0.5	50.0	50.0	44.0	6.03	8.289		
400.0	400.0	399.8	399.8	3.0	3.0	89.43	0.5	50.0	50.0	43.9	6.07	8.244		
500.0	500.0	499.8	499.8	3.1	3.1	89.43	0.5	50.0	50.0	43.9	6.11	8.184		
600.0	600.0	599.8	599.8	3.1	3.1	89.43	0.5	50.0	50.0	43.8	6.16	8.111		
700.0	700.0	699.8	699.8	3.1	3.1	89.43	0.5	50.0	50.0	43.8	6.23	8.025		
800.0	800.0	799.8	799.8	3.2	3.2	89.43	0.5	50.0	50.0	43.7	6.31	7.928		
900.0	900.0	899.8	899.8	3.2	3.2	89.43	0.5	50.0	50.0	43.6	6.39	7.822		
1,000.0	1,000.0	999.8	999.8	3.2	3.2	89.43	0.5	50.0	50.0	43.5	6.49	7.706		
1,100.0	1,100.0	1,099.8	1,099.8	3.3	3.3	89.43	0.5	50.0	50.0	43.4	6.59	7.584		
1,200.0	1,200.0	1,199.8	1,199.8	3.4	3.4	89.43	0.5	50.0	50.0	43.3	6.71	7.455		
1,300.0	1,300.0	1,299.8	1,299.8	3.4	3.4	89.43	0.5	50.0	50.0	43.2	6.83	7.322		
1,400.0	1,400.0	1,399.8	1,399.8	3.5	3.5	89.43	0.5	50.0	50.0	43.0	6.96	7.185		
1,500.0	1,500.0	1,499.8	1,499.8	3.5	3.5	89.43	0.5	50.0	50.0	42.9	7.10	7.046		
1,600.0	1,600.0	1,599.8	1,599.8	3.6	3.6	89.43	0.5	50.0	50.0	42.8	7.24	6.906		
1,700.0	1,700.0	1,699.8	1,699.8	3.7	3.7	89.43	0.5	50.0	50.0	42.6	7.39	6.765		
1,800.0	1,800.0	1,799.8	1,799.8	3.8	3.8	89.43	0.5	50.0	50.0	42.5	7.55	6.624		
1,900.0	1,900.0	1,899.8	1,899.8	3.9	3.9	89.43	0.5	50.0	50.0	42.3	7.71	6.485		
2,000.0	2,000.0	1,999.8	1,999.8	3.9	3.9	89.43	0.5	50.0	50.0	42.1	7.88	6.346		
2,100.0	2,100.0	2,099.8	2,099.8	4.0	4.0	89.43	0.5	50.0	50.0	41.9	8.05	6.209		
2,200.0	2,200.0	2,199.8	2,199.8	4.1	4.1	89.43	0.5	50.0	50.0	41.8	8.23	6.075		
2,300.0	2,300.0	2,299.8	2,299.8	4.2	4.2	89.43	0.5	50.0	50.0	41.6	8.41	5.943		
2,400.0	2,400.0	2,399.8	2,399.8	4.3	4.3	89.43	0.5	50.0	50.0	41.4	8.60	5.814		
2,500.0	2,500.0	2,499.8	2,499.8	4.4	4.4	89.43	0.5	50.0	50.0	41.2	8.79	5.688		
2,600.0	2,600.0	2,599.8	2,599.8	4.5	4.5	89.43	0.5	50.0	50.0	41.0	8.99	5.565		
2,700.0	2,700.0	2,699.8	2,699.8	4.6	4.6	89.43	0.5	50.0	50.0	40.8	9.18	5.445		
2,800.0	2,800.0	2,799.8	2,799.8	4.7	4.7	89.43	0.5	50.0	50.0	40.6	9.39	5.328		
2,900.0	2,900.0	2,899.8	2,899.8	4.8	4.8	89.43	0.5	50.0	50.0	40.4	9.59	5.214		
3,000.0	3,000.0	2,999.8	2,999.8	4.9	4.9	89.43	0.5	50.0	50.0	40.2	9.80	5.104		
3,100.0	3,100.0	3,099.8	3,099.8	5.0	5.0	89.43	0.5	50.0	50.0	40.0	10.01	4.997		
3,200.0	3,200.0	3,199.8	3,199.8	5.1	5.1	89.43	0.5	50.0	50.0	39.8	10.22	4.893		
3,300.0	3,300.0	3,299.8	3,299.8	5.2	5.2	89.43	0.5	50.0	50.0	39.6	10.43	4.793		
3,400.0	3,400.0	3,399.8	3,399.8	5.3	5.3	89.43	0.5	50.0	50.0	39.4	10.65	4.695		
3,500.0	3,500.0	3,499.8	3,499.8	5.4	5.4	89.43	0.5	50.0	50.0	39.1	10.87	4.601		
3,600.0	3,600.0	3,599.8	3,599.8	5.5	5.5	89.43	0.5	50.0	50.0	38.9	11.09	4.509		
3,700.0	3,700.0	3,699.8	3,699.8	5.7	5.7	89.43	0.5	50.0	50.0	38.7	11.31	4.420		
3,800.0	3,800.0	3,799.8	3,799.8	5.8	5.8	89.43	0.5	50.0	50.0	38.5	11.54	4.334		
3,900.0	3,900.0	3,899.8	3,899.8	5.9	5.9	89.43	0.5	50.0	50.0	38.2	11.76	4.251		
4,000.0	4,000.0	3,999.8	3,999.8	6.0	6.0	89.43	0.5	50.0	50.0	38.0	11.99	4.170		
4,100.0	4,100.0	4,099.8	4,099.8	6.1	6.1	89.43	0.5	50.0	50.0	37.8	12.22	4.092		
4,200.0	4,200.0	4,199.8	4,199.8	6.2	6.2	89.43	0.5	50.0	50.0	37.6	12.45	4.016		
4,300.0	4,300.0	4,299.8	4,299.8	6.3	6.3	89.43	0.5	50.0	50.0	37.3	12.68	3.943		
4,400.0	4,400.0	4,399.8	4,399.8	6.5	6.5	89.43	0.5	50.0	50.0	37.1	12.91	3.872		
4,500.0	4,500.0	4,499.8	4,499.8	6.6	6.6	89.43	0.5	50.0	50.0	36.9	13.15	3.803		
4,600.0	4,600.0	4,599.8	4,599.8	6.7	6.7	89.43	0.5	50.0	50.0	36.6	13.38	3.736		
4,700.0	4,700.0	4,699.8	4,699.8	6.8	6.8	89.43	0.5	50.0	50.0	36.4	13.62	3.671		
4,800.0	4,800.0	4,799.8	4,799.8	6.9	6.9	89.43	0.5	50.0	50.0	36.1	13.86	3.609		
4,900.0	4,900.0	4,899.8	4,899.8	7.0	7.0	89.43	0.5	50.0	50.0	35.9	14.09	3.548		
5,000.0	5,000.0	4,999.8	4,999.8	7.2	7.2	89.43	0.5	50.0	50.0	35.7	14.33	3.488		
5,100.0	5,100.0	5,099.8	5,099.8	7.3	7.3	89.43	0.5	50.0	50.0	35.4	14.57	3.431		

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #10H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104, 8723-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	
5,200.0	5,200.0	5,199.8	5,199.8	7.4	7.4	89.43	0.5	50.0	50.0	35.2	14.81	3.375	
5,300.0	5,300.0	5,299.8	5,299.8	7.5	7.5	89.43	0.5	50.0	50.0	34.9	15.06	3.321	
5,400.0	5,400.0	5,399.8	5,399.8	7.6	7.6	89.43	0.5	50.0	50.0	34.7	15.30	3.269	
5,500.0	5,500.0	5,499.8	5,499.8	7.8	7.8	89.43	0.5	50.0	50.0	34.5	15.54	3.217	
5,600.0	5,600.0	5,599.8	5,599.8	7.9	7.9	89.43	0.5	50.0	50.0	34.2	15.78	3.168	
5,700.0	5,700.0	5,699.8	5,699.8	8.0	8.0	89.43	0.5	50.0	50.0	34.0	16.03	3.120	
5,800.0	5,800.0	5,799.8	5,799.8	8.1	8.1	89.43	0.5	50.0	50.0	33.7	16.27	3.073	
5,900.0	5,900.0	5,899.8	5,899.8	8.3	8.3	89.43	0.5	50.0	50.0	33.5	16.52	3.027	
6,000.0	6,000.0	5,999.8	5,999.8	8.4	8.4	89.43	0.5	50.0	50.0	33.2	16.76	2.983	
6,100.0	6,100.0	6,099.8	6,099.8	8.5	8.5	89.43	0.5	50.0	50.0	33.0	17.01	2.939	
6,200.0	6,200.0	6,199.8	6,199.8	8.6	8.6	89.43	0.5	50.0	50.0	32.7	17.26	2.897	
6,300.0	6,300.0	6,299.8	6,299.8	8.8	8.8	89.43	0.5	50.0	50.0	32.5	17.51	2.856	
6,400.0	6,400.0	6,399.8	6,399.8	8.9	8.9	89.43	0.5	50.0	50.0	32.2	17.75	2.816	
6,500.0	6,500.0	6,499.8	6,499.8	9.0	9.0	89.43	0.5	50.0	50.0	32.0	18.00	2.778	
6,600.0	6,600.0	6,599.8	6,599.8	9.1	9.1	89.43	0.5	50.0	50.0	31.8	18.25	2.740	
6,700.0	6,700.0	6,699.8	6,699.8	9.3	9.3	89.43	0.5	50.0	50.0	31.5	18.50	2.703	
6,800.0	6,800.0	6,799.8	6,799.8	9.4	9.4	89.43	0.5	50.0	50.0	31.3	18.75	2.667	
6,900.0	6,900.0	6,899.8	6,899.8	9.5	9.5	89.43	0.5	50.0	50.0	31.0	19.00	2.632	
7,000.0	7,000.0	6,999.8	6,999.8	9.6	9.6	89.43	0.5	50.0	50.0	30.8	19.25	2.597	
7,100.0	7,100.0	7,099.8	7,099.8	9.8	9.8	89.43	0.5	50.0	50.0	30.5	19.50	2.564	
7,200.0	7,200.0	7,199.8	7,199.8	9.9	9.9	89.43	0.5	50.0	50.0	30.3	19.75	2.532	
7,300.0	7,300.0	7,299.8	7,299.8	10.0	10.0	89.43	0.5	50.0	50.0	30.0	20.00	2.500	
7,400.0	7,400.0	7,399.8	7,399.8	10.1	10.1	89.43	0.5	50.0	50.0	29.7	20.26	2.469	
7,500.0	7,500.0	7,499.8	7,499.8	10.3	10.3	89.43	0.5	50.0	50.0	29.5	20.51	2.438	
7,600.0	7,600.0	7,599.8	7,599.8	10.4	10.4	89.43	0.5	50.0	50.0	29.2	20.76	2.409	
7,700.0	7,700.0	7,699.8	7,699.8	10.5	10.5	89.43	0.5	50.0	50.0	29.0	21.01	2.380	
7,800.0	7,800.0	7,799.8	7,799.8	10.6	10.6	89.43	0.5	50.0	50.0	28.7	21.26	2.351	
7,900.0	7,900.0	7,899.8	7,899.8	10.8	10.8	89.43	0.5	50.0	50.0	28.5	21.52	2.324	
8,000.0	8,000.0	7,999.8	7,999.8	10.9	10.9	89.43	0.5	50.0	50.0	28.2	21.77	2.297	
8,100.0	8,100.0	8,099.8	8,099.8	11.0	11.0	89.43	0.5	50.0	50.0	28.0	22.02	2.270	
8,200.0	8,200.0	8,199.8	8,199.8	11.1	11.1	89.43	0.5	50.0	50.0	27.7	22.28	2.244	
8,300.0	8,300.0	8,299.8	8,299.8	11.3	11.3	89.43	0.5	50.0	50.0	27.5	22.53	2.219	
8,400.0	8,400.0	8,399.8	8,399.8	11.4	11.4	89.43	0.5	50.0	50.0	27.2	22.79	2.194	
8,500.0	8,500.0	8,499.8	8,499.8	11.5	11.5	89.43	0.5	50.0	50.0	27.0	23.04	2.170	
8,600.0	8,600.0	8,599.8	8,599.8	11.6	11.6	89.43	0.5	50.0	50.0	26.7	23.30	2.146	
8,700.0	8,700.0	8,699.8	8,699.8	11.8	11.8	89.43	0.5	50.0	50.0	26.5	23.55	2.123	
8,716.4	8,716.4	8,716.2	8,716.2	11.8	11.8	89.43	0.5	50.0	50.0	26.4	23.59	2.119 CC	
8,727.5	8,727.5	8,727.1	8,727.1	11.8	11.8	89.45	0.5	50.0	50.0	26.4	23.62	2.118 ES	
8,750.0	8,750.0	8,748.9	8,748.9	11.8	11.8	-118.75	-0.2	50.2	50.5	26.9	23.63	2.137	
8,775.0	8,774.9	8,773.0	8,772.9	11.8	11.8	-118.27	-2.0	50.9	52.0	28.4	23.64	2.201	
8,800.0	8,799.7	8,797.0	8,796.7	11.8	11.8	-117.67	-5.0	51.9	54.6	31.0	23.65	2.309	
8,825.0	8,824.3	8,820.8	8,820.1	11.8	11.8	-116.99	-9.0	53.3	58.2	34.5	23.66	2.460	
8,850.0	8,848.7	8,844.3	8,843.0	11.8	11.8	-116.24	-14.1	55.1	62.8	39.1	23.67	2.653	
8,875.0	8,872.7	8,867.6	8,865.3	11.9	11.8	-115.46	-20.1	57.2	68.4	44.7	23.69	2.886	
8,900.0	8,896.3	8,890.5	8,887.0	11.9	11.8	-114.65	-27.1	59.7	74.9	51.2	23.71	3.159	
8,925.0	8,919.4	8,913.0	8,908.0	11.9	11.9	-113.81	-34.9	62.4	82.4	58.6	23.74	3.470	
8,950.0	8,942.0	8,935.2	8,928.2	11.9	11.9	-112.95	-43.5	65.4	90.7	67.0	23.77	3.817	
8,975.0	8,964.1	8,957.0	8,947.6	11.9	11.9	-112.05	-52.7	68.6	99.9	76.1	23.80	4.198	
9,000.0	8,985.4	8,978.3	8,966.2	11.9	11.9	-111.13	-62.6	72.1	109.9	86.1	23.84	4.612	
9,025.0	9,006.1	9,000.0	8,984.6	12.0	11.9	-110.18	-73.5	75.9	120.7	96.8	23.88	5.055	
9,050.0	9,026.0	9,019.5	9,000.7	12.0	11.9	-109.16	-83.9	79.6	132.2	108.3	23.93	5.527	
9,075.0	9,045.1	9,039.4	9,016.7	12.0	12.0	-108.09	-95.2	83.5	144.5	120.5	23.98	6.025	

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #10H - OWB - PWP0												Offset Site Error:	0.0 usft
Survey Program: 0-Standard Keeper 104, 8723-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)		
9,100.0	9,063.4	9,058.9	9,031.7	12.1	12.0	-106.98	-106.8	87.6	157.3	133.3	24.03	6.547	
9,125.0	9,080.7	9,077.9	9,046.0	12.1	12.0	-105.80	-118.7	91.7	170.8	146.7	24.09	7.090	
9,150.0	9,097.0	9,096.5	9,059.4	12.1	12.0	-104.57	-130.8	96.0	184.8	160.6	24.15	7.653	
9,175.0	9,112.3	9,114.6	9,072.0	12.2	12.0	-103.27	-143.1	100.3	199.3	175.1	24.21	8.232	
9,200.0	9,126.6	9,132.3	9,083.8	12.2	12.1	-101.90	-155.5	104.6	214.4	190.1	24.28	8.827	
9,225.0	9,139.8	9,150.0	9,095.1	12.3	12.1	-100.49	-168.4	109.1	229.8	205.5	24.36	9.434	
9,250.0	9,151.8	9,166.6	9,105.3	12.3	12.1	-98.98	-180.8	113.5	245.7	221.3	24.44	10.052	
9,275.0	9,162.7	9,183.2	9,115.0	12.4	12.1	-97.43	-193.5	117.9	261.9	237.4	24.53	10.678	
9,300.0	9,172.4	9,200.0	9,124.3	12.5	12.2	-95.84	-206.7	122.5	278.5	253.9	24.63	11.309	
9,325.0	9,180.8	9,215.5	9,132.5	12.5	12.2	-94.15	-219.1	126.9	295.4	270.6	24.73	11.943	
9,350.0	9,188.1	9,231.2	9,140.3	12.6	12.2	-92.44	-232.0	131.4	312.5	287.6	24.85	12.577	
9,375.0	9,194.0	9,246.7	9,147.6	12.7	12.2	-90.69	-244.9	135.9	329.8	304.8	24.97	13.207	
9,400.0	9,198.7	9,262.0	9,154.3	12.8	12.3	-88.91	-257.8	140.5	347.3	322.2	25.11	13.831	
9,425.0	9,202.1	9,277.1	9,160.5	13.0	12.3	-87.11	-270.8	145.0	365.0	339.8	25.27	14.445	
9,450.0	9,204.2	9,292.0	9,166.3	13.1	12.3	-85.29	-283.8	149.5	382.8	357.4	25.45	15.046	
9,475.0	9,205.0	9,306.8	9,171.5	13.3	12.4	-83.46	-296.8	154.1	400.8	375.1	25.64	15.629	
9,477.6	9,205.0	9,308.3	9,172.0	13.3	12.4	-83.28	-298.2	154.6	402.6	376.9	25.66	15.688	
9,500.0	9,205.0	9,321.7	9,176.4	13.5	12.4	-84.44	-310.2	158.8	418.7	392.8	25.86	16.190	
9,600.0	9,205.0	9,387.5	9,192.5	14.4	12.6	-88.02	-370.4	179.9	488.3	461.4	26.95	18.122	
9,700.0	9,205.0	9,461.5	9,199.9	15.5	12.9	-89.33	-439.7	204.2	553.7	525.3	28.38	19.507	
9,800.0	9,204.9	9,592.5	9,200.0	16.7	14.0	-89.47	-564.9	242.7	610.8	580.1	30.73	19.877	
9,900.0	9,204.9	9,754.9	9,200.0	17.9	16.1	-89.55	-724.1	274.4	652.9	618.8	34.07	19.165	
10,000.0	9,204.8	9,936.1	9,200.0	19.2	18.6	-89.60	-904.7	288.2	677.1	639.3	37.84	17.895	
10,100.0	9,204.7	10,039.6	9,200.0	20.5	20.1	-89.62	-1,008.1	289.0	687.6	647.1	40.52	16.968	
10,200.6	9,204.6	10,140.1	9,200.0	21.7	21.5	-89.63	-1,108.7	289.7	691.1	647.9	43.21	15.996	
10,300.0	9,204.5	10,239.5	9,200.0	22.9	23.0	-89.64	-1,208.0	290.4	691.1	645.2	45.92	15.052	
10,400.0	9,204.4	10,339.5	9,200.0	24.2	24.5	-89.65	-1,308.0	291.1	691.1	642.4	48.73	14.183	
10,500.0	9,204.3	10,439.5	9,200.0	25.6	26.0	-89.66	-1,408.0	291.9	691.1	639.5	51.61	13.391	
10,600.0	9,204.2	10,539.5	9,200.0	27.0	27.6	-89.67	-1,508.0	292.6	691.1	636.5	54.55	12.669	
10,700.0	9,204.1	10,639.5	9,200.0	28.4	29.1	-89.68	-1,608.0	293.3	691.1	633.5	57.54	12.011	
10,800.0	9,204.0	10,739.5	9,200.0	29.9	30.7	-89.69	-1,708.0	294.1	691.0	630.5	60.56	11.410	
10,900.0	9,203.9	10,839.5	9,200.0	31.3	32.3	-89.69	-1,808.0	294.8	691.0	627.4	63.63	10.861	
11,000.0	9,203.8	10,939.5	9,200.0	32.8	33.9	-89.70	-1,908.0	295.5	691.0	624.3	66.72	10.357	
11,100.0	9,203.7	11,039.5	9,200.0	34.4	35.5	-89.71	-2,008.0	296.2	691.0	621.2	69.83	9.895	
11,200.0	9,203.6	11,139.5	9,200.0	35.9	37.1	-89.72	-2,108.0	297.0	691.0	618.0	72.97	9.470	
11,300.0	9,203.5	11,239.5	9,200.0	37.4	38.7	-89.73	-2,208.0	297.7	691.0	614.9	76.12	9.077	
11,400.0	9,203.4	11,339.5	9,200.0	39.0	40.3	-89.74	-2,308.0	298.4	691.0	611.7	79.29	8.714	
11,500.0	9,203.3	11,439.5	9,200.0	40.5	41.9	-89.75	-2,408.0	299.1	690.9	608.5	82.48	8.378	
11,600.0	9,203.2	11,539.5	9,200.0	42.1	43.5	-89.76	-2,508.0	299.9	690.9	605.3	85.67	8.065	
11,700.0	9,203.0	11,639.5	9,200.0	43.7	45.2	-89.76	-2,608.0	300.6	690.9	602.0	88.88	7.774	
11,800.0	9,202.9	11,739.5	9,200.0	45.3	46.8	-89.77	-2,708.0	301.3	690.9	598.8	92.09	7.502	
11,900.0	9,202.8	11,839.5	9,200.0	46.9	48.4	-89.78	-2,808.0	302.0	690.9	595.6	95.32	7.248	
12,000.0	9,202.7	11,939.5	9,200.0	48.5	50.1	-89.79	-2,908.0	302.8	690.9	592.3	98.55	7.011	
12,100.0	9,202.6	12,039.5	9,200.0	50.1	51.7	-89.80	-3,008.0	303.5	690.9	589.1	101.79	6.787	
12,200.0	9,202.5	12,139.5	9,200.0	51.7	53.3	-89.81	-3,108.0	304.2	690.9	585.8	105.03	6.578	
12,300.0	9,202.4	12,239.5	9,200.0	53.3	55.0	-89.82	-3,208.0	304.9	690.8	582.6	108.28	6.380	
12,400.0	9,202.3	12,339.5	9,200.0	54.9	56.6	-89.82	-3,308.0	305.7	690.8	579.3	111.54	6.194	
12,500.0	9,202.2	12,439.5	9,200.0	56.5	58.3	-89.83	-3,408.0	306.4	690.8	576.0	114.80	6.018	
12,600.0	9,202.1	12,539.5	9,200.0	58.1	59.9	-89.84	-3,508.0	307.1	690.8	572.7	118.06	5.851	
12,700.0	9,202.0	12,639.5	9,200.0	59.8	61.6	-89.85	-3,608.0	307.8	690.8	569.5	121.33	5.694	
12,800.0	9,201.9	12,739.5	9,200.0	61.4	63.2	-89.86	-3,708.0	308.6	690.8	566.2	124.60	5.544	
12,900.0	9,201.8	12,839.5	9,200.0	63.0	64.9	-89.87	-3,808.0	309.3	690.8	562.9	127.87	5.402	

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #10H - OWB - PWP0													Offset Site Error:	0.0 usft
Survey Program: 0-Standard Keeper 104, 8723-MWD													Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
13,000.0	9,201.7	12,939.5	9,200.0	64.6	66.5	-89.88	-3,908.0	310.0	690.8	559.6	131.15	5.267		
13,100.0	9,201.6	13,039.5	9,200.0	66.3	68.2	-89.89	-4,008.0	310.7	690.7	556.3	134.43	5.138		
13,200.0	9,201.5	13,139.5	9,200.0	67.9	69.8	-89.89	-4,108.0	311.5	690.7	553.0	137.71	5.016		
13,300.0	9,201.4	13,239.5	9,200.0	69.5	71.5	-89.90	-4,208.0	312.2	690.7	549.7	141.00	4.899		
13,400.0	9,201.3	13,339.5	9,200.0	71.2	73.1	-89.91	-4,308.0	312.9	690.7	546.4	144.28	4.787		
13,500.0	9,201.2	13,439.5	9,200.0	72.8	74.8	-89.92	-4,408.0	313.6	690.7	543.1	147.57	4.680		
13,600.0	9,201.1	13,539.5	9,200.0	74.5	76.4	-89.93	-4,508.0	314.4	690.7	539.8	150.86	4.578		
13,700.0	9,201.0	13,639.5	9,200.0	76.1	78.1	-89.94	-4,607.9	315.1	690.7	536.5	154.16	4.480		
13,800.0	9,200.8	13,739.5	9,200.0	77.7	79.7	-89.95	-4,707.9	315.8	690.7	533.2	157.45	4.386		
13,900.0	9,200.7	13,839.5	9,200.0	79.4	81.4	-89.95	-4,807.9	316.5	690.6	529.9	160.75	4.296		
14,000.0	9,200.6	13,939.5	9,200.0	81.0	83.0	-89.96	-4,907.9	317.3	690.6	526.6	164.04	4.210		
14,100.0	9,200.5	14,039.5	9,200.0	82.7	84.7	-89.97	-5,007.9	318.0	690.6	523.3	167.34	4.127		
14,200.0	9,200.4	14,139.5	9,200.0	84.3	86.3	-89.98	-5,107.9	318.7	690.6	520.0	170.64	4.047		
14,300.0	9,200.3	14,239.5	9,200.0	86.0	88.0	-89.99	-5,207.9	319.5	690.6	516.6	173.94	3.970		
14,400.0	9,200.2	14,339.5	9,200.0	87.6	89.6	-90.00	-5,307.9	320.2	690.6	513.3	177.25	3.896		
14,500.0	9,200.1	14,439.5	9,200.0	89.2	91.3	-90.01	-5,407.9	320.9	690.6	510.0	180.55	3.825		
14,600.0	9,200.0	14,539.5	9,200.0	90.9	93.0	-90.02	-5,507.9	321.6	690.6	506.7	183.86	3.756		
14,700.0	9,199.9	14,639.5	9,200.0	92.5	94.6	-90.02	-5,607.9	322.4	690.5	503.4	187.16	3.690		
14,800.0	9,199.8	14,739.5	9,200.0	94.2	96.3	-90.03	-5,707.9	323.1	690.5	500.1	190.47	3.625		
14,900.0	9,199.7	14,839.5	9,200.0	95.8	97.9	-90.04	-5,807.9	323.8	690.5	496.7	193.77	3.563		
15,000.0	9,199.6	14,939.5	9,200.0	97.5	99.6	-90.05	-5,907.9	324.5	690.5	493.4	197.08	3.504		
15,100.0	9,199.5	15,039.5	9,200.0	99.1	101.2	-90.06	-6,007.9	325.3	690.5	490.1	200.39	3.446		
15,200.0	9,199.4	15,139.5	9,200.0	100.8	102.9	-90.07	-6,107.9	326.0	690.5	486.8	203.70	3.390		
15,300.0	9,199.3	15,239.5	9,200.0	102.4	104.6	-90.08	-6,207.9	326.7	690.5	483.5	207.01	3.335		
15,400.0	9,199.2	15,339.5	9,200.0	104.1	106.2	-90.08	-6,307.9	327.4	690.5	480.1	210.32	3.283		
15,500.0	9,199.1	15,439.5	9,200.0	105.7	107.9	-90.09	-6,407.9	328.2	690.4	476.8	213.63	3.232		
15,600.0	9,199.0	15,539.5	9,200.0	107.4	109.5	-90.10	-6,507.9	328.9	690.4	473.5	216.95	3.182		
15,700.0	9,198.9	15,639.5	9,200.0	109.1	111.2	-90.11	-6,607.9	329.6	690.4	470.2	220.26	3.135		
15,800.0	9,198.8	15,739.5	9,200.0	110.7	112.9	-90.12	-6,707.9	330.3	690.4	466.8	223.57	3.088		
15,900.0	9,198.7	15,839.5	9,200.0	112.4	114.5	-90.13	-6,807.9	331.1	690.4	463.5	226.89	3.043		
16,000.0	9,198.5	15,939.5	9,200.0	114.0	116.2	-90.14	-6,907.9	331.8	690.4	460.2	230.20	2.999		
16,100.0	9,198.4	16,039.5	9,200.0	115.7	117.8	-90.15	-7,007.9	332.5	690.4	456.8	233.52	2.956		
16,200.0	9,198.3	16,139.5	9,200.0	117.3	119.5	-90.15	-7,107.9	333.2	690.4	453.5	236.83	2.915		
16,300.0	9,198.2	16,239.5	9,200.0	119.0	121.2	-90.16	-7,207.9	334.0	690.3	450.2	240.15	2.875		
16,400.0	9,198.1	16,339.5	9,200.0	120.6	122.8	-90.17	-7,307.9	334.7	690.3	446.9	243.46	2.835		
16,500.0	9,198.0	16,439.5	9,200.0	122.3	124.5	-90.18	-7,407.9	335.4	690.3	443.5	246.78	2.797		
16,600.0	9,197.9	16,539.5	9,200.0	124.0	126.1	-90.19	-7,507.9	336.1	690.3	440.2	250.10	2.760		
16,700.0	9,197.8	16,639.5	9,200.0	125.6	127.8	-90.20	-7,607.9	336.9	690.3	436.9	253.41	2.724		
16,800.0	9,197.7	16,739.5	9,200.0	127.3	129.5	-90.21	-7,707.9	337.6	690.3	433.5	256.73	2.689		
16,900.0	9,197.6	16,839.5	9,200.0	128.9	131.1	-90.22	-7,807.9	338.3	690.3	430.2	260.05	2.654		
17,000.0	9,197.5	16,939.5	9,200.0	130.6	132.8	-90.22	-7,907.9	339.0	690.3	426.9	263.37	2.621		
17,100.0	9,197.4	17,039.5	9,200.0	132.2	134.5	-90.23	-8,007.9	339.8	690.2	423.6	266.69	2.588		
17,200.0	9,197.3	17,139.5	9,200.0	133.9	136.1	-90.24	-8,107.9	340.5	690.2	420.2	270.00	2.556		
17,300.0	9,197.2	17,239.5	9,200.0	135.6	137.8	-90.25	-8,207.9	341.2	690.2	416.9	273.32	2.525		
17,400.0	9,197.1	17,339.5	9,200.0	137.2	139.4	-90.26	-8,307.8	342.0	690.2	413.6	276.64	2.495		
17,500.0	9,197.0	17,439.5	9,200.0	138.9	141.1	-90.27	-8,407.8	342.7	690.2	410.2	279.96	2.465		
17,600.0	9,196.9	17,539.5	9,200.0	140.5	142.8	-90.28	-8,507.8	343.4	690.2	406.9	283.28	2.436		
17,700.0	9,196.8	17,639.5	9,200.0	142.2	144.4	-90.28	-8,607.8	344.1	690.2	403.6	286.60	2.408		
17,800.0	9,196.7	17,739.5	9,200.0	143.8	146.1	-90.29	-8,707.8	344.9	690.2	400.2	289.92	2.380		
17,900.0	9,196.6	17,839.5	9,200.0	145.5	147.7	-90.30	-8,807.8	345.6	690.1	396.9	293.24	2.353		
18,000.0	9,196.5	17,939.5	9,200.0	147.2	149.4	-90.31	-8,907.8	346.3	690.1	393.6	296.57	2.327		
18,100.0	9,196.4	18,039.5	9,200.0	148.8	151.1	-90.32	-9,007.8	347.0	690.1	390.2	299.89	2.301		

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

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well WINDWARD FEDERAL #9H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3551+26 @ 3577.0usft (McVay 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #9H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #10H - OWB - PWP0													Offset Site Error: 0.0 usft
Survey Program: 0-Standard Keeper 104, 8723-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
18,200.0	9,196.2	18,139.5	9,200.0	150.5	152.7	-90.33	-9,107.8	347.8	690.1	386.9	303.21	2.276	
18,300.0	9,196.1	18,239.5	9,200.0	152.1	154.4	-90.34	-9,207.8	348.5	690.1	383.6	306.53	2.251	
18,400.0	9,196.0	18,339.5	9,200.0	153.8	156.1	-90.35	-9,307.8	349.2	690.1	380.2	309.85	2.227	
18,500.0	9,195.9	18,439.5	9,200.0	155.5	157.7	-90.35	-9,407.8	349.9	690.1	376.9	313.17	2.203	
18,600.0	9,195.8	18,539.5	9,200.0	157.1	159.4	-90.36	-9,507.8	350.7	690.1	373.6	316.50	2.180	
18,700.0	9,195.7	18,639.5	9,200.0	158.8	161.0	-90.37	-9,607.8	351.4	690.0	370.2	319.82	2.158	
18,800.0	9,195.6	18,739.5	9,200.0	160.4	162.7	-90.38	-9,707.8	352.1	690.0	366.9	323.14	2.135	
18,900.0	9,195.5	18,839.5	9,200.0	162.1	164.4	-90.39	-9,807.8	352.8	690.0	363.6	326.46	2.114	
19,000.0	9,195.4	18,939.5	9,200.0	163.8	166.0	-90.40	-9,907.8	353.6	690.0	360.2	329.79	2.092	
19,100.0	9,195.3	19,039.5	9,200.0	165.4	167.7	-90.41	-10,007.8	354.3	690.0	356.9	333.11	2.071	
19,200.0	9,195.2	19,139.5	9,200.0	167.1	169.4	-90.41	-10,107.8	355.0	690.0	353.6	336.43	2.051	
19,300.0	9,195.1	19,239.5	9,200.0	168.7	171.0	-90.42	-10,207.8	355.7	690.0	350.2	339.76	2.031	
19,367.8	9,195.0	19,307.3	9,200.0	169.9	172.1	-90.43	-10,275.6	356.2	690.0	348.0	342.01	2.017	
19,394.7	9,195.0	19,330.2	9,200.0	170.3	172.5	-90.43	-10,298.5	356.4	690.0	347.1	342.84	2.013 SF	



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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #3H - OWB - ACTUAL WELLPATH												Offset Site Error:	0.0 usft
Survey Program: 100-GYD_DP_MS, 9931-MWD												Offset Well Error:	2.0 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	0.9	0.9	3.0	2.0	-79.15	19.1	-99.7	101.5				
100.0	100.0	100.2	100.2	3.0	2.0	-79.04	19.4	-100.0	101.8	96.8	5.00	20.361	
200.0	200.0	200.4	200.4	3.0	2.0	-78.91	19.7	-100.5	102.4	97.4	5.02	20.413	
300.0	300.0	300.0	300.0	3.0	2.0	-78.90	19.9	-101.3	103.2	98.2	5.04	20.479	
400.0	400.0	399.9	399.9	3.0	2.0	-78.87	20.1	-102.3	104.2	99.2	5.07	20.560	
500.0	500.0	499.8	499.7	3.1	2.0	-78.84	20.4	-103.2	105.2	100.1	5.10	20.621	
600.0	600.0	599.7	599.6	3.1	2.1	-78.99	20.3	-104.4	106.4	101.2	5.14	20.681	
700.0	700.0	699.8	699.8	3.1	2.1	-79.23	20.1	-105.6	107.5	102.3	5.19	20.711	
800.0	800.0	800.0	800.0	3.2	2.1	-79.29	20.2	-106.5	108.4	103.2	5.24	20.688	
900.0	900.0	900.3	900.2	3.2	2.1	-79.28	20.3	-107.3	109.2	103.9	5.30	20.603	
1,000.0	1,000.0	1,000.8	1,000.7	3.2	2.1	-79.35	20.2	-107.7	109.5	104.2	5.36	20.435	
1,100.0	1,100.0	1,100.7	1,100.7	3.3	2.1	-79.43	20.1	-107.9	109.7	104.3	5.43	20.219	
1,200.0	1,200.0	1,200.7	1,200.7	3.4	2.1	-79.54	20.0	-108.1	109.9	104.4	5.50	19.994	
1,300.0	1,300.0	1,300.9	1,300.9	3.4	2.2	-79.67	19.7	-108.2	110.0	104.5	5.57	19.749	
1,400.0	1,400.0	1,401.3	1,401.3	3.5	2.2	-79.76	19.5	-108.1	109.9	104.2	5.64	19.478	
1,500.0	1,500.0	1,501.3	1,501.3	3.5	2.2	-79.80	19.4	-107.8	109.5	103.8	5.72	19.164	
1,600.0	1,600.0	1,601.4	1,601.4	3.6	2.2	-79.78	19.4	-107.4	109.1	103.3	5.79	18.838	
1,700.0	1,700.0	1,701.2	1,701.1	3.7	2.2	-79.69	19.5	-107.0	108.8	102.9	5.87	18.524	
1,800.0	1,800.0	1,801.1	1,801.1	3.8	2.2	-79.57	19.7	-106.8	108.6	102.7	5.96	18.230	
1,900.0	1,900.0	1,901.1	1,901.0	3.9	2.2	-79.37	20.0	-106.6	108.5	102.4	6.05	17.939	
2,000.0	2,000.0	2,001.0	2,000.9	3.9	2.2	-79.11	20.5	-106.5	108.4	102.3	6.14	17.655	
2,037.3	2,037.3	2,038.3	2,038.2	4.0	2.2	-79.02	20.7	-106.4	108.4	102.2	6.18	17.552	
2,100.0	2,100.0	2,100.9	2,100.9	4.0	2.2	-78.84	21.0	-106.4	108.4	102.2	6.24	17.382	
2,200.0	2,200.0	2,200.9	2,200.8	4.1	2.2	-78.48	21.7	-106.3	108.5	102.1	6.34	17.116	
2,300.0	2,300.0	2,300.9	2,300.8	4.2	2.2	-78.22	22.2	-106.3	108.5	102.1	6.44	16.853	
2,400.0	2,400.0	2,400.7	2,400.7	4.3	2.2	-78.08	22.4	-106.3	108.7	102.1	6.55	16.601	
2,500.0	2,500.0	2,500.6	2,500.5	4.4	2.3	-77.81	23.0	-106.5	109.0	102.3	6.65	16.372	
2,600.0	2,600.0	2,600.7	2,600.7	4.5	2.3	-77.57	23.5	-106.7	109.2	102.5	6.77	16.145	
2,700.0	2,700.0	2,700.5	2,700.4	4.6	2.3	-77.40	23.9	-106.9	109.5	102.7	6.88	15.924	
2,800.0	2,800.0	2,800.9	2,800.8	4.7	2.3	-77.24	24.2	-107.1	109.8	102.8	6.99	15.699	
2,900.0	2,900.0	2,900.8	2,900.8	4.8	2.3	-77.09	24.6	-107.1	109.9	102.8	7.11	15.456	
3,000.0	3,000.0	3,000.8	3,000.8	4.9	2.3	-76.89	24.9	-107.1	110.0	102.8	7.23	15.218	
3,100.0	3,100.0	3,100.9	3,100.8	5.0	2.3	-76.71	25.3	-107.1	110.1	102.7	7.35	14.981	
3,200.0	3,200.0	3,200.9	3,200.8	5.1	2.4	-76.43	25.9	-107.1	110.1	102.7	7.47	14.748	
3,300.0	3,300.0	3,301.0	3,300.9	5.2	2.4	-76.09	26.5	-106.9	110.2	102.6	7.59	14.516	
3,400.0	3,400.0	3,400.7	3,400.6	5.3	2.4	-75.80	27.1	-106.9	110.3	102.6	7.71	14.301	
3,500.0	3,500.0	3,500.2	3,500.1	5.4	2.4	-75.66	27.4	-107.4	110.8	103.0	7.84	14.142	
3,600.0	3,600.0	3,600.4	3,600.3	5.5	2.4	-75.75	27.4	-108.0	111.4	103.5	7.96	14.004	
3,700.0	3,700.0	3,700.6	3,700.5	5.7	2.4	-75.80	27.4	-108.5	111.9	103.8	8.08	13.844	
3,800.0	3,800.0	3,800.7	3,800.7	5.8	2.4	-75.73	27.7	-108.7	112.2	103.9	8.21	13.660	
3,900.0	3,900.0	3,900.8	3,900.7	5.9	2.5	-75.65	27.8	-108.9	112.4	104.0	8.34	13.470	
4,000.0	4,000.0	4,001.0	4,000.9	6.0	2.5	-75.68	27.8	-108.9	112.4	104.0	8.46	13.293	
4,100.0	4,100.0	4,101.3	4,101.2	6.1	2.5	-75.75	27.6	-108.8	112.3	103.7	8.57	13.100	
4,156.2	4,156.2	4,157.1	4,157.1	6.2	2.5	-75.77	27.6	-108.8	112.2	103.6	8.63	12.994	
4,200.0	4,200.0	4,200.7	4,200.7	6.2	2.5	-75.80	27.5	-108.8	112.2	103.6	8.68	12.925	
4,300.0	4,300.0	4,300.8	4,300.7	6.3	2.5	-75.77	27.6	-109.0	112.4	103.6	8.81	12.762	
4,400.0	4,400.0	4,400.9	4,400.8	6.5	2.5	-75.63	27.9	-109.0	112.5	103.6	8.94	12.584	
4,500.0	4,500.0	4,500.9	4,500.8	6.6	2.5	-75.48	28.2	-109.0	112.6	103.5	9.08	12.409	
4,600.0	4,600.0	4,600.9	4,600.8	6.7	2.5	-75.32	28.6	-109.0	112.7	103.5	9.21	12.238	
4,700.0	4,700.0	4,700.9	4,700.8	6.8	2.5	-75.13	28.9	-109.0	112.8	103.4	9.35	12.069	
4,800.0	4,800.0	4,801.0	4,800.9	6.9	2.6	-74.96	29.3	-109.0	112.8	103.3	9.48	11.901	
4,900.0	4,900.0	4,900.9	4,900.8	7.0	2.6	-74.79	29.6	-108.9	112.9	103.3	9.62	11.738	

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #3H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-GYD_DP_MS_9931-MWD													Offset Well Error: 2.0 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)					
5,000.0	5,000.0	5,001.0	5,001.0	7.2	2.6	-74.60	30.0	-108.8	112.9	103.1	9.75	11.576	
5,100.0	5,100.0	5,101.2	5,101.1	7.3	2.6	-74.45	30.2	-108.6	112.8	102.9	9.89	11.409	
5,152.1	5,152.1	5,153.0	5,153.0	7.3	2.6	-74.38	30.3	-108.6	112.7	102.8	9.95	11.325	
5,200.0	5,200.0	5,200.8	5,200.7	7.4	2.6	-74.33	30.5	-108.6	112.8	102.8	10.02	11.257	
5,300.0	5,300.0	5,300.5	5,300.4	7.5	2.6	-74.31	30.6	-108.8	113.1	102.9	10.15	11.136	
5,400.0	5,400.0	5,400.9	5,400.8	7.6	2.6	-74.42	30.4	-109.1	113.3	103.0	10.28	11.022	
5,500.0	5,500.0	5,501.1	5,501.0	7.8	2.6	-74.56	30.2	-109.2	113.3	102.9	10.40	10.893	
5,600.0	5,600.0	5,601.0	5,600.9	7.9	2.6	-74.69	29.9	-109.2	113.2	102.7	10.52	10.762	
5,700.0	5,700.0	5,701.0	5,700.9	8.0	2.6	-74.85	29.6	-109.2	113.2	102.5	10.64	10.635	
5,714.1	5,714.1	5,715.1	5,715.0	8.0	2.6	-74.87	29.5	-109.3	113.2	102.5	10.66	10.618	
5,800.0	5,800.0	5,800.9	5,800.8	8.1	2.6	-75.01	29.3	-109.4	113.2	102.5	10.77	10.516	
5,900.0	5,900.0	5,900.9	5,900.8	8.3	2.6	-75.14	29.1	-109.5	113.3	102.4	10.89	10.401	
6,000.0	6,000.0	6,001.0	6,000.9	8.4	2.6	-75.28	28.8	-109.6	113.3	102.3	11.02	10.285	
6,100.0	6,100.0	6,101.3	6,101.2	8.5	2.6	-75.43	28.5	-109.5	113.2	102.0	11.14	10.158	
6,200.0	6,200.0	6,201.3	6,201.3	8.6	2.6	-75.47	28.3	-109.3	112.9	101.6	11.26	10.020	
6,300.0	6,300.0	6,301.2	6,301.1	8.8	2.6	-75.36	28.5	-109.0	112.6	101.2	11.39	9.883	
6,400.0	6,400.0	6,401.2	6,401.2	8.9	2.7	-75.23	28.7	-108.7	112.4	100.9	11.53	9.751	
6,500.0	6,500.0	6,501.1	6,501.0	9.0	2.7	-75.09	28.9	-108.4	112.2	100.6	11.66	9.623	
6,600.0	6,600.0	6,601.3	6,601.2	9.1	2.7	-74.99	29.0	-108.2	112.0	100.2	11.80	9.498	
6,700.0	6,700.0	6,701.3	6,701.2	9.3	2.7	-74.90	29.1	-107.9	111.8	99.8	11.93	9.370	
6,800.0	6,800.0	6,801.3	6,801.3	9.4	2.7	-74.84	29.1	-107.6	111.4	99.4	12.06	9.244	
6,900.0	6,900.0	6,901.4	6,901.3	9.5	2.7	-74.85	29.0	-107.2	111.1	98.9	12.18	9.117	
7,000.0	7,000.0	7,001.0	7,000.9	9.6	2.7	-74.95	28.8	-107.1	110.9	98.6	12.31	9.008	
7,025.0	7,025.0	7,026.0	7,025.9	9.7	2.7	-74.99	28.7	-107.1	110.9	98.5	12.34	8.985	
7,100.0	7,100.0	7,100.9	7,100.8	9.8	2.7	-75.10	28.5	-107.2	110.9	98.5	12.44	8.918	
7,200.0	7,200.0	7,200.9	7,200.8	9.9	2.7	-75.26	28.2	-107.3	111.0	98.4	12.56	8.832	
7,300.0	7,300.0	7,300.7	7,300.6	10.0	2.7	-75.37	28.1	-107.5	111.1	98.4	12.70	8.754	
7,400.0	7,400.0	7,400.9	7,400.8	10.1	2.7	-75.49	27.9	-107.8	111.3	98.5	12.83	8.678	
7,500.0	7,500.0	7,500.8	7,500.7	10.3	2.7	-75.64	27.6	-108.0	111.4	98.5	12.96	8.600	
7,600.0	7,600.0	7,600.7	7,600.6	10.4	2.7	-75.74	27.5	-108.2	111.6	98.5	13.09	8.527	
7,700.0	7,700.0	7,700.7	7,700.6	10.5	2.7	-75.73	27.6	-108.4	111.9	98.6	13.23	8.455	
7,800.0	7,800.0	7,800.8	7,800.8	10.6	2.7	-75.64	27.8	-108.6	112.1	98.7	13.37	8.380	
7,900.0	7,900.0	7,900.7	7,900.6	10.8	2.8	-75.55	28.0	-108.7	112.3	98.7	13.51	8.308	
8,000.0	8,000.0	8,000.8	8,000.7	10.9	2.8	-75.58	28.0	-109.0	112.5	98.9	13.65	8.243	
8,100.0	8,100.0	8,101.5	8,101.4	11.0	2.8	-75.67	27.8	-108.9	112.4	98.6	13.77	8.160	
8,200.0	8,200.0	8,201.5	8,201.4	11.1	2.8	-75.77	27.5	-108.5	112.0	98.1	13.90	8.054	
8,300.0	8,300.0	8,301.4	8,301.3	11.3	2.8	-75.91	27.1	-108.2	111.5	97.5	14.03	7.952	
8,400.0	8,400.0	8,401.2	8,401.1	11.4	2.8	-76.10	26.7	-108.0	111.3	97.1	14.16	7.860	
8,500.0	8,500.0	8,501.2	8,501.1	11.5	2.8	-76.33	26.3	-107.9	111.1	96.8	14.28	7.775	
8,600.0	8,600.0	8,601.3	8,601.2	11.6	2.8	-76.54	25.8	-107.8	110.8	96.4	14.41	7.687	
8,700.0	8,700.0	8,701.1	8,701.0	11.8	2.8	-76.66	25.5	-107.6	110.6	96.1	14.54	7.605	
8,727.5	8,727.5	8,728.7	8,728.6	11.8	2.8	-76.69	25.5	-107.6	110.6	96.0	14.58	7.584	
8,750.0	8,750.0	8,751.3	8,751.2	11.8	2.8	75.07	25.4	-107.6	110.4	95.8	14.60	7.561	
8,775.0	8,774.9	8,776.3	8,776.2	11.8	2.8	76.01	25.3	-107.5	109.8	95.2	14.64	7.505	
8,800.0	8,799.7	8,801.2	8,801.1	11.8	2.8	77.64	25.2	-107.4	109.0	94.3	14.74	7.399	
8,825.0	8,824.3	8,825.7	8,825.6	11.8	2.8	79.94	25.0	-107.4	108.1	93.2	14.87	7.265	
8,850.0	8,848.7	8,849.9	8,849.8	11.8	2.8	82.91	24.9	-107.4	107.1	92.1	15.05	7.119	
8,875.0	8,872.7	8,873.8	8,873.7	11.9	2.8	86.51	24.8	-107.4	106.4	91.1	15.25	6.977	
8,897.3	8,893.7	8,894.8	8,894.7	11.9	2.8	90.18	24.7	-107.4	106.1	90.7	15.45	6.870	
8,900.0	8,896.3	8,897.4	8,897.3	11.9	2.8	90.66	24.7	-107.4	106.1	90.7	15.47	6.859 ES	
8,925.0	8,919.4	8,920.6	8,920.5	11.9	2.8	95.25	24.6	-107.4	106.6	90.9	15.72	6.784	
8,950.0	8,942.0	8,943.2	8,943.1	11.9	2.8	100.12	24.4	-107.5	108.2	92.2	15.98	6.770	

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #3H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-GYD_DP_MS_9931-MWD													Offset Well Error: 2.0 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
8,975.0	8,964.1	8,965.4	8,965.3	11.9	2.8	105.09	24.3	-107.5	111.0	94.8	16.25	6.832	
9,000.0	8,985.4	8,986.9	8,986.8	11.9	2.8	109.97	24.1	-107.6	115.4	98.9	16.53	6.983	
9,025.0	9,006.1	9,007.7	9,007.6	12.0	2.8	114.59	24.0	-107.7	121.6	104.8	16.82	7.229	
9,050.0	9,026.0	9,027.6	9,027.5	12.0	2.8	118.81	23.8	-107.8	129.5	112.4	17.10	7.573	
9,075.0	9,045.1	9,046.6	9,046.5	12.0	2.8	122.57	23.7	-107.9	139.3	121.9	17.39	8.012	
9,100.0	9,063.4	9,064.8	9,064.7	12.1	2.8	125.82	23.6	-107.9	150.9	133.3	17.68	8.538	
9,125.0	9,080.7	9,082.1	9,082.0	12.1	2.8	128.55	23.5	-108.0	164.2	146.2	17.96	9.142	
9,150.0	9,097.0	9,098.3	9,098.2	12.1	2.8	130.75	23.5	-108.1	179.0	160.8	18.24	9.816	
9,175.0	9,112.3	9,114.0	9,113.9	12.2	2.8	132.53	23.4	-108.2	195.2	176.7	18.51	10.548	
9,200.0	9,126.6	9,128.6	9,128.5	12.2	2.8	133.82	23.4	-108.3	212.7	193.9	18.77	11.330	
9,225.0	9,139.8	9,142.2	9,142.1	12.3	2.8	134.61	23.3	-108.3	231.2	212.2	19.03	12.155	
9,250.0	9,151.8	9,154.6	9,154.5	12.3	2.8	134.88	23.2	-108.3	250.8	231.5	19.27	13.016	
9,275.0	9,162.7	9,165.9	9,165.8	12.4	2.8	134.59	23.1	-108.4	271.3	251.8	19.50	13.909	
9,300.0	9,172.4	9,176.0	9,175.9	12.5	2.8	133.69	23.0	-108.4	292.5	272.8	19.73	14.828	
9,325.0	9,180.8	9,184.9	9,184.8	12.5	2.8	132.07	23.0	-108.4	314.5	294.5	19.94	15.770	
9,350.0	9,188.1	9,192.6	9,192.5	12.6	2.8	129.58	22.9	-108.4	337.0	316.9	20.15	16.728	
9,375.0	9,194.0	9,198.9	9,198.8	12.7	2.8	126.00	22.8	-108.4	360.1	339.7	20.34	17.700	
9,400.0	9,198.7	9,204.1	9,204.0	12.8	2.8	121.05	22.8	-108.4	383.6	363.0	20.53	18.679	
9,425.0	9,202.1	9,207.9	9,207.8	13.0	2.8	114.32	22.7	-108.4	407.4	386.7	20.72	19.662	
9,450.0	9,204.2	9,210.4	9,210.3	13.1	2.8	105.44	22.7	-108.4	431.5	410.6	20.90	20.644	
9,475.0	9,205.0	9,211.5	9,211.4	13.3	2.8	94.27	22.7	-108.4	455.7	434.6	21.08	21.619	
9,477.6	9,205.0	9,211.6	9,211.5	13.3	2.8	93.01	22.7	-108.4	458.2	437.1	21.10	21.718	
9,500.0	9,205.0	9,211.9	9,211.8	13.5	2.8	93.38	22.7	-108.4	480.1	458.8	21.26	22.578	
9,600.0	9,205.0	9,213.1	9,213.0	14.4	2.8	96.41	22.7	-108.4	578.8	556.7	22.17	26.108	
9,700.0	9,205.0	9,214.4	9,214.3	15.5	2.8	113.77	22.6	-108.4	678.6	655.3	23.28	29.147	
9,800.0	9,204.9	9,215.7	9,215.6	16.7	2.8	-106.35	22.6	-108.4	778.5	754.0	24.50	31.781	
9,900.0	9,204.9	9,217.1	9,217.0	17.9	2.8	-96.78	22.6	-108.4	878.3	852.5	25.75	34.101	
10,000.0	9,204.8	9,218.5	9,218.4	19.2	2.8	-94.43	22.6	-108.4	977.4	950.4	27.02	36.175	
10,100.0	9,204.7	9,219.9	9,219.8	20.5	2.8	-93.37	22.6	-108.4	1,075.7	1,047.4	28.27	38.051	
10,200.6	9,204.6	9,221.3	9,221.2	21.7	2.8	-92.75	22.6	-108.5	1,173.5	1,144.0	29.51	39.768	
10,300.0	9,204.5	9,222.7	9,222.6	22.9	2.8	-93.02	22.5	-108.5	1,269.8	1,239.0	30.75	41.290	
10,400.0	9,204.4	9,224.2	9,224.0	24.2	2.8	-93.29	22.5	-108.5	1,367.1	1,335.1	32.06	42.643	
10,500.0	9,204.3	11,751.5	10,629.1	25.6	24.3	-167.37	-1,413.7	-80.2	1,459.2	1,409.4	49.85	29.271	
10,600.0	9,204.2	11,853.2	10,627.4	27.0	25.9	-167.21	-1,515.4	-75.6	1,458.4	1,405.5	52.94	27.551	
10,611.8	9,204.2	11,861.8	10,627.2	27.2	26.1	-167.19	-1,523.9	-75.1	1,458.4	1,405.2	53.25	27.391	
10,700.0	9,204.1	11,935.3	10,626.7	28.4	27.3	-167.02	-1,597.2	-70.0	1,459.1	1,403.3	55.73	26.179	
10,800.0	9,204.0	12,030.6	10,626.3	29.9	28.9	-166.79	-1,692.3	-63.6	1,460.1	1,401.3	58.79	24.837	
10,900.0	9,203.9	12,125.0	10,626.6	31.3	30.5	-166.59	-1,786.5	-57.4	1,461.9	1,400.1	61.85	23.637	
11,000.0	9,203.8	12,264.5	10,625.8	32.8	32.8	-166.32	-1,925.8	-49.6	1,462.6	1,396.9	65.69	22.267	
11,057.8	9,203.7	12,308.3	10,624.8	33.7	33.6	-166.23	-1,969.5	-47.1	1,462.2	1,394.9	67.29	21.728	
11,100.0	9,203.7	12,333.1	10,624.6	34.4	34.0	-166.18	-1,994.3	-45.5	1,462.5	1,394.1	68.35	21.396	
11,200.0	9,203.6	12,411.2	10,625.2	35.9	35.3	-165.98	-2,072.1	-39.6	1,464.9	1,393.7	71.20	20.574	
11,300.0	9,203.5	12,581.6	10,622.6	37.4	38.2	-165.50	-2,242.0	-26.2	1,465.3	1,389.7	75.62	19.376	
11,400.0	9,203.4	12,656.0	10,620.3	39.0	39.4	-165.28	-2,316.1	-20.4	1,464.1	1,385.6	78.44	18.667	
11,404.4	9,203.4	12,656.0	10,620.3	39.1	39.4	-165.28	-2,316.1	-20.4	1,464.1	1,385.6	78.50	18.650	
11,500.0	9,203.3	12,690.1	10,620.3	40.5	40.0	-165.18	-2,350.1	-17.6	1,466.1	1,385.5	80.58	18.195	
11,600.0	9,203.2	12,750.0	10,623.9	42.1	41.0	-165.03	-2,409.6	-12.1	1,473.2	1,390.0	83.16	17.714	
11,700.0	9,203.0	12,770.5	10,626.0	43.7	41.4	-164.98	-2,429.9	-10.2	1,483.3	1,398.2	85.09	17.432	
11,800.0	9,202.9	12,893.1	10,638.9	45.3	43.5	-164.75	-2,551.4	0.5	1,495.8	1,407.1	88.75	16.854	
11,900.0	9,202.8	13,051.3	10,650.6	46.9	46.1	-164.66	-2,709.0	7.2	1,503.7	1,410.7	93.00	16.169	
12,000.0	9,202.7	13,188.8	10,658.7	48.5	48.4	-164.70	-2,846.2	9.5	1,509.9	1,413.0	96.88	15.586	
12,100.0	9,202.6	13,353.0	10,663.0	50.1	51.1	-164.93	-3,010.3	5.5	1,511.4	1,410.3	101.17	14.940	

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWPO

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #3H - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 100-GYD_DP_MS_9931-MWD													Offset Well Error:	2.0 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)				Between Centres (usft)	Between Ellipses (usft)	
12,200.0	9,202.5	13,478.1	10,664.0	51.7	53.1	-165.18	-3,135.2	-0.1	1,511.0	1,406.2	104.80	14.418		
12,300.0	9,202.4	13,623.9	10,660.2	53.3	55.5	-165.45	-3,280.8	-7.1	1,506.9	1,398.1	108.78	13.853		
12,400.0	9,202.3	13,691.0	10,658.3	54.9	56.6	-165.48	-3,347.9	-7.9	1,503.6	1,392.1	111.49	13.486		
12,500.0	9,202.2	13,775.6	10,656.7	56.5	58.0	-165.44	-3,432.4	-6.7	1,501.9	1,387.4	114.51	13.116		
12,564.0	9,202.1	13,818.9	10,656.0	57.6	58.7	-165.41	-3,475.7	-5.7	1,501.4	1,385.2	116.27	12.913		
12,600.0	9,202.1	13,841.6	10,656.0	58.1	59.1	-165.39	-3,498.4	-5.0	1,501.6	1,384.4	117.23	12.809		
12,700.0	9,202.0	13,913.1	10,657.1	59.8	60.3	-165.34	-3,569.9	-3.0	1,503.6	1,383.5	120.05	12.525		
12,800.0	9,201.9	14,002.0	10,659.4	61.4	61.8	-165.29	-3,658.8	-0.2	1,506.9	1,383.7	123.17	12.234		
12,900.0	9,201.8	14,249.4	10,651.1	63.0	65.9	-164.67	-3,905.2	16.3	1,504.8	1,375.9	128.97	11.668		
13,000.0	9,201.7	14,304.3	10,647.1	64.6	66.9	-164.49	-3,959.7	20.6	1,500.0	1,368.5	131.52	11.405		
13,100.0	9,201.6	14,363.2	10,644.8	66.3	67.9	-164.28	-4,018.4	26.1	1,498.4	1,364.2	134.16	11.169		
13,200.0	9,201.5	14,486.2	10,639.9	67.9	70.0	-163.80	-4,140.6	38.5	1,497.3	1,359.4	137.89	10.859		
13,300.0	9,201.4	14,584.4	10,634.8	69.5	71.7	-163.42	-4,238.2	48.3	1,495.0	1,353.8	141.20	10.588		
13,400.0	9,201.3	14,673.6	10,631.8	71.2	73.2	-163.16	-4,327.0	55.1	1,493.8	1,349.4	144.35	10.349		
13,500.0	9,201.2	14,783.6	10,627.9	72.8	75.0	-162.85	-4,436.7	63.2	1,492.4	1,344.6	147.85	10.094		
13,600.0	9,201.1	14,886.8	10,623.5	74.5	76.8	-162.54	-4,539.5	71.0	1,490.5	1,339.3	151.24	9.856		
13,700.0	9,201.0	14,988.2	10,618.9	76.1	78.5	-162.20	-4,640.5	79.7	1,488.6	1,334.0	154.60	9.629		
13,800.0	9,200.8	15,066.5	10,615.9	77.7	79.8	-161.97	-4,718.5	85.7	1,487.2	1,329.6	157.57	9.439		
13,827.3	9,200.8	15,086.4	10,615.5	78.2	80.2	-161.92	-4,738.3	86.8	1,487.1	1,328.8	158.35	9.391		
13,900.0	9,200.7	15,161.0	10,614.5	79.4	81.4	-161.80	-4,812.8	90.5	1,487.3	1,326.5	160.80	9.249		
13,952.0	9,200.7	15,211.3	10,613.6	80.2	82.3	-161.71	-4,863.0	93.0	1,487.1	1,324.6	162.51	9.151		
14,000.0	9,200.6	15,245.2	10,613.3	81.0	82.8	-161.66	-4,897.0	94.6	1,487.4	1,323.5	163.87	9.077		
14,100.0	9,200.5	15,326.8	10,613.8	82.7	84.2	-161.56	-4,978.4	98.0	1,489.1	1,322.3	166.88	8.923		
14,200.0	9,200.4	15,437.5	10,614.8	84.3	86.1	-161.43	-5,089.0	102.8	1,491.2	1,320.8	170.39	8.752		
14,300.0	9,200.3	15,542.2	10,614.4	86.0	87.8	-161.27	-5,193.6	107.8	1,492.3	1,318.5	173.80	8.586		
14,400.0	9,200.2	15,654.2	10,613.9	87.6	89.7	-161.11	-5,305.5	113.1	1,493.2	1,315.9	177.33	8.421		
14,500.0	9,200.1	15,741.5	10,613.3	89.2	91.2	-160.98	-5,392.7	117.1	1,493.9	1,313.5	180.44	8.279		
14,600.0	9,200.0	15,842.1	10,612.9	90.9	92.9	-160.81	-5,493.1	122.5	1,495.2	1,311.4	183.79	8.135		
14,700.0	9,199.9	15,950.0	10,612.1	92.5	94.7	-160.62	-5,600.9	128.3	1,496.2	1,308.9	187.26	7.990		
14,800.0	9,199.8	16,054.8	10,610.8	94.2	96.5	-160.42	-5,705.5	134.0	1,496.6	1,306.0	190.68	7.849		
14,900.0	9,199.7	16,165.4	10,609.2	95.8	98.4	-160.22	-5,816.0	140.0	1,496.9	1,302.7	194.20	7.708		
15,000.0	9,199.6	16,264.0	10,606.2	97.5	100.0	-160.01	-5,914.3	145.5	1,495.8	1,298.3	197.51	7.573		
15,008.7	9,199.6	16,269.0	10,606.1	97.6	100.1	-160.00	-5,919.4	145.8	1,495.8	1,298.1	197.74	7.564		
15,100.0	9,199.5	16,324.0	10,605.5	99.1	101.0	-159.86	-5,974.2	149.7	1,497.0	1,296.8	200.18	7.478		
15,200.0	9,199.4	16,418.0	10,605.3	100.8	102.6	-159.62	-6,067.9	157.1	1,499.3	1,295.9	203.43	7.370		
15,300.0	9,199.3	16,512.0	10,605.8	102.4	104.2	-159.39	-6,161.6	164.5	1,502.5	1,295.8	206.68	7.270		
15,400.0	9,199.2	16,571.8	10,607.4	104.1	105.3	-159.26	-6,221.1	169.3	1,507.4	1,298.1	209.35	7.200		
15,500.0	9,199.1	16,661.3	10,611.0	105.7	106.8	-159.06	-6,310.2	176.9	1,514.0	1,301.4	212.53	7.124		
15,600.0	9,199.0	16,751.8	10,614.6	107.4	108.3	-158.86	-6,400.4	184.7	1,520.7	1,305.0	215.73	7.049		
15,700.0	9,198.9	16,864.2	10,619.7	109.1	110.2	-158.60	-6,512.2	194.8	1,528.0	1,308.7	219.30	6.968		
15,800.0	9,198.8	17,038.4	10,621.5	110.7	113.2	-158.35	-6,686.1	204.1	1,529.9	1,306.0	223.90	6.833		
15,900.0	9,198.7	17,163.2	10,621.2	112.4	115.3	-158.15	-6,810.7	210.7	1,531.6	1,303.9	227.66	6.728		
16,000.0	9,198.5	17,285.7	10,618.1	114.0	117.3	-157.98	-6,933.1	215.4	1,530.5	1,299.1	231.37	6.615		
16,100.0	9,198.4	17,370.4	10,615.9	115.7	118.8	-157.85	-7,017.7	218.8	1,529.5	1,295.0	234.44	6.524		
16,132.3	9,198.4	17,395.6	10,615.5	116.2	119.2	-157.81	-7,042.9	219.9	1,529.4	1,294.0	235.40	6.497		
16,200.0	9,198.3	17,453.0	10,614.8	117.3	120.2	-157.73	-7,100.2	222.6	1,529.7	1,292.2	237.49	6.441		
16,300.0	9,198.2	17,596.7	10,611.3	119.0	122.6	-157.51	-7,243.7	228.5	1,528.8	1,287.2	241.56	6.329		
16,400.0	9,198.1	17,696.4	10,607.3	120.6	124.2	-157.35	-7,343.3	232.3	1,526.3	1,281.5	244.89	6.233		
16,500.0	9,198.0	17,786.0	10,603.9	122.3	125.8	-157.18	-7,432.7	236.6	1,524.5	1,276.5	248.05	6.146		
16,600.0	9,197.9	17,887.4	10,600.5	124.0	127.5	-156.98	-7,533.9	241.5	1,523.2	1,271.7	251.41	6.058		
16,700.0	9,197.8	17,982.8	10,597.1	125.6	129.1	-156.80	-7,629.1	246.1	1,521.6	1,266.9	254.68	5.975		
16,800.0	9,197.7	18,076.9	10,594.7	127.3	130.6	-156.66	-7,723.1	249.9	1,520.6	1,262.7	257.91	5.896		

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 #9H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
MD Reference: RKB=3551+26 @ 3577.0usft (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 #3H - OWB - ACTUAL WELLPATH												Offset Site Error:	0.0 usft
Survey Program: 100-GYD_DP_MS_9931-MWD												Offset Well Error:	2.0 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)		
16,868.4	9,197.6	18,132.0	10,593.5	128.4	131.6	-156.58	-7,778.2	252.0	1,520.2	1,260.2	259.97	5.847	
16,900.0	9,197.6	18,151.9	10,593.3	128.9	131.9	-156.56	-7,798.0	252.6	1,520.3	1,259.5	260.83	5.829	
17,000.0	9,197.5	18,222.5	10,594.3	130.6	133.1	-156.53	-7,868.7	254.5	1,522.2	1,258.6	263.67	5.773	
17,100.0	9,197.4	18,327.7	10,596.0	132.2	134.8	-156.50	-7,973.8	257.1	1,524.6	1,257.5	267.08	5.708	
17,200.0	9,197.3	18,418.3	10,597.9	133.9	136.4	-156.46	-8,064.3	259.7	1,527.4	1,257.1	270.26	5.652	
17,300.0	9,197.2	18,527.3	10,600.0	135.6	138.2	-156.41	-8,173.3	263.0	1,530.1	1,256.4	273.74	5.590	
17,400.0	9,197.1	18,646.6	10,600.7	137.2	140.2	-156.30	-8,292.5	267.2	1,531.9	1,254.5	277.40	5.522	
17,500.0	9,197.0	18,755.2	10,600.0	138.9	142.0	-156.18	-8,401.0	271.4	1,532.7	1,251.8	280.88	5.457	
17,600.0	9,196.9	18,863.0	10,598.5	140.5	143.8	-156.03	-8,508.7	275.9	1,532.9	1,248.5	284.35	5.391	
17,700.0	9,196.8	18,937.4	10,597.8	142.2	145.1	-155.93	-8,583.0	279.2	1,533.6	1,246.4	287.26	5.339	
17,800.0	9,196.7	19,017.4	10,598.2	143.8	146.4	-155.81	-8,662.9	283.5	1,536.1	1,245.8	290.28	5.292	
17,900.0	9,196.6	19,111.0	10,599.1	145.5	148.0	-155.64	-8,756.3	289.7	1,539.5	1,246.0	293.52	5.245	
18,000.0	9,196.5	19,230.3	10,599.5	147.2	150.0	-155.39	-8,875.3	298.1	1,542.6	1,245.3	297.21	5.190	
18,100.0	9,196.4	19,350.4	10,597.8	148.8	152.1	-155.11	-8,995.1	306.5	1,543.9	1,243.0	300.91	5.131	
18,200.0	9,196.2	19,441.7	10,596.0	150.5	153.6	-154.87	-9,086.1	313.5	1,545.2	1,241.1	304.12	5.081	
18,300.0	9,196.1	19,537.9	10,594.0	152.1	155.3	-154.60	-9,182.0	321.5	1,546.7	1,239.3	307.42	5.031	
18,400.0	9,196.0	19,616.0	10,593.5	153.8	156.6	-154.40	-9,259.8	327.9	1,549.4	1,238.9	310.41	4.991	
18,500.0	9,195.9	19,710.0	10,593.5	155.5	158.2	-154.18	-9,353.5	335.2	1,552.6	1,238.9	313.67	4.950	
18,600.0	9,195.8	19,804.0	10,594.2	157.1	159.8	-153.98	-9,447.2	342.4	1,556.3	1,239.3	316.93	4.910	
18,700.0	9,195.7	19,949.1	10,593.2	158.8	162.3	-153.68	-9,592.0	352.0	1,558.1	1,237.1	321.05	4.853	
18,800.0	9,195.6	20,056.8	10,592.4	160.4	164.1	-153.54	-9,699.6	356.9	1,559.3	1,234.7	324.53	4.805	
18,900.0	9,195.5	20,197.9	10,588.3	162.1	166.5	-153.28	-9,840.5	363.7	1,558.6	1,230.0	328.56	4.744	
19,000.0	9,195.4	20,312.4	10,582.1	163.8	168.4	-153.01	-9,954.6	369.8	1,555.9	1,223.8	332.15	4.684	
19,099.0	9,195.3	20,366.0	10,579.1	165.4	169.3	-152.88	-10,008.0	372.7	1,553.7	1,219.0	334.70	4.642	
19,100.0	9,195.3	20,366.0	10,579.1	165.4	169.3	-152.88	-10,008.0	372.7	1,553.7	1,219.0	334.71	4.642	
19,200.0	9,195.2	20,366.0	10,579.1	167.1	169.3	-152.88	-10,008.0	372.7	1,557.0	1,220.6	336.37	4.629 SF	
19,300.0	9,195.1	20,366.0	10,579.1	168.7	169.3	-152.88	-10,008.0	372.7	1,566.7	1,228.6	338.04	4.635	
19,394.7	9,195.0	20,366.0	10,579.1	170.3	169.3	-152.88	-10,008.0	372.7	1,581.6	1,242.0	339.61	4.657	

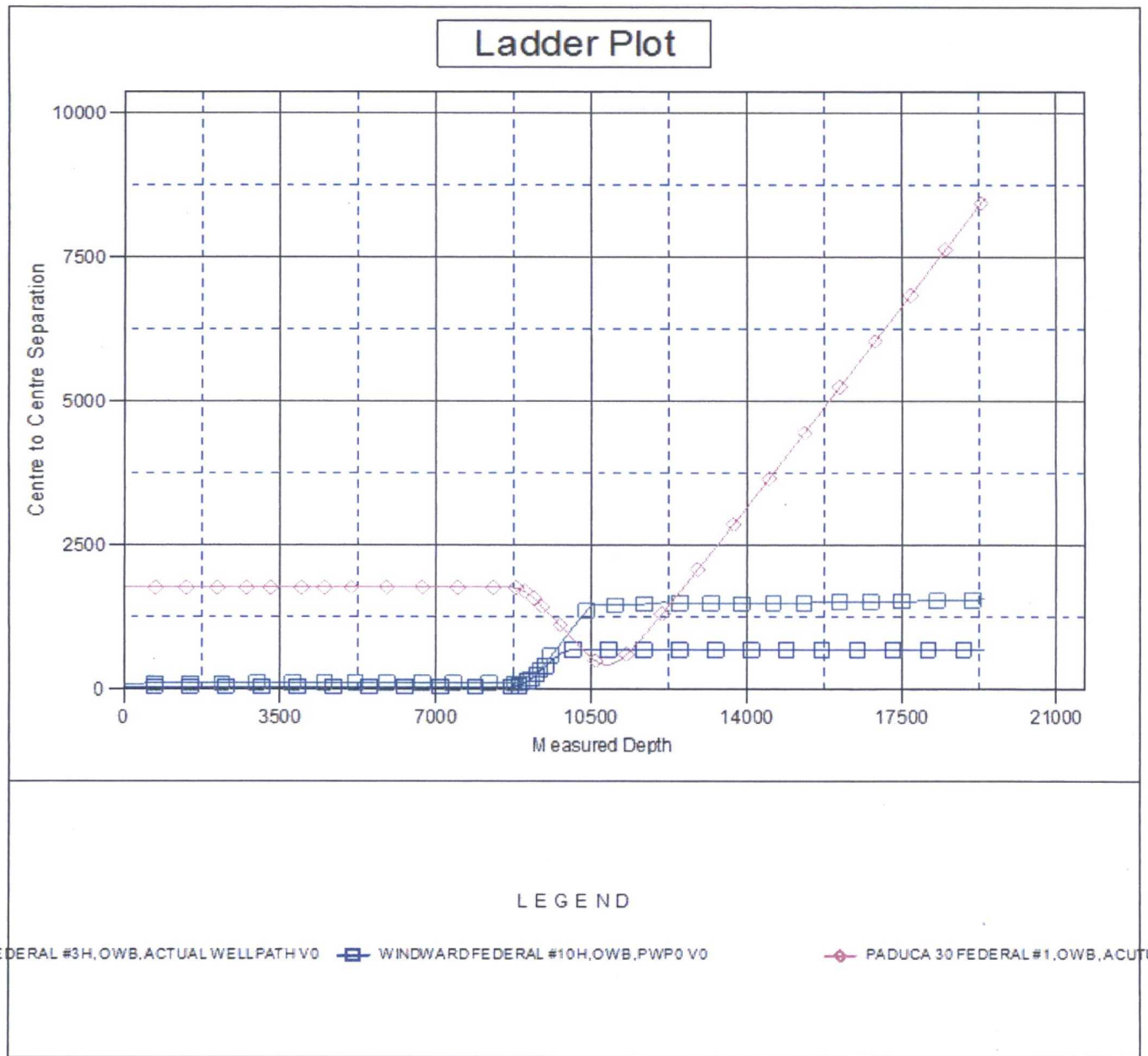
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Company: COG OPERATING LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: WINDWARD FEDERAL #9H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
 Reference Design: PWP0

Local Co-ordinate Reference: Well WINDWARD FEDERAL #9H
 TVD Reference: RKB=3551+26 @ 3577.0usft (McVay 8)
 MD Reference: RKB=3551+26 @ 3577.0usft (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=3551+26 @ 3577.0usft (McVay)
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: WINDWARD FEDERAL #9H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.33°



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