CONCHO

COG OPERATING LLC

LEA COUNTY, NM
AVALON SHALE
WINDWARD FEDERAL #12H

OWB
PWP0

Anticollision Report

01 September, 2016

COG Operating LLC
Anticollision Report

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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	8,714.5	PWP0 (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
8,714.5	19,310.8	PWP0 (OWB)	MWD	OWSG MWD - Standard

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
AVALON SHALE						
WINDWARD FEDERAL #11H - OWB - PWP0	8,714.5	8,714.3	30.0	6.4	1.272	Shut in Produces, CC, ES,
DEEP BSS						
WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPA	8,779.4	8,783.1	79.9	37.4	1.883	Advise and Monitor, CC,
WINDWARD FEDERAL #4H - OWB - ACTUAL WELLPA	8,800.0	8,803.3	80.0	37.5	1.883	Advise and Monitor, SF
DELAWARE						
KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH	271.5	271.5	199.6	193.6	32.898	CC, ES
KING TUT FEDERAL #4H - OWB - ACTUAL WELLPATH	19,100.0	18,222.0	734.5	397.9	2.182	SF

Offset Design AVALON SHALE - WINDWARD FEDERAL #11H - OWB - PWP0

Survey Program: 0-Standard Keeper 104, 8718-MWD

Offset Site Error: 0.0 usft

Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	3.0	3.0	-90.57	-0.3	-30.0	30.0				
100.0	100.0	99.8	99.8	3.0	3.0	-90.57	-0.3	-30.0	30.0	24.0	6.00	5.000	
200.0	200.0	199.8	199.8	3.0	3.0	-90.57	-0.3	-30.0	30.0	24.0	6.01	4.991	
300.0	300.0	299.8	299.8	3.0	3.0	-90.57	-0.3	-30.0	30.0	24.0	6.03	4.973	
400.0	400.0	399.8	399.8	3.0	3.0	-90.57	-0.3	-30.0	30.0	23.9	6.07	4.946	
500.0	500.0	499.8	499.8	3.1	3.1	-90.57	-0.3	-30.0	30.0	23.9	6.11	4.911	
600.0	600.0	599.8	599.8	3.1	3.1	-90.57	-0.3	-30.0	30.0	23.8	6.16	4.867	
700.0	700.0	699.8	699.8	3.1	3.1	-90.57	-0.3	-30.0	30.0	23.8	6.23	4.815	
800.0	800.0	799.8	799.8	3.2	3.2	-90.57	-0.3	-30.0	30.0	23.7	6.31	4.757	
900.0	900.0	899.8	899.8	3.2	3.2	-90.57	-0.3	-30.0	30.0	23.6	6.39	4.693	
1,000.0	1,000.0	999.8	999.8	3.2	3.2	-90.57	-0.3	-30.0	30.0	23.5	6.49	4.624	
1,100.0	1,100.0	1,099.8	1,099.8	3.3	3.3	-90.57	-0.3	-30.0	30.0	23.4	6.59	4.550	
1,200.0	1,200.0	1,199.8	1,199.8	3.4	3.4	-90.57	-0.3	-30.0	30.0	23.3	6.71	4.473	
1,300.0	1,300.0	1,299.8	1,299.8	3.4	3.4	-90.57	-0.3	-30.0	30.0	23.2	6.83	4.393	
1,400.0	1,400.0	1,399.8	1,399.8	3.5	3.5	-90.57	-0.3	-30.0	30.0	23.0	6.96	4.311	
1,500.0	1,500.0	1,499.8	1,499.8	3.5	3.5	-90.57	-0.3	-30.0	30.0	22.9	7.10	4.228	
1,600.0	1,600.0	1,599.8	1,599.8	3.6	3.6	-90.57	-0.3	-30.0	30.0	22.8	7.24	4.144	
1,700.0	1,700.0	1,699.8	1,699.8	3.7	3.7	-90.57	-0.3	-30.0	30.0	22.6	7.39	4.059	

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

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Reference Design:	PWP0	**Offset TVD Reference:**	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #11H - OWB - PWP0 — Offset Site Error: 0.0 usft

Survey Program: 0-Standard Keeper 104, 8718-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
1,800.0	1,800.0	1,799.8	1,799.8	3.8	3.8	-90.57	-0.3	-30.0	30.0	22.5	7.55	3.975	
1,900.0	1,900.0	1,899.8	1,899.8	3.9	3.9	-90.57	-0.3	-30.0	30.0	22.3	7.71	3.891	
2,000.0	2,000.0	1,999.8	1,999.8	3.9	3.9	-90.57	-0.3	-30.0	30.0	22.1	7.88	3.808	
2,100.0	2,100.0	2,099.8	2,099.8	4.0	4.0	-90.57	-0.3	-30.0	30.0	21.9	8.05	3.726	
2,200.0	2,200.0	2,199.8	2,199.8	4.1	4.1	-90.57	-0.3	-30.0	30.0	21.8	8.23	3.645	
2,300.0	2,300.0	2,299.8	2,299.8	4.2	4.2	-90.57	-0.3	-30.0	30.0	21.6	8.41	3.566	
2,400.0	2,400.0	2,399.8	2,399.8	4.3	4.3	-90.57	-0.3	-30.0	30.0	21.4	8.60	3.488	
2,500.0	2,500.0	2,499.8	2,499.8	4.4	4.4	-90.57	-0.3	-30.0	30.0	21.2	8.79	3.413	
2,600.0	2,600.0	2,599.8	2,599.8	4.5	4.5	-90.57	-0.3	-30.0	30.0	21.0	8.99	3.339	
2,700.0	2,700.0	2,699.8	2,699.8	4.6	4.6	-90.57	-0.3	-30.0	30.0	20.8	9.18	3.267	
2,800.0	2,800.0	2,799.8	2,799.8	4.7	4.7	-90.57	-0.3	-30.0	30.0	20.6	9.39	3.197	
2,900.0	2,900.0	2,899.8	2,899.8	4.8	4.8	-90.57	-0.3	-30.0	30.0	20.4	9.59	3.129	
3,000.0	3,000.0	2,999.8	2,999.8	4.9	4.9	-90.57	-0.3	-30.0	30.0	20.2	9.80	3.062	
3,100.0	3,100.0	3,099.8	3,099.8	5.0	5.0	-90.57	-0.3	-30.0	30.0	20.0	10.01	2.998	
3,200.0	3,200.0	3,199.8	3,199.8	5.1	5.1	-90.57	-0.3	-30.0	30.0	19.8	10.22	2.936	
3,300.0	3,300.0	3,299.8	3,299.8	5.2	5.2	-90.57	-0.3	-30.0	30.0	19.6	10.43	2.876	
3,400.0	3,400.0	3,399.8	3,399.8	5.3	5.3	-90.57	-0.3	-30.0	30.0	19.4	10.65	2.817	
3,500.0	3,500.0	3,499.8	3,499.8	5.4	5.4	-90.57	-0.3	-30.0	30.0	19.1	10.87	2.760	
3,600.0	3,600.0	3,599.8	3,599.8	5.5	5.5	-90.57	-0.3	-30.0	30.0	18.9	11.09	2.705	
3,700.0	3,700.0	3,699.8	3,699.8	5.7	5.7	-90.57	-0.3	-30.0	30.0	18.7	11.31	2.652	
3,800.0	3,800.0	3,799.8	3,799.8	5.8	5.8	-90.57	-0.3	-30.0	30.0	18.5	11.54	2.601	
3,900.0	3,900.0	3,899.8	3,899.8	5.9	5.9	-90.57	-0.3	-30.0	30.0	18.2	11.76	2.551	
4,000.0	4,000.0	3,999.8	3,999.8	6.0	6.0	-90.57	-0.3	-30.0	30.0	18.0	11.99	2.502	
4,100.0	4,100.0	4,099.8	4,099.8	6.1	6.1	-90.57	-0.3	-30.0	30.0	17.8	12.22	2.455	
4,200.0	4,200.0	4,199.8	4,199.8	6.2	6.2	-90.57	-0.3	-30.0	30.0	17.6	12.45	2.410	
4,300.0	4,300.0	4,299.8	4,299.8	6.3	6.3	-90.57	-0.3	-30.0	30.0	17.3	12.68	2.366	
4,400.0	4,400.0	4,399.8	4,399.8	6.5	6.5	-90.57	-0.3	-30.0	30.0	17.1	12.91	2.323	
4,500.0	4,500.0	4,499.8	4,499.8	6.6	6.6	-90.57	-0.3	-30.0	30.0	16.9	13.15	2.282	
4,600.0	4,600.0	4,599.8	4,599.8	6.7	6.7	-90.57	-0.3	-30.0	30.0	16.6	13.38	2.242	
4,700.0	4,700.0	4,699.8	4,699.8	6.8	6.8	-90.57	-0.3	-30.0	30.0	16.4	13.62	2.203	
4,800.0	4,800.0	4,799.8	4,799.8	6.9	6.9	-90.57	-0.3	-30.0	30.0	16.1	13.86	2.165	
4,900.0	4,900.0	4,899.8	4,899.8	7.0	7.0	-90.57	-0.3	-30.0	30.0	15.9	14.09	2.129	
5,000.0	5,000.0	4,999.8	4,999.8	7.2	7.2	-90.57	-0.3	-30.0	30.0	15.7	14.33	2.093	
5,100.0	5,100.0	5,099.8	5,099.8	7.3	7.3	-90.57	-0.3	-30.0	30.0	15.4	14.57	2.059	
5,200.0	5,200.0	5,199.8	5,199.8	7.4	7.4	-90.57	-0.3	-30.0	30.0	15.2	14.81	2.025	
5,300.0	5,300.0	5,299.8	5,299.8	7.5	7.5	-90.57	-0.3	-30.0	30.0	14.9	15.06	1.993	Advise and Monitor
5,400.0	5,400.0	5,399.8	5,399.8	7.6	7.6	-90.57	-0.3	-30.0	30.0	14.7	15.30	1.961	Advise and Monitor
5,500.0	5,500.0	5,499.8	5,499.8	7.8	7.8	-90.57	-0.3	-30.0	30.0	14.5	15.54	1.930	Advise and Monitor
5,600.0	5,600.0	5,599.8	5,599.8	7.9	7.9	-90.57	-0.3	-30.0	30.0	14.2	15.78	1.901	Advise and Monitor
5,700.0	5,700.0	5,699.8	5,699.8	8.0	8.0	-90.57	-0.3	-30.0	30.0	14.0	16.03	1.872	Advise and Monitor
5,800.0	5,800.0	5,799.8	5,799.8	8.1	8.1	-90.57	-0.3	-30.0	30.0	13.7	16.27	1.844	Advise and Monitor
5,900.0	5,900.0	5,899.8	5,899.8	8.3	8.3	-90.57	-0.3	-30.0	30.0	13.5	16.52	1.816	Advise and Monitor
6,000.0	6,000.0	5,999.8	5,999.8	8.4	8.4	-90.57	-0.3	-30.0	30.0	13.2	16.76	1.790	Advise and Monitor
6,100.0	6,100.0	6,099.8	6,099.8	8.5	8.5	-90.57	-0.3	-30.0	30.0	13.0	17.01	1.764	Advise and Monitor
6,200.0	6,200.0	6,199.8	6,199.8	8.6	8.6	-90.57	-0.3	-30.0	30.0	12.7	17.26	1.738	Advise and Monitor
6,300.0	6,300.0	6,299.8	6,299.8	8.8	8.8	-90.57	-0.3	-30.0	30.0	12.5	17.51	1.714	Advise and Monitor
6,400.0	6,400.0	6,399.8	6,399.8	8.9	8.9	-90.57	-0.3	-30.0	30.0	12.2	17.75	1.690	Advise and Monitor
6,500.0	6,500.0	6,499.8	6,499.8	9.0	9.0	-90.57	-0.3	-30.0	30.0	12.0	18.00	1.667	Advise and Monitor
6,600.0	6,600.0	6,599.8	6,599.8	9.1	9.1	-90.57	-0.3	-30.0	30.0	11.8	18.25	1.644	Advise and Monitor
6,700.0	6,700.0	6,699.8	6,699.8	9.3	9.3	-90.57	-0.3	-30.0	30.0	11.5	18.50	1.622	Advise and Monitor
6,800.0	6,800.0	6,799.8	6,799.8	9.4	9.4	-90.57	-0.3	-30.0	30.0	11.3	18.75	1.600	Advise and Monitor
6,900.0	6,900.0	6,899.8	6,899.8	9.5	9.5	-90.57	-0.3	-30.0	30.0	11.0	19.00	1.579	Advise and Monitor

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Reference Design:	PWP0	**Offset TVD Reference:**	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #11H - OWB - PWP0 — **Offset Site Error:** 0.0 usft

Survey Program: 0-Standard Keeper 104, 8718-MWD — **Offset Well Error:** 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,000.0	7,000.0	6,999.8	6,999.8	9.6	9.6	-90.57	-0.3	-30.0	30.0	10.8	19.25	1.558	Advise and Monitor
7,100.0	7,100.0	7,099.8	7,099.8	9.8	9.8	-90.57	-0.3	-30.0	30.0	10.5	19.50	1.538	Advise and Monitor
7,200.0	7,200.0	7,199.8	7,199.8	9.9	9.9	-90.57	-0.3	-30.0	30.0	10.2	19.75	1.519	Advise and Monitor
7,300.0	7,300.0	7,299.8	7,299.8	10.0	10.0	-90.57	-0.3	-30.0	30.0	10.0	20.00	1.500	Shut in Produces
7,400.0	7,400.0	7,399.8	7,399.8	10.1	10.1	-90.57	-0.3	-30.0	30.0	9.7	20.26	1.481	Shut in Produces
7,500.0	7,500.0	7,499.8	7,499.8	10.3	10.3	-90.57	-0.3	-30.0	30.0	9.5	20.51	1.463	Shut in Produces
7,600.0	7,600.0	7,599.8	7,599.8	10.4	10.4	-90.57	-0.3	-30.0	30.0	9.2	20.76	1.445	Shut in Produces
7,700.0	7,700.0	7,699.8	7,699.8	10.5	10.5	-90.57	-0.3	-30.0	30.0	9.0	21.01	1.428	Shut in Produces
7,800.0	7,800.0	7,799.8	7,799.8	10.6	10.6	-90.57	-0.3	-30.0	30.0	8.7	21.26	1.411	Shut in Produces
7,900.0	7,900.0	7,899.8	7,899.8	10.8	10.8	-90.57	-0.3	-30.0	30.0	5	21.52	1.394	Shut in Produces
8,000.0	8,000.0	7,999.8	7,999.8	10.9	10.9	-90.57	-0.3	-30.0	30.0	8.2	21.77	1.378	Shut in Produces
8,100.0	8,100.0	8,099.8	8,099.8	11.0	11.0	-90.57	-0.3	-30.0	30.0	8.0	22.02	1.362	Shut in Produces
8,200.0	8,200.0	8,199.8	8,199.8	11.1	11.1	-90.57	-0.3	-30.0	30.0	7.7	22.28	1.347	Shut in Produces
8,300.0	8,300.0	8,299.8	8,299.8	11.3	11.3	-90.57	-0.3	-30.0	30.0	7.5	22.53	1.331	Shut in Produces
8,400.0	8,400.0	8,399.8	8,399.8	11.4	11.4	-90.57	-0.3	-30.0	30.0	7.2	22.79	1.317	Shut in Produces
8,500.0	8,500.0	8,499.8	8,499.8	11.5	11.5	-90.57	-0.3	-30.0	30.0	7.0	23.04	1.302	Shut in Produces
8,600.0	8,600.0	8,599.8	8,599.8	11.6	11.6	-90.57	-0.3	-30.0	30.0	6.7	23.30	1.288	Shut in Produces
8,700.0	8,700.0	8,699.8	8,699.8	11.8	11.8	-90.57	-0.3	-30.0	30.0	6.5	23.55	1.274	Shut in Produces
8,714.5	8,714.5	8,714.3	8,714.3	11.8	11.8	-90.57	-0.3	-30.0	30.0	6.4	23.59	1.272	Shut in Produces, CC, ES, SF
8,725.0	8,725.0	8,724.6	8,724.6	11.8	11.8	106.84	-0.3	-30.0	30.1	6.5	23.60	1.274	Shut in Produces
8,750.0	8,750.0	8,748.7	8,748.7	11.8	11.8	107.28	-1.2	-30.5	30.9	7.3	23.61	1.311	Shut in Produces
8,775.0	8,774.8	8,772.8	8,772.7	11.8	11.8	107.85	-3.0	-31.7	32.9	9.3	23.61	1.392	Shut in Produces
8,800.0	8,799.5	8,796.8	8,796.4	11.8	11.8	108.45	-5.9	-33.4	35.9	12.2	23.62	1.518	Advise and Monitor
8,825.0	8,824.0	8,820.5	8,819.7	11.8	11.8	109.00	-9.7	-35.8	39.9	16.2	23.63	1.687	Advise and Monitor
8,850.0	8,848.2	8,844.0	8,842.5	11.8	11.8	109.44	-14.5	-38.7	44.9	21.2	23.65	1.898	Advise and Monitor
8,875.0	8,872.0	8,867.2	8,864.8	11.8	11.8	109.74	-20.1	-42.2	50.9	27.2	23.67	2.150	
8,900.0	8,895.4	8,890.1	8,886.3	11.9	11.8	109.88	-26.6	-46.1	57.9	34.2	23.69	2.443	
8,925.0	8,918.2	8,912.5	8,907.1	11.9	11.9	109.87	-33.8	-50.6	65.8	42.1	23.72	2.773	
8,950.0	8,940.6	8,934.6	8,927.2	11.9	11.9	109.71	-41.6	-55.4	74.6	50.8	23.75	3.140	
8,975.0	8,962.3	8,956.2	8,946.4	11.9	11.9	109.41	-50.1	-60.6	84.2	60.4	23.79	3.541	
9,000.0	8,983.3	8,977.3	8,964.7	11.9	11.9	108.98	-59.1	-66.1	94.7	70.9	23.83	3.975	
9,025.0	9,003.6	8,998.0	8,982.1	11.9	11.9	108.43	-68.5	-71.9	105.9	82.1	23.87	4.439	
9,050.0	9,023.1	9,018.2	8,998.7	12.0	11.9	107.76	-78.4	-77.9	117.9	94.0	23.91	4.931	
9,075.0	9,041.7	9,037.9	9,014.4	12.0	12.0	106.98	-88.5	-84.2	130.6	106.6	23.96	5.450	
9,100.0	9,059.5	9,057.2	9,029.3	12.0	12.0	106.10	-99.0	-90.6	143.9	119.9	24.01	5.992	
9,125.0	9,076.3	9,075.0	9,042.5	12.1	12.0	105.07	-109.1	-96.8	157.8	133.7	24.07	6.557	
9,150.0	9,092.1	9,094.3	9,056.4	12.1	12.0	104.04	-120.6	-103.8	172.3	148.1	24.13	7.140	
9,175.0	9,106.9	9,112.2	9,068.8	12.1	12.1	102.86	-131.6	-110.6	187.3	163.1	24.19	7.741	
9,200.0	9,120.6	9,129.7	9,080.4	12.2	12.1	101.60	-142.7	-117.5	202.7	178.5	24.26	8.358	
9,225.0	9,133.2	9,146.8	9,091.2	12.2	12.1	100.24	-154.0	-124.3	218.6	194.3	24.33	8.988	
9,250.0	9,144.6	9,163.5	9,101.4	12.2	12.2	98.80	-165.3	-131.3	234.9	210.6	24.40	9.630	
9,275.0	9,154.9	9,179.8	9,110.9	12.3	12.2	97.28	-176.6	-138.2	251.6	227.1	24.47	10.281	
9,300.0	9,163.9	9,195.9	9,119.8	12.3	12.2	95.69	-188.0	-145.2	268.6	244.1	24.56	10.939	
9,325.0	9,171.8	9,211.6	9,128.0	12.4	12.3	94.04	-199.4	-152.2	285.9	261.2	24.64	11.601	
9,350.0	9,178.3	9,227.0	9,135.7	12.4	12.3	92.32	-210.8	-159.2	303.4	278.7	24.74	12.265	
9,375.0	9,183.6	9,242.2	9,142.8	12.5	12.3	90.55	-222.2	-166.3	321.2	296.3	24.84	12.928	
9,400.0	9,187.6	9,257.2	9,149.4	12.6	12.4	88.75	-233.7	-173.3	339.1	314.2	24.96	13.586	
9,425.0	9,190.4	9,271.9	9,155.5	12.7	12.4	86.91	-245.1	-180.3	357.2	332.1	25.10	14.234	
9,450.0	9,191.8	9,286.6	9,161.1	12.8	12.5	85.05	-256.7	-187.4	375.4	350.2	25.25	14.868	
9,464.6	9,192.0	9,295.0	9,164.2	12.8	12.5	83.96	-263.4	-191.5	386.1	360.7	25.35	15.228	
9,500.0	9,192.0	9,316.2	9,171.2	13.1	12.6	85.84	-280.4	-202.0	411.9	386.3	25.65	16.058	
9,600.0	9,192.0	9,382.5	9,187.4	14.0	12.9	89.29	-335.1	-235.6	482.6	455.7	26.89	17.950	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 #11H - OWB - PWP0 — Offset Site Error: 0.0 usft

Survey Program: 0-Standard Keeper 104, 8718-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,700.0	9,192.0	9,457.0	9,194.9	15.2	13.4	90.42	-398.2	-274.3	548.8	520.1	28.62	19.175	
9,800.0	9,192.0	9,587.2	9,195.0	16.6	14.6	90.35	-511.7	-338.1	606.6	575.4	31.21	19.437	
9,886.6	9,192.0	9,725.4	9,195.0	17.8	16.3	90.31	-637.8	-394.3	644.9	610.8	34.04	18.945	
9,900.0	9,192.0	9,748.1	9,195.0	17.9	16.6	90.30	-659.1	-402.4	649.7	615.2	34.51	18.827	
10,000.0	9,192.0	9,926.4	9,195.0	19.3	18.9	90.28	-829.7	-453.8	679.3	641.1	38.20	17.781	
10,100.0	9,192.0	10,116.1	9,195.0	20.8	21.3	90.26	-1,016.8	-484.7	696.4	654.3	42.05	16.559	
10,200.0	9,192.0	10,289.5	9,195.0	22.3	23.4	90.26	-1,189.9	-491.4	700.4	654.8	45.65	15.344	
10,300.0	9,192.0	10,389.5	9,195.0	23.8	24.6	90.26	-1,289.9	-490.6	700.4	652.0	48.39	14.473	
10,400.0	9,192.0	10,489.5	9,195.0	25.3	25.9	90.26	-1,389.9	-489.9	700.4	649.2	51.22	13.676	
10,500.0	9,192.0	10,589.5	9,195.0	26.9	27.2	90.26	-1,489.9	-489.2	700.4	646.3	54.10	12.946	
10,600.0	9,192.0	10,689.5	9,195.0	28.5	28.6	90.26	-1,589.9	-488.4	700.4	643.4	57.04	12.279	
10,700.0	9,192.0	10,789.5	9,195.0	30.1	30.0	90.26	-1,689.9	-487.7	700.4	640.4	60.02	11.669	
10,800.0	9,192.0	10,889.5	9,195.0	31.6	31.4	90.26	-1,789.9	-487.0	700.4	637.4	63.05	11.109	
10,900.0	9,192.0	10,989.5	9,195.0	33.2	32.9	90.26	-1,889.9	-486.2	700.4	634.3	66.10	10.596	
11,000.0	9,192.0	11,089.5	9,195.0	34.8	34.3	90.26	-1,989.9	-485.5	700.4	631.2	69.18	10.124	
11,100.0	9,192.0	11,189.5	9,195.0	36.5	35.8	90.26	-2,089.9	-484.8	700.4	628.1	72.29	9.689	
11,200.0	9,192.0	11,289.5	9,195.0	38.1	37.3	90.26	-2,189.9	-484.0	700.4	625.0	75.42	9.287	
11,300.0	9,192.0	11,389.5	9,195.0	39.7	38.9	90.26	-2,289.9	-483.3	700.4	621.8	78.56	8.915	
11,400.0	9,192.0	11,489.5	9,195.0	41.3	40.4	90.26	-2,389.9	-482.6	700.4	618.7	81.72	8.570	
11,500.0	9,192.0	11,589.5	9,195.0	43.0	41.9	90.26	-2,489.9	-481.8	700.4	615.5	84.90	8.249	
11,600.0	9,192.0	11,689.5	9,195.0	44.6	43.5	90.26	-2,589.9	-481.1	700.4	612.3	88.09	7.951	
11,700.0	9,192.0	11,789.5	9,195.0	46.2	45.1	90.26	-2,689.9	-480.4	700.4	609.1	91.29	7.672	
11,800.0	9,192.0	11,889.5	9,195.0	47.8	46.6	90.26	-2,789.9	-479.6	700.4	605.9	94.50	7.412	
11,900.0	9,192.0	11,989.5	9,195.0	49.5	48.2	90.26	-2,889.9	-478.9	700.4	602.6	97.71	7.167	
12,000.0	9,192.0	12,089.5	9,195.0	51.1	49.8	90.26	-2,989.9	-478.2	700.3	599.4	100.94	6.938	
12,100.0	9,192.0	12,189.5	9,195.0	52.8	51.4	90.26	-3,089.9	-477.4	700.3	596.2	104.17	6.723	
12,200.0	9,192.0	12,289.5	9,195.0	54.4	53.0	90.26	-3,189.9	-476.7	700.3	592.9	107.41	6.520	
12,300.0	9,192.0	12,389.5	9,195.0	56.1	54.6	90.26	-3,289.9	-476.0	700.3	589.7	110.65	6.329	
12,400.0	9,192.0	12,489.5	9,195.0	57.7	56.2	90.26	-3,389.9	-475.2	700.3	586.4	113.90	6.148	
12,500.0	9,192.0	12,589.5	9,195.0	59.3	57.8	90.26	-3,489.9	-474.5	700.3	583.2	117.16	5.978	
12,600.0	9,192.0	12,689.5	9,195.0	61.0	59.4	90.26	-3,589.9	-473.8	700.3	579.9	120.42	5.816	
12,700.0	9,192.0	12,789.5	9,195.0	62.6	61.0	90.26	-3,689.9	-473.0	700.3	576.6	123.68	5.662	
12,800.0	9,192.0	12,889.5	9,195.0	64.3	62.7	90.26	-3,789.9	-472.3	700.3	573.4	126.95	5.516	
12,900.0	9,192.0	12,989.5	9,195.0	65.9	64.3	90.26	-3,889.9	-471.6	700.3	570.1	130.22	5.378	
13,000.0	9,192.0	13,089.5	9,195.0	67.6	65.9	90.26	-3,989.9	-470.8	700.3	566.8	133.49	5.246	
13,100.0	9,192.0	13,189.5	9,195.0	69.2	67.5	90.26	-4,089.9	-470.1	700.3	563.5	136.77	5.120	
13,200.0	9,192.0	13,289.5	9,195.0	70.9	69.2	90.26	-4,189.9	-469.4	700.3	560.2	140.05	5.000	
13,300.0	9,192.0	13,389.5	9,195.0	72.5	70.8	90.26	-4,289.8	-468.6	700.3	556.9	143.33	4.886	
13,400.0	9,192.0	13,489.5	9,195.0	74.2	72.4	90.26	-4,389.8	-467.9	700.3	553.7	146.61	4.776	
13,500.0	9,192.0	13,589.5	9,195.0	75.9	74.0	90.26	-4,489.8	-467.2	700.3	550.4	149.90	4.672	
13,600.0	9,192.0	13,689.5	9,195.0	77.5	75.7	90.26	-4,589.8	-466.4	700.3	547.1	153.19	4.571	
13,700.0	9,192.0	13,789.5	9,195.0	79.2	77.3	90.26	-4,689.8	-465.7	700.3	543.8	156.48	4.475	
13,800.0	9,192.0	13,889.5	9,195.0	80.8	78.9	90.26	-4,789.8	-465.0	700.2	540.5	159.77	4.383	
13,900.0	9,192.0	13,989.5	9,195.0	82.5	80.6	90.26	-4,889.8	-464.2	700.2	537.2	163.06	4.294	
14,000.0	9,192.0	14,089.5	9,195.0	84.1	82.2	90.26	-4,989.8	-463.5	700.2	533.9	166.36	4.209	
14,100.0	9,192.0	14,189.5	,195.0	85.8	83.9	90.26	-5,089.8	-462.8	700.2	530.6	169.65	4.127	
14,200.0	9,192.0	14,289.5	9,195.0	87.4	85.5	90.26	-5,189.8	-462.0	700.2	527.3	172.95	4.049	
14,300.0	9,192.0	14,389.5	9,195.0	89.1	87.1	90.26	-5,289.8	-461.3	700.2	524.0	176.25	3.973	
14,400.0	9,192.0	14,489.5	9,195.0	90.8	88.8	90.26	-5,389.8	-460.6	700.2	520.7	179.55	3.900	
14,500.0	9,192.0	14,589.5	9,195.0	92.4	90.4	90.26	-5,489.8	-459.8	700.2	517.4	182.85	3.829	
14,600.0	9,192.0	14,689.5	9,195.0	94.1	92.1	90.26	-5,589.8	-459.1	700.2	514.1	186.15	3.761	
14,700.0	9,192.0	14,789.5	9,195.0	95.7	93.7	90.26	-5,689.8	-458.4	700.2	510.7	189.46	3.696	

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 #11H - OWB - PWP0 — Offset Site Error: 0.0 usft

Survey Program: 0-Standard Keeper 104, 8718-MWD — Offset Well Error: 3.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
14,800.0	9,192.0	14,889.5	9,195.0	97.4	95.4	90.26	-5,789.8	-457.6	700.2	507.4	192.76	3.632	
14,900.0	9,192.0	14,989.5	9,195.0	99.1	97.0	90.26	-5,889.8	-456.9	700.2	504.1	196.07	3.571	
15,000.0	9,192.0	15,089.5	9,195.0	100.7	98.7	90.26	-5,989.8	-456.2	700.2	500.8	199.37	3.512	
15,100.0	9,192.0	15,189.5	9,195.0	102.4	100.3	90.26	-6,089.8	-455.4	700.2	497.5	202.68	3.455	
15,200.0	9,192.0	15,289.5	9,195.0	104.0	102.0	90.26	-6,189.8	-454.7	700.2	494.2	205.99	3.399	
15,300.0	9,192.0	15,389.5	9,195.0	105.7	103.6	90.26	-6,289.8	-454.0	700.2	490.9	209.30	3.345	
15,400.0	9,192.0	15,489.5	9,195.0	107.3	105.3	90.26	-6,389.8	-453.2	700.2	487.6	212.61	3.293	
15,500.0	9,192.0	15,589.5	9,195.0	109.0	106.9	90.26	-6,489.8	-452.5	700.2	484.2	215.92	3.243	
15,600.0	9,192.0	15,689.5	9,195.0	110.7	108.6	90.26	-6,589.8	-451.8	700.2	480.9	219.23	3.194	
15,700.0	9,192.0	15,789.5	9,195.0	112.3	110.2	90.26	-6,689.8	-451.0	700.1	477.6	222.54	3.146	
15,800.0	9,192.0	15,889.5	9,195.0	114.0	111.9	90.26	-6,789.8	-450.3	700.1	474.3	225.85	3.100	
15,900.0	9,192.0	15,989.5	9,195.0	115.7	113.5	90.26	-6,889.8	-449.6	700.1	471.0	229.16	3.055	
16,000.0	9,192.0	16,089.5	9,195.0	117.3	115.2	90.26	-6,989.8	-448.8	700.1	467.7	232.48	3.012	
16,100.0	9,192.0	16,189.5	9,195.0	119.0	116.8	90.26	-7,089.8	-448.1	700.1	464.3	235.79	2.969	
16,200.0	9,192.0	16,289.5	9,195.0	120.6	118.5	90.26	-7,189.8	-447.4	700.1	461.0	239.10	2.928	
16,300.0	9,192.0	16,389.5	9,195.0	122.3	120.1	90.26	-7,289.8	-446.6	700.1	457.7	242.42	2.888	
16,400.0	9,192.0	16,489.5	9,195.0	124.0	121.8	90.26	-7,389.8	-445.9	700.1	454.4	245.73	2.849	
16,500.0	9,192.0	16,589.5	9,195.0	125.6	123.4	90.26	-7,489.8	-445.2	700.1	451.1	249.05	2.811	
16,600.0	9,192.0	16,689.5	9,195.0	127.3	125.1	90.26	-7,589.8	-444.4	700.1	447.7	252.36	2.774	
16,700.0	9,192.0	16,789.5	9,195.0	128.9	126.7	90.26	-7,689.8	-443.7	700.1	444.4	255.68	2.738	
16,800.0	9,192.0	16,889.5	9,195.0	130.6	128.4	90.26	-7,789.8	-443.0	700.1	441.1	259.00	2.703	
16,900.0	9,192.0	16,989.5	9,195.0	132.3	130.1	90.26	-7,889.8	-442.2	700.1	437.8	262.31	2.669	
17,000.0	9,192.0	17,089.5	9,195.0	133.9	131.7	90.26	-7,989.7	-441.5	700.1	434.4	265.63	2.636	
17,100.0	9,192.0	17,189.5	9,195.0	135.6	133.4	90.26	-8,089.7	-440.7	700.1	431.1	268.95	2.603	
17,200.0	9,192.0	17,289.5	9,195.0	137.2	135.0	90.26	-8,189.7	-440.0	700.1	427.8	272.27	2.571	
17,300.0	9,192.0	17,389.5	9,195.0	138.9	136.7	90.26	-8,289.7	-439.3	700.1	424.5	275.59	2.540	
17,400.0	9,192.0	17,489.5	9,195.0	140.6	138.3	90.26	-8,389.7	-438.5	700.1	421.2	278.90	2.510	
17,500.0	9,192.0	17,589.5	9,195.0	142.2	140.0	90.26	-8,489.7	-437.8	700.1	417.8	282.22	2.480	
17,600.0	9,192.0	17,689.5	9,195.0	143.9	141.6	90.26	-8,589.7	-437.1	700.0	414.5	285.54	2.452	
17,700.0	9,192.0	17,789.5	9,195.0	145.6	143.3	90.26	-8,689.7	-436.3	700.0	411.2	288.86	2.423	
17,800.0	9,192.0	17,889.5	9,195.0	147.2	145.0	90.26	-8,789.7	-435.6	700.0	407.9	292.18	2.396	
17,900.0	9,192.0	17,989.5	9,195.0	148.9	146.6	90.26	-8,889.7	-434.9	700.0	404.5	295.50	2.369	
18,000.0	9,192.0	18,089.5	9,195.0	150.5	148.3	90.26	-8,989.7	-434.1	700.0	401.2	298.82	2.343	
18,100.0	9,192.0	18,189.5	9,195.0	152.2	149.9	90.26	-9,089.7	-433.4	700.0	397.9	302.14	2.317	
18,200.0	9,192.0	18,289.5	9,195.0	153.9	151.6	90.26	-9,189.7	-432.7	700.0	394.6	305.46	2.292	
18,300.0	9,192.0	18,389.5	9,195.0	155.5	153.2	90.26	-9,289.7	-431.9	700.0	391.2	308.78	2.267	
18,400.0	9,192.0	18,489.5	9,195.0	157.2	154.9	90.26	-9,389.7	-431.2	700.0	387.9	312.10	2.243	
18,500.0	9,192.0	18,589.5	9,195.0	158.9	156.6	90.26	-9,489.7	-430.5	700.0	384.6	315.43	2.219	
18,600.0	9,192.0	18,689.5	9,195.0	160.5	158.2	90.26	-9,589.7	-429.7	700.0	381.2	318.75	2.196	
18,700.0	9,192.0	18,789.5	9,195.0	162.2	159.9	90.26	-9,689.7	-429.0	700.0	377.9	322.07	2.173	
18,800.0	9,192.0	18,889.5	9,195.0	163.8	161.5	90.26	-9,789.7	-428.3	700.0	374.6	325.39	2.151	
18,900.0	9,192.0	18,989.5	9,195.0	165.5	163.2	90.26	-9,889.7	-427.5	700.0	371.3	328.71	2.129	
19,000.0	9,192.0	19,089.5	9,195.0	167.2	164.9	90.26	-9,989.7	-426.8	700.0	367.9	332.04	2.108	
19,100.0	9,192.0	19,189.5	9,195.0	168.8	166.5	90.26	-10,089.7	-426.1	700.0	364.6	335.36	2.087	
19,200.0	9,192.0	19,289.5	9,195.0	170.5	168.2	90.26	-10,189.7	-425.3	700.0	361.3	338.68	2.067	
19,300.0	9,192.0	19,389.5	9,195.0	172.2	169.8	90.26	-10,289.7	-424.6	700.0	358.0	342.00	2.047	
19,310.8	9,192.0	19,400.4	9,195.0	172.3	170.0	90.26	-10,300.5	-424.5	700.0	357.6	342.36	2.044	

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	2.0	2.0	3.0	3.0	78.14	21.0	100.0	102.2				
100.0	100.0	102.2	102.2	3.0	3.0	78.04	21.2	99.9	102.1	96.1	6.00	17.007	
200.0	200.0	202.2	202.2	3.0	3.0	77.80	21.5	99.6	101.9	95.9	6.04	16.861	
300.0	300.0	302.2	302.2	3.0	3.1	77.51	22.0	99.3	101.7	95.6	6.13	16.592	
400.0	400.0	402.1	402.1	3.0	3.2	77.13	22.6	99.0	101.6	95.3	6.26	16.230	
426.2	426.2	428.2	428.2	3.0	3.3	77.00	22.8	99.0	101.6	95.3	6.30	16.124	
500.0	500.0	501.7	501.7	3.1	3.4	76.60	23.6	98.9	101.7	95.3	6.43	15.823	
600.0	600.0	601.4	601.3	3.1	3.5	76.02	24.7	99.1	102.1	95.5	6.63	15.413	
700.0	700.0	701.3	701.3	3.1	3.7	75.47	25.8	99.5	102.8	96.0	6.86	14.991	
800.0	800.0	801.2	801.2	3.2	4.0	74.94	26.9	100.0	103.6	96.5	7.12	14.556	
900.0	900.0	902.3	902.2	3.2	4.2	74.46	27.8	100.1	103.8	96.5	7.40	14.037	
1,000.0	1,000.0	1,002.4	1,002.3	3.2	4.5	74.30	28.0	99.7	103.6	95.9	7.70	13.457	
1,100.0	1,100.0	1,102.1	1,102.1	3.3	4.7	74.36	27.9	99.6	103.4	95.4	8.01	12.907	
1,200.0	1,200.0	1,202.1	1,202.0	3.4	5.0	74.37	27.8	99.5	103.4	95.0	8.34	12.393	
1,300.0	1,300.0	1,302.1	1,302.0	3.4	5.3	74.38	27.8	99.5	103.3	94.7	8.68	11.900	
1,400.0	1,400.0	1,402.2	1,402.1	3.5	5.6	74.40	27.8	99.5	103.3	94.2	9.04	11.425	
1,500.0	1,500.0	1,502.1	1,502.0	3.5	5.9	74.42	27.7	99.4	103.2	93.8	9.40	10.974	
1,600.0	1,600.0	1,602.1	1,602.0	3.6	6.2	74.43	27.7	99.4	103.2	93.4	9.78	10.550	
1,700.0	1,700.0	1,702.1	1,702.0	3.7	6.5	74.45	27.7	99.4	103.1	93.0	10.16	10.149	
1,800.0	1,800.0	1,802.1	1,802.0	3.8	6.8	74.46	27.6	99.3	103.1	92.5	10.55	9.771	
1,900.0	1,900.0	1,902.1	1,902.0	3.9	7.1	74.47	27.6	99.3	103.1	92.1	10.95	9.413	
2,000.0	2,000.0	2,002.1	2,002.1	3.9	7.4	74.49	27.5	99.2	103.0	91.6	11.35	9.074	
2,098.0	2,098.0	2,100.0	2,100.0	4.0	7.7	74.50	27.5	99.2	103.0	91.2	11.75	8.762	
2,100.0	2,100.0	2,102.0	2,102.0	4.0	7.7	74.50	27.5	99.2	103.0	91.2	11.76	8.756	
2,200.0	2,200.0	2,202.0	2,201.9	4.1	8.1	74.51	27.5	99.2	103.0	90.8	12.17	8.462	
2,300.0	2,300.0	2,301.9	2,301.8	4.2	8.4	74.52	27.5	99.3	103.1	90.5	12.58	8.191	
2,400.0	2,400.0	2,402.0	2,402.0	4.3	8.7	74.50	27.6	99.4	103.2	90.2	13.00	7.933	
2,500.0	2,500.0	2,501.7	2,501.7	4.4	9.0	74.48	27.6	99.6	103.3	89.9	13.43	7.696	
2,600.0	2,600.0	2,601.9	2,601.9	4.5	9.4	74.27	28.1	99.6	103.5	89.7	13.85	7.473	
2,700.0	2,700.0	2,702.1	2,702.0	4.6	9.7	73.91	28.7	99.5	103.6	89.3	14.28	7.250	
2,800.0	2,800.0	2,802.3	2,802.2	4.7	10.0	73.59	29.2	99.2	103.4	88.7	14.72	7.028	
2,900.0	2,900.0	2,902.4	2,902.3	4.8	10.4	73.38	29.5	98.9	103.2	88.0	15.16	6.807	
2,942.0	2,942.0	2,944.1	2,944.0	4.8	10.5	73.39	29.5	98.8	103.1	87.8	15.34	6.721	
3,000.0	3,000.0	3,001.6	3,001.5	4.9	10.7	73.56	29.2	99.0	103.2	87.6	15.59	6.621	
3,100.0	3,100.0	3,100.8	3,100.8	5.0	11.0	73.87	28.9	100.0	104.1	88.0	16.03	6.492	
3,200.0	3,200.0	3,200.9	3,200.9	5.1	11.4	73.80	29.3	101.0	105.2	88.7	16.47	6.387	
3,300.0	3,300.0	3,301.5	3,301.4	5.2	11.7	73.46	30.2	101.6	106.0	89.1	16.92	6.267	
3,400.0	3,400.0	3,402.3	3,402.3	5.3	12.0	73.13	30.8	101.6	106.1	88.8	17.37	6.112	
3,436.6	3,436.6	3,438.7	3,438.6	5.4	12.2	73.07	30.9	101.5	106.1	88.6	17.53	6.053	
3,500.0	3,500.0	3,501.6	3,501.5	5.4	12.4	73.14	30.8	101.7	106.2	88.4	17.81	5.965	
3,600.0	3,600.0	3,600.9	3,600.9	5.5	12.7	73.06	31.2	102.3	107.0	88.7	18.26	5.860	
3,700.0	3,700.0	3,701.9	3,701.8	5.7	13.1	72.56	32.2	102.7	107.6	88.9	18.71	5.751	
3,800.0	3,800.0	3,801.9	3,801.8	5.8	13.4	72.15	33.1	102.6	107.8	88.7	19.16	5.626	
3,900.0	3,900.0	3,901.9	3,901.8	5.9	13.7	71.94	33.5	102.7	108.0	88.4	19.62	5.506	
4,000.0	4,000.0	4,001.9	4,001.8	6.0	14.1	71.81	33.8	102.8	108.2	88.1	20.07	5.390	
4,100.0	4,100.0	4,102.0	4,101.9	6.1	14.4	71.60	34.2	102.8	108.3	87.8	20.53	5.276	
4,200.0	4,200.0	4,201.8	4,201.8	6.2	14.8	71.20	35.0	102.7	108.5	87.5	20.99	5.169	
4,300.0	4,300.0	4,302.6	4,302.5	6.3	15.1	70.98	35.3	102.4	108.3	86.9	21.45	5.052	
4,400.0	4,400.0	4,403.6	4,403.5	6.5	15.5	71.18	34.6	101.6	107.4	85.4	21.91	4.900	
4,500.0	4,500.0	4,502.5	4,502.4	6.6	15.8	71.84	33.2	101.1	106.4	84.1	22.36	4.759	
4,543.4	4,543.4	4,545.5	4,545.4	6.6	15.9	72.24	32.4	101.3	106.3	83.8	22.56	4.713	
4,600.0	4,600.0	4,601.6	4,601.4	6.7	16.1	72.75	31.6	101.7	106.5	83.7	22.82	4.667	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
4,700.0	4,700.0	4,700.5	4,700.3	6.8	16.5	73.31	30.9	103.0	107.5	84.3	23.28	4.620	
4,800.0	4,800.0	4,801.1	4,800.9	6.9	16.8	73.14	31.6	104.1	108.8	85.1	23.74	4.583	
4,900.0	4,900.0	4,902.1	4,902.0	7.0	17.2	72.45	33.0	104.2	109.3	85.1	24.21	4.516	
5,000.0	5,000.0	5,003.0	5,002.8	7.2	17.5	71.69	34.2	103.4	108.9	84.3	24.68	4.415	
5,100.0	5,100.0	5,103.0	5,102.8	7.3	17.9	70.97	35.3	102.3	108.2	83.1	25.14	4.305	
5,200.0	5,200.0	5,203.0	5,202.8	7.4	18.2	70.20	36.4	101.1	107.5	81.9	25.60	4.197	
5,300.0	5,300.0	5,303.1	5,302.9	7.5	18.5	69.38	37.6	99.8	106.7	80.6	26.07	4.091	
5,400.0	5,400.0	5,403.2	5,403.0	7.6	18.9	68.57	38.7	98.5	105.8	79.2	26.54	3.986	
5,500.0	5,500.0	5,503.1	5,502.9	7.8	19.2	67.75	39.7	97.1	104.9	77.9	27.00	3.884	
5,600.0	5,600.0	5,602.8	5,602.5	7.9	19.6	66.93	40.8	95.9	104.2	76.7	27.47	3.793	
5,700.0	5,700.0	5,702.7	5,702.4	8.0	19.9	66.20	41.9	94.9	103.7	75.8	27.94	3.713	
5,800.0	5,800.0	5,802.3	5,802.1	8.1	20.3	65.50	42.9	94.2	103.5	75.1	28.41	3.643	
5,900.0	5,900.0	5,902.3	5,902.1	8.3	20.6	64.93	43.8	93.7	103.4	74.6	28.87	3.582	
5,935.7	5,935.7	5,937.9	5,937.7	8.3	20.7	64.78	44.1	93.6	103.4	74.4	29.04	3.561	
6,000.0	6,000.0	6,002.2	6,001.9	8.4	21.0	64.47	44.6	93.4	103.5	74.1	29.34	3.526	
6,100.0	6,100.0	6,102.5	6,102.2	8.5	21.3	64.02	45.3	92.9	103.4	73.6	29.81	3.468	
6,200.0	6,200.0	6,202.6	6,202.3	8.6	21.7	63.63	45.8	92.4	103.1	72.9	30.28	3.406	
6,300.0	6,300.0	6,302.6	6,302.3	8.8	22.0	63.35	46.1	91.9	102.8	72.1	30.75	3.344	
6,400.0	6,400.0	6,402.5	6,402.2	8.9	22.3	63.08	46.5	91.5	102.6	71.4	31.22	3.287	
6,500.0	6,500.0	6,502.6	6,502.4	9.0	22.7	62.83	46.7	91.1	102.4	70.7	31.70	3.229	
6,600.0	6,600.0	6,602.8	6,602.5	9.1	23.0	62.66	46.8	90.6	101.9	69.8	32.17	3.169	
6,700.0	6,700.0	6,702.6	6,702.3	9.3	23.4	62.43	47.0	90.0	101.6	68.9	32.64	3.112	
6,800.0	6,800.0	6,802.7	6,802.4	9.4	23.7	62.19	47.2	89.5	101.2	68.1	33.11	3.057	
6,900.0	6,900.0	6,902.3	6,902.0	9.5	24.1	61.93	47.5	89.1	101.0	67.4	33.58	3.008	
7,000.0	7,000.0	7,002.3	7,002.0	9.6	24.4	61.59	48.1	88.9	101.0	67.0	34.05	2.966	
7,100.0	7,100.0	7,102.6	7,102.3	9.8	24.8	61.36	48.3	88.5	100.8	66.3	34.53	2.921	
7,200.0	7,200.0	7,202.8	7,202.5	9.9	25.1	61.17	48.5	88.0	100.5	65.5	35.00	2.870	
7,300.0	7,300.0	7,303.4	7,303.1	10.0	25.5	61.07	48.2	87.2	99.7	64.2	35.48	2.810	
7,400.0	7,400.0	7,403.2	7,402.9	10.1	25.8	61.14	47.6	86.5	98.7	62.8	35.95	2.746	
7,500.0	7,500.0	7,503.2	7,502.9	10.3	26.2	61.22	47.1	85.7	97.8	61.4	36.42	2.685	
7,600.0	7,600.0	7,602.9	7,602.6	10.4	26.5	61.44	46.4	85.2	97.0	60.1	36.89	2.629	
7,700.0	7,700.0	7,703.1	7,702.8	10.5	26.9	62.03	45.2	85.0	96.3	58.9	37.36	2.576	
7,800.0	7,800.0	7,803.2	7,802.9	10.6	27.2	62.89	43.5	84.9	95.4	57.6	37.84	2.522	
7,900.0	7,900.0	7,903.6	7,903.2	10.8	27.6	63.94	41.4	84.7	94.3	56.0	38.31	2.462	
8,000.0	8,000.0	8,003.7	8,003.3	10.9	27.9	65.03	39.3	84.3	93.0	54.2	38.78	2.398	
8,100.0	8,100.0	8,103.6	8,103.2	11.0	28.2	66.04	37.2	83.8	91.7	52.4	39.26	2.335	
8,200.0	8,200.0	8,203.9	8,203.5	11.1	28.6	67.01	35.2	83.0	90.2	50.5	39.73	2.270	
8,300.0	8,300.0	8,304.0	8,303.5	11.3	28.9	67.85	33.4	82.0	88.5	48.3	40.21	2.201	
8,400.0	8,400.0	8,403.9	8,403.4	11.4	29.3	68.71	31.5	80.9	86.8	46.2	40.68	2.134	
8,500.0	8,500.0	8,503.8	8,503.3	11.5	29.6	69.51	29.8	79.9	85.3	44.1	41.16	2.072	
8,600.0	8,600.0	8,604.5	8,604.0	11.6	30.0	69.52	29.1	78.0	83.3	41.7	41.63	2.001	
8,700.0	8,700.0	8,704.3	8,703.8	11.8	30.3	69.05	28.9	75.6	81.0	38.9	42.11	1.923	Advise and Monitor
8,714.5	8,714.5	8,718.7	8,718.2	11.8	30.4	68.99	28.9	75.3	80.7	38.5	42.18	1.913	Advise and Monitor
8,725.0	8,725.0	8,729.2	8,728.6	11.8	30.4	-93.86	28.9	75.1	80.5	38.3	42.22	1.906	Advise and Monitor
8,750.0	8,750.0	8,754.0	8,753.5	11.8	30.5	-94.87	28.9	74.6	80.1	37.8	42.31	1.892	Advise and Monitor
8,775.0	8,774.8	8,778.8	8,778.2	11.8	30.6	-96.79	28.9	74.1	79.9	37.5	42.40	1.884	Advise and Monitor
8,779.4	8,779.2	8,783.1	8,782.5	11.8	30.6	-97.22	28.9	74.0	79.9	37.4	42.41	1.883	Advise and Monitor, CC, ES
8,800.0	8,799.5	8,803.3	8,802.8	11.8	30.7	-99.57	28.9	73.6	80.0	37.5	42.49	1.883	Advise and Monitor, SF
8,825.0	8,824.0	8,827.6	8,827.1	11.8	30.8	-103.08	28.8	73.2	80.7	38.1	42.58	1.894	Advise and Monitor
8,850.0	8,848.2	8,851.7	8,851.1	11.8	30.8	-107.16	28.8	72.9	82.1	39.4	42.67	1.923	Advise and Monitor
8,875.0	8,872.0	8,875.4	8,874.8	11.8	30.9	-111.65	28.7	72.7	84.5	41.7	42.77	1.975	Advise and Monitor
8,900.0	8,895.4	8,898.7	8,898.1	11.9	31.0	-116.32	28.5	72.6	8.0	45.2	42.86	2.054	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
8,925.0	8,918.2	8,921.5	8,921.0	11.9	31.1	-120.97	28.4	72.5	93.0	50.0	42.96	2.165	
8,950.0	8,940.6	8,943.8	8,943.2	11.9	31.2	-125.44	28.2	72.4	99.5	56.4	43.05	2.310	
8,975.0	8,962.3	8,965.5	8,965.0	11.9	31.2	-129.58	28.0	72.4	107.5	64.4	43.14	2.492	
9,000.0	8,983.3	8,986.6	8,986.0	11.9	31.3	-133.31	27.9	72.5	117.2	73.9	43.24	2.710	
9,025.0	9,003.6	9,007.0	9,006.4	11.9	31.4	-136.59	27.7	72.6	128.4	85.0	43.33	2.962	
9,050.0	9,023.1	9,026.7	9,026.1	12.0	31.5	-139.42	27.5	72.7	141.0	97.6	43.43	3.247	
9,075.0	9,041.7	9,045.6	9,045.0	12.0	31.5	-141.81	27.3	72.8	155.0	111.5	43.52	3.562	
9,100.0	9,059.5	9,063.7	9,063.1	12.0	31.6	-143.77	27.1	72.9	170.3	126.7	43.61	3.906	
9,125.0	9,076.3	9,080.8	9,080.2	12.1	31.6	-145.33	27.0	73.0	186.8	143.1	43.70	4.275	
9,150.0	9,092.1	9,097.0	9,096.4	12.1	31.7	-146.51	26.8	73.1	204.4	160.6	43.79	4.668	
9,175.0	9,106.9	9,112.3	9,111.7	12.1	31.7	-147.34	26.6	73.2	223.0	179.1	43.87	5.083	
9,200.0	9,120.6	9,126.5	9,125.9	12.2	31.8	-147.80	26.4	73.3	242.5	198.6	43.96	5.517	
9,225.0	9,133.2	9,139.6	9,139.0	12.2	31.8	-147.89	26.2	73.4	262.9	218.8	44.04	5.969	
9,250.0	9,144.6	9,151.6	9,151.0	12.2	31.9	-147.58	26.0	73.5	284.0	239.9	44.12	6.436	
9,275.0	9,154.9	9,162.4	9,161.9	12.3	31.9	-146.78	25.8	73.5	305.8	261.6	44.20	6.918	
9,300.0	9,163.9	9,172.1	9,171.5	12.3	32.0	-145.42	25.7	73.5	328.2	284.0	44.28	7.412	
9,325.0	9,171.8	9,180.4	9,179.9	12.4	32.0	-143.33	25.5	73.6	351.2	306.9	44.36	7.917	
9,350.0	9,178.3	9,187.6	9,187.0	12.4	32.0	-140.25	25.4	73.6	374.7	330.2	44.44	8.430	
9,375.0	9,183.6	9,193.4	9,192.8	12.5	32.0	-135.79	25.3	73.6	398.5	354.0	44.53	8.949	
9,400.0	9,187.6	9,198.0	9,197.4	12.6	32.0	-129.30	25.2	73.6	422.6	378.0	44.62	9.473	
9,425.0	9,190.4	9,201.2	9,200.6	12.7	32.1	-119.86	25.2	73.6	447.0	402.3	44.71	9.997	
9,450.0	9,191.8	9,203.1	9,202.5	12.8	32.1	-106.39	25.1	73.6	471.6	426.8	44.83	10.520	
9,464.6	9,192.0	9,203.6	9,203.0	12.8	32.1	-96.58	25.1	73.6	485.9	441.0	44.90	10.822	
9,500.0	9,192.0	9,204.2	9,203.6	13.1	32.1	-98.36	25.1	73.6	521.0	475.9	45.12	11.547	
9,600.0	9,192.0	9,206.0	9,205.4	14.0	32.1	-114.03	25.1	73.6	620.6	574.6	46.05	13.477	
9,700.0	9,192.0	9,207.9	9,207.3	15.2	32.1	122.24	25.0	73.6	720.6	673.3	47.30	15.235	
9,800.0	9,192.0	9,209.8	9,209.2	16.6	32.1	101.52	25.0	73.6	820.4	771.7	48.65	16.861	
9,886.6	9,192.0	9,211.5	9,210.9	17.8	32.1	97.61	25.0	73.6	906.4	856.5	49.85	18.184	
9,900.0	9,192.0	9,211.8	9,211.2	17.9	32.1	97.73	25.0	73.6	919.6	869.6	50.03	18.381	
10,000.0	9,192.0	9,213.8	9,213.2	19.3	32.1	98.60	24.9	73.6	1,018.8	967.3	51.44	19.806	
10,100.0	9,192.0	9,215.7	9,215.1	20.8	32.1	99.48	24.9	73.6	1,118.0	1,065.1	52.90	21.136	
10,200.0	9,192.0	9,217.7	9,217.1	22.3	32.1	100.35	24.9	73.6	1,217.4	1,163.0	54.40	22.381	
10,300.0	9,192.0	9,219.8	9,219.2	23.8	32.1	101.23	24.8	73.6	1,316.9	1,261.0	55.92	23.549	
10,400.0	9,192.0	11,784.9	10,545.4	25.3	42.1	166.55	-1,436.8	-112.4	1,390.4	1,323.0	67.42	20.624	
10,500.0	9,192.0	11,874.5	10,543.2	26.9	42.9	166.69	-1,526.2	-107.7	1,387.0	1,317.2	69.81	19.868	
10,600.0	9,192.0	11,951.2	10,542.4	28.5	43.7	166.82	-1,602.8	-103.7	1,384.9	1,312.8	72.13	19.202	
10,700.0	9,192.0	12,050.9	10,542.6	30.1	44.7	166.98	-1,702.4	-99.1	1,384.3	1,309.6	74.71	18.528	
10,800.0	9,192.0	12,141.9	10,542.4	31.6	45.6	167.13	-1,793.3	-94.7	1,383.2	1,305.9	77.26	17.903	
10,900.0	9,192.0	12,250.1	10,542.9	33.2	46.8	167.28	-1,901.4	-90.3	1,383.0	1,302.9	80.03	17.281	
11,000.0	9,192.0	12,344.4	10,542.5	34.8	47.8	167.40	-1,995.6	-86.6	1,381.9	1,299.2	82.69	16.711	
11,100.0	9,192.0	12,463.0	10,541.7	36.5	49.2	167.48	-2,114.2	-83.4	1,380.8	1,295.1	85.67	16.118	
11,200.0	9,192.0	12,549.8	10,540.6	38.1	50.2	167.53	-2,200.9	-81.5	1,379.2	1,290.9	88.31	15.618	
11,260.2	9,192.0	12,596.0	10,540.6	39.1	50.8	167.56	-2,247.1	-80.2	1,378.9	1,289.1	89.84	15.348	
11,300.0	9,192.0	12,626.0	10,540.8	39.7	51.2	167.59	-2,277.1	-79.5	1,379.1	1,288.2	90.85	15.179	
11,400.0	9,192.0	12,745.0	10,541.3	41.3	52.6	167.69	-2,396.1	-76.1	1,379.0	1,285.1	93.94	14.680	
11,500.0	9,192.0	12,839.0	10,541.3	43.0	53.8	167.78	-2,490.0	-73.1	1,378.5	1,281.8	96.75	14.248	
11,600.0	9,192.0	12,957.3	10,541.0	44.6	55.3	167.92	-2,608.3	-68.9	1,377.7	1,277.8	99.90	13.791	
11,700.0	9,192.0	13,046.1	10,541.1	46.2	56.5	168.06	-2,696.9	-64.7	1,376.9	1,274.2	102.69	13.408	
11,800.0	9,192.0	13,161.8	10,539.8	47.8	58.0	168.26	-2,812.5	-58.9	1,374.8	1,269.0	105.86	12.987	
11,900.0	9,192.0	13,272.6	10,539.1	49.5	59.5	168.45	-2,923.1	-53.2	1,373.4	1,264.4	108.99	12.602	
12,000.0	9,192.0	13,363.2	10,537.2	51.1	60.7	168.61	-3,013.5	-48.3	1,370.4	1,258.6	111.86	12.252	
12,094.6	9,192.0	13,431.0	10,537.1	52.7	61.7	168.71	-3,081.3	-45.3	1,369.6	1,255.3	114.34	11.978	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,100.0	9,192.0	13,435.3	10,537.1	52.8	61.7	168.72	-3,085.6	-45.1	1,369.6	1,255.1	114.49	11.963	
12,200.0	9,192.0	13,526.7	10,538.4	54.4	63.0	168.85	-3,177.0	-41.5	1,370.3	1,252.9	117.40	11.672	
12,290.9	9,192.0	13,627.4	10,539.1	55.9	64.4	169.00	-3,277.5	-37.1	1,370.3	1,250.0	120.31	11.390	
12,300.0	9,192.0	13,635.0	10,539.2	56.1	64.5	169.02	-3,285.1	-36.7	1,370.3	1,249.7	120.56	11.366	
12,400.0	9,192.0	13,742.2	10,540.7	57.7	66.0	169.26	-3,392.1	-30.2	1,370.7	1,246.9	123.73	11.078	
12,481.7	9,192.0	13,818.0	10,540.9	59.0	67.1	169.44	-3,467.7	-25.5	1,370.1	1,244.0	126.16	10.860	
12,500.0	9,192.0	13,830.7	10,541.0	59.3	67.3	169.46	-3,480.4	-24.8	1,370.2	1,243.5	126.64	10.819	
12,600.0	9,192.0	13,938.6	10,543.0	61.0	68.8	169.67	-3,588.1	-19.2	1,371.2	1,241.3	129.84	10.560	
12,667.4	9,192.0	14,002.5	10,543.2	62.1	69.8	169.79	-3,652.0	-16.1	1,370.9	1,239.0	131.88	10.395	
12,700.0	9,192.0	14,025.4	10,543.4	62.6	70.1	169.83	-3,674.9	-15.0	1,371.0	1,238.3	132.75	10.328	
12,800.0	9,192.0	14,122.2	10,545.5	64.3	71.5	169.99	-3,771.6	-10.6	1,372.5	1,236.7	135.81	10.106	
12,900.0	9,192.0	14,239.0	10,546.9	65.9	73.2	170.21	-3,888.2	-4.7	1,372.9	1,233.7	139.18	9.864	
13,000.0	9,192.0	14,358.7	10,546.9	67.6	75.0	170.44	-4,007.7	1.7	1,372.1	1,229.5	142.61	9.621	
13,100.0	9,192.0	14,482.1	10,544.8	69.2	76.9	170.67	-4,130.9	8.6	1,369.7	1,223.6	146.10	9.375	
13,200.0	9,192.0	14,574.3	10,542.3	70.9	78.2	170.84	-4,222.9	13.7	1,366.3	1,217.1	149.14	9.161	
13,300.0	9,192.0	14,659.4	10,541.5	72.5	79.5	170.98	-4,307.9	18.0	1,364.5	1,212.4	152.08	8.972	
13,400.0	9,192.0	14,756.1	10,540.2	74.2	81.0	171.13	-4,404.5	22.3	1,362.6	1,207.4	155.19	8.780	
13,477.1	9,192.0	14,815.0	10,540.1	75.5	81.9	171.21	-4,463.4	24.7	1,362.1	1,204.8	157.36	8.656	
13,500.0	9,192.0	14,835.1	10,540.3	75.9	82.2	171.23	-4,483.5	25.4	1,362.2	1,204.1	158.04	8.619	
13,600.0	9,192.0	14,936.2	10,540.9	77.5	83.7	171.35	-4,584.5	28.8	1,362.4	1,201.1	161.24	8.449	
13,700.0	9,192.0	15,039.4	10,541.4	79.2	85.3	171.48	-4,687.6	32.7	1,362.4	1,197.9	164.47	8.284	
13,800.0	9,192.0	15,140.7	10,541.6	80.8	86.9	171.63	-4,788.8	37.0	1,362.2	1,194.5	167.68	8.124	
13,859.6	9,192.0	15,197.7	10,541.9	81.8	87.7	171.72	-4,845.8	39.5	1,362.1	1,192.6	169.54	8.034	
13,900.0	9,192.0	15,237.6	10,542.1	82.5	88.4	171.78	-4,885.6	41.2	1,362.1	1,191.3	170.83	7.974	
14,000.0	9,192.0	15,337.6	10,542.6	84.1	89.9	171.92	-4,985.5	45.1	1,362.2	1,188.1	174.03	7.827	
14,100.0	9,192.0	15,436.5	10,543.2	85.8	91.4	172.07	-5,084.4	49.4	1,362.2	1,185.0	177.22	7.687	
14,200.0	9,192.0	15,540.6	10,543.8	87.4	93.1	172.23	-5,188.4	54.0	1,362.3	1,181.8	180.50	7.547	
14,255.1	9,192.0	15,593.4	10,543.9	88.4	93.9	172.31	-5,241.1	56.3	1,362.2	1,179.9	182.23	7.475	
14,300.0	9,192.0	15,632.0	10,544.2	89.1	94.5	172.37	-5,279.7	58.1	1,362.3	1,178.7	183.58	7.421	
14,400.0	9,192.0	15,745.1	10,545.2	90.8	96.2	172.57	-5,392.6	63.5	1,362.6	1,175.6	187.01	7.286	
14,495.1	9,192.0	15,833.6	10,545.2	92.3	97.6	172.70	-5,481.1	67.2	1,362.3	1,172.3	189.97	7.171	
14,500.0	9,192.0	15,838.0	10,545.3	92.4	97.7	172.71	-5,485.5	67.4	1,362.3	1,172.2	190.12	7.165	
14,600.0	9,192.0	15,956.9	10,544.9	94.1	99.6	172.86	-5,604.2	71.9	1,361.6	1,168.0	193.65	7.031	
14,700.0	9,192.0	16,056.9	10,544.1	95.7	101.1	172.93	-5,704.2	74.5	1,360.5	1,163.6	196.88	6.911	
14,800.0	9,192.0	16,213.8	10,538.9	97.4	103.6	173.01	-5,860.9	78.2	1,357.1	1,156.1	201.00	6.752	
14,900.0	9,192.0	16,295.7	10,534.8	99.1	104.9	173.03	-5,942.8	79.8	1,352.0	1,148.1	203.95	6.629	
15,000.0	9,192.0	16,381.1	10,531.9	100.7	106.2	173.07	-6,028.1	81.6	1,348.4	1,141.5	206.95	6.516	
15,100.0	9,192.0	16,460.8	10,530.1	102.4	107.5	173.14	-6,107.7	84.1	1,345.9	1,136.0	209.87	6.413	
15,200.0	9,192.0	16,539.1	10,529.9	104.0	108.7	173.27	-6,185.9	87.7	1,345.2	1,132.4	212.78	6.322	
15,201.2	9,192.0	16,540.1	10,529.9	104.0	108.8	173.27	-6,187.0	87.8	1,345.2	1,132.4	212.81	6.321	
15,300.0	9,192.0	16,630.9	10,530.8	105.7	110.2	173.45	-6,277.6	92.7	1,345.6	1,129.7	215.91	6.232	
15,400.0	9,192.0	16,739.3	10,531.9	107.3	112.0	173.69	-6,385.8	99.0	1,346.1	1,126.8	219.30	6.138	
15,500.0	9,192.0	16,869.0	10,531.5	109.0	114.0	174.00	-6,515.2	107.4	1,345.1	1,122.1	223.05	6.031	
15,600.0	9,192.0	16,965.4	10,529.9	110.7	115.6	174.24	-6,611.4	113.8	1,342.9	1,116.6	226.26	5.935	
15,700.0	9,192.0	17,042.7	10,529.4	112.3	116.8	174.44	-6,688.6	119.2	1,341.7	1,112.6	229.17	5.855	
15,711.7	9,192.0	17,051.5	10,529.5	112.5	117.0	174.47	-6,697.3	119.8	1,341.7	1,112.2	229.50	5.846	
15,800.0	9,192.0	17,135.4	10,530.4	114.0	118.3	174.71	-6,780.9	126.1	1,342.1	1,109.8	232.33	5.777	
15,900.0	9,192.0	17,251.4	10,530.9	115.7	120.2	175.07	-6,896.5	135.2	1,342.0	1,106.1	235.87	5.689	
16,000.0	9,192.0	17,356.0	10,530.4	117.3	121.9	175.37	-7,000.9	143.3	1,340.9	1,101.6	239.23	5.605	
16,060.9	9,192.0	17,401.6	10,530.4	118.3	122.7	175.50	-7,046.3	146.5	1,340.5	1,099.5	240.98	5.563	
16,100.0	9,192.0	17,430.2	10,530.6	119.0	123.1	175.57	-7,074.9	148.5	1,340.7	1,098.6	242.09	5.538	
16,200.0	9,192.0	17,525.1	10,532.2	120.6	124.7	175.81	-7,169.5	154.5	1,341.9	1,096.6	245.29	5.470	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
16,300.0	9,192.0	17,627.9	10,533.7	122.3	126.3	176.08	-7,272.2	161.5	1,342.9	1,094.3	248.63	5.401	
16,400.0	9,192.0	17,724.4	10,535.1	124.0	127.9	176.31	-7,368.4	167.7	1,344.0	1,092.2	251.86	5.336	
16,500.0	9,192.0	17,813.4	10,536.8	125.6	129.3	176.48	-7,457.3	172.1	1,345.7	1,090.7	254.96	5.278	
16,600.0	9,192.0	17,935.4	10,538.9	127.3	131.3	176.70	-7,579.1	178.1	1,347.2	1,088.6	258.61	5.209	
16,700.0	9,192.0	18,061.7	10,538.2	128.9	133.4	176.91	-7,705.3	183.9	1,346.3	1,084.0	262.32	5.132	
16,800.0	9,192.0	18,155.7	10,537.0	130.6	134.9	177.02	-7,799.3	187.4	1,344.8	1,079.3	265.51	5.065	
16,900.0	9,192.0	18,242.4	10,536.6	132.3	136.3	177.06	-7,885.9	188.8	1,344.3	1,075.8	268.57	5.006	
16,907.7	9,192.0	18,249.4	10,536.6	132.4	136.4	177.06	-7,892.9	188.9	1,344.3	1,075.5	268.81	5.001	
17,000.0	9,192.0	18,340.4	10,536.7	133.9	137.9	177.03	-7,983.9	188.9	1,344.5	1,072.7	271.80	4.947	
17,074.4	9,192.0	18,416.0	10,536.6	135.2	139.1	176.97	-8,059.5	188.1	1,344.5	1,070.2	274.25	4.902	
17,100.0	9,192.0	18,438.8	10,536.6	135.6	139.5	176.95	-8,082.3	187.8	1,344.5	1,069.5	275.04	4.888	
17,200.0	9,192.0	18,534.3	10,537.0	137.2	141.0	176.87	-8,177.8	186.6	1,345.0	1,066.8	278.23	4.834	
17,300.0	9,192.0	18,641.9	10,537.2	138.9	142.7	176.78	-8,285.4	185.2	1,345.3	1,063.7	281.62	4.777	
17,400.0	9,192.0	18,751.6	10,536.7	140.6	144.5	176.71	-8,395.1	184.5	1,344.9	1,059.9	285.05	4.718	
17,500.0	9,192.0	18,862.4	10,535.4	142.2	146.3	176.68	-8,505.9	184.6	1,343.8	1,055.3	288.50	4.658	
17,600.0	9,192.0	18,969.8	10,533.4	143.9	148.0	176.65	-8,613.2	184.7	1,342.0	1,050.1	291.89	4.598	
17,700.0	9,192.0	19,070.3	10,531.2	145.6	149.6	176.63	-8,713.7	185.2	1,339.8	1,044.6	295.18	4.539	
17,800.0	9,192.0	19,162.9	10,529.4	147.2	151.1	176.62	-8,806.3	185.6	1,337.9	1,039.6	298.34	4.485	
17,900.0	9,192.0	19,256.1	10,528.2	148.9	152.6	176.61	-8,899.5	186.1	1,336.7	1,035.2	301.51	4.433	
18,000.0	9,192.0	19,357.7	10,527.1	150.5	154.3	176.61	-9,001.1	187.1	1,335.5	1,030.7	304.82	4.381	
18,100.0	9,192.0	19,455.6	10,526.0	152.2	155.9	176.64	-9,099.0	188.4	1,334.4	1,026.3	308.07	4.331	
18,200.0	9,192.0	19,558.5	10,525.0	153.9	157.5	176.68	-9,201.9	190.3	1,333.4	1,021.9	311.41	4.282	
18,300.0	9,192.0	19,681.1	10,522.8	155.5	159.5	176.78	-9,324.3	193.6	1,331.4	1,016.4	315.07	4.226	
18,400.0	9,192.0	19,761.5	10,520.7	157.2	160.9	176.84	-9,404.7	195.7	1,328.9	1,010.8	318.05	4.178	
18,500.0	9,192.0	19,843.7	10,520.4	158.9	162.2	176.89	-9,487.0	197.3	1,328.4	1,007.3	321.06	4.137	
18,600.0	9,192.0	19,947.7	10,520.2	160.5	163.9	176.93	-9,590.9	199.3	1,328.1	1,003.7	324.42	4.094	
18,700.0	9,192.0	20,051.7	10,519.6	162.2	165.6	177.01	-9,694.9	201.7	1,327.5	999.7	327.78	4.050	
18,800.0	9,192.0	20,158.3	10,518.7	163.8	167.3	177.10	-9,801.4	204.7	1,326.5	995.4	331.19	4.005	
18,900.0	9,192.0	20,264.4	10,517.3	165.5	169.1	177.22	-9,907.5	208.3	1,325.1	990.5	334.59	3.960	
19,000.0	9,192.0	20,361.0	10,515.6	167.2	170.7	177.36	-10,003.9	212.3	1,323.1	985.3	337.84	3.916	
19,018.9	9,192.0	20,361.0	10,515.6	167.5	170.7	177.36	-10,003.9	212.3	1,323.0	984.8	338.16	3.912	
19,100.0	9,192.0	20,361.0	10,515.6	168.8	170.7	177.36	-10,003.9	212.3	1,325.5	986.0	339.51	3.904	
19,200.0	9,192.0	20,361.0	10,515.6	170.5	170.7	177.36	-10,003.9	212.3	1,335.3	994.1	341.17	3.914	
19,300.0	9,192.0	20,361.0	10,515.6	172.2	170.7	177.36	-10,003.9	212.3	1,352.5	1,009.7	342.83	3.945	
19,310.8	9,192.0	20,361.0	10,515.6	172.3	170.7	177.36	-10,003.9	212.3	1,354.8	1,011.8	343.01	3.950	

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	3.0	3.0	83.69	22.1	199.9	201.1				
100.0	100.0	101.2	101.2	3.0	3.0	83.61	22.4	199.6	200.8	194.8	6.00	33.445	
200.0	200.0	201.9	201.9	3.0	3.0	83.35	23.2	198.6	200.0	193.9	6.02	33.192	
271.5	271.5	271.5	271.5	3.0	3.1	83.16	23.8	198.2	199.6	193.6	6.07	32.898	CC, ES
300.0	300.0	299.3	299.2	3.0	3.1	83.09	24.0	198.2	199.7	193.6	6.09	32.781	
400.0	400.0	398.4	398.4	3.0	3.2	82.86	24.9	198.8	200.4	194.2	6.20	32.317	
500.0	500.0	498.9	498.9	3.1	3.3	82.53	26.1	199.4	201.1	194.7	6.35	31.654	
600.0	600.0	597.9	597.8	3.1	3.5	82.15	27.6	200.0	201.9	195.4	6.54	30.867	
700.0	700.0	697.2	697.2	3.1	3.6	81.60	29.7	201.0	203.2	196.5	6.76	30.056	
800.0	800.0	798.1	798.0	3.2	3.9	81.04	31.8	201.8	204.3	197.3	7.01	29.138	
900.0	900.0	897.9	897.8	3.2	4.1	80.64	33.4	202.9	205.7	198.4	7.28	28.236	
1,000.0	1,000.0	1,000.5	1,000.4	3.2	4.3	80.51	33.9	203.0	205.9	198.3	7.58	27.152	
1,071.2	1,071.2	1,071.3	1,071.2	3.3	4.5	80.50	34.0	203.0	205.8	198.0	7.80	26.387	
1,100.0	1,100.0	1,100.1	1,100.0	3.3	4.6	80.50	34.0	203.0	205.8	197.9	7.89	26.084	
1,200.0	1,200.0	1,200.1	1,200.0	3.4	4.9	80.46	34.1	203.0	205.8	197.6	8.22	25.052	
1,300.0	1,300.0	1,300.3	1,300.2	3.4	5.1	80.39	34.4	202.9	205.8	197.2	8.56	24.048	
1,372.8	1,372.8	1,372.9	1,372.8	3.5	5.3	80.33	34.5	202.8	205.7	196.9	8.81	23.344	
1,400.0	1,400.0	1,399.8	1,399.7	3.5	5.4	80.32	34.6	202.8	205.7	196.8	8.91	23.095	
1,500.0	1,500.0	1,500.8	1,500.7	3.5	5.7	80.29	34.7	202.8	205.8	196.5	9.27	22.195	
1,600.0	1,600.0	1,600.7	1,600.6	3.6	6.0	80.27	34.7	202.3	205.3	195.6	9.64	21.289	
1,656.0	1,656.0	1,656.1	1,656.0	3.7	6.2	80.29	34.6	202.3	205.2	195.4	9.85	20.828	
1,700.0	1,700.0	1,699.6	1,699.5	3.7	6.3	80.32	34.5	202.3	205.3	195.2	10.02	20.487	
1,800.0	1,800.0	1,799.6	1,799.5	3.8	6.6	80.15	35.1	202.5	205.6	195.2	10.41	19.753	
1,900.0	1,900.0	1,899.6	1,899.4	3.9	6.9	80.00	35.7	202.7	205.8	195.0	10.80	19.056	
2,000.0	2,000.0	1,999.5	1,999.4	3.9	7.3	79.88	36.2	202.9	206.1	194.9	11.20	18.399	
2,100.0	2,100.0	2,099.5	2,099.4	4.0	7.6	79.81	36.5	203.2	206.4	194.8	11.61	17.781	
2,200.0	2,200.0	2,199.3	2,199.2	4.1	7.9	79.77	36.7	203.5	206.8	194.7	12.02	17.201	
2,300.0	2,300.0	2,298.9	2,298.8	4.2	8.2	79.75	36.9	203.9	207.2	194.8	12.43	16.667	
2,400.0	2,400.0	2,398.5	2,398.4	4.3	8.6	79.77	36.9	204.6	207.9	195.1	12.85	16.177	
2,500.0	2,500.0	2,498.4	2,498.3	4.4	8.9	79.84	36.8	205.5	208.8	195.5	13.28	15.724	
2,600.0	2,600.0	2,598.6	2,598.5	4.5	9.2	80.09	36.1	206.4	209.5	195.8	13.70	15.289	
2,700.0	2,700.0	2,698.8	2,698.6	4.6	9.5	80.53	34.6	207.3	210.2	196.1	14.14	14.871	
2,800.0	2,800.0	2,798.8	2,798.6	4.7	9.9	81.08	32.7	208.3	210.8	196.3	14.57	14.473	
2,900.0	2,900.0	2,898.8	2,898.6	4.8	10.2	81.51	31.2	209.2	211.5	196.5	15.00	14.097	
3,000.0	3,000.0	2,998.7	2,998.5	4.9	10.5	81.80	30.3	210.0	212.2	196.8	15.44	13.741	
3,100.0	3,100.0	3,094.7	3,094.4	5.0	10.9	81.93	30.0	211.6	213.8	197.9	15.87	13.469	
3,200.0	3,200.0	3,197.2	3,197.0	5.1	11.2	81.86	30.6	213.7	215.9	199.6	16.32	13.228	
3,300.0	3,300.0	3,299.2	3,298.9	5.2	11.6	81.76	31.1	214.6	216.8	200.1	16.77	12.927	
3,400.0	3,400.0	3,399.8	3,399.6	5.3	11.9	81.78	31.0	214.9	217.2	200.0	17.22	12.611	
3,500.0	3,500.0	3,499.6	3,499.4	5.4	12.2	81.88	30.7	215.2	217.4	199.7	17.67	12.306	
3,600.0	3,600.0	3,599.3	3,599.1	5.5	12.6	82.01	30.3	215.7	217.8	199.7	18.12	12.021	
3,700.0	3,700.0	3,698.7	3,698.5	5.7	12.9	82.11	30.0	216.3	218.3	199.8	18.56	11.761	
3,800.0	3,800.0	3,798.1	3,797.9	5.8	13.2	82.13	30.0	217.1	219.2	200.1	19.01	11.526	
3,900.0	3,900.0	3,897.9	3,897.6	5.9	13.6	82.08	30.4	218.1	220.3	200.8	19.47	11.314	
4,000.0	4,000.0	3,998.9	3,998.6	6.0	13.9	82.04	30.6	219.0	221.1	201.2	19.93	11.096	
4,100.0	4,100.0	4,099.9	4,099.6	6.1	14.3	82.08	30.5	219.4	221.5	201.1	20.38	10.866	
4,200.0	4,200.0	4,200.2	4,199.9	6.2	14.6	82.15	30.3	219.5	221.6	200.7	20.84	10.631	
4,300.0	4,300.0	4,300.2	4,299.9	6.3	15.0	82.17	30.2	219.5	221.6	200.3	21.30	10.404	
4,400.0	4,400.0	4,400.2	4,399.9	6.5	15.3	82.13	30.3	219.6	221.6	199.9	21.76	10.187	
4,500.0	4,500.0	4,500.1	4,499.9	6.6	15.6	82.09	30.5	219.6	221.7	199.5	22.16	10.002	
4,600.0	4,600.0	4,599.4	4,599.2	6.7	15.7	82.16	30.3	219.8	221.8	199.5	22.39	9.907	
4,700.0	4,700.0	4,699.1	4,698.8	6.8	15.7	82.27	29.9	220.3	222.4	199.8	22.52	9.873	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
4,800.0	4,800.0	4,798.8	4,798.5	6.9	15.7	82.42	29.4	221.0	222.9	200.3	22.66	9.838	
4,900.0	4,900.0	4,898.0	4,897.7	7.0	15.8	82.60	28.8	221.9	223.8	201.0	22.81	9.812	
5,000.0	5,000.0	4,997.4	4,997.1	7.2	15.8	82.74	28.4	223.1	224.9	202.0	22.96	9.796	
5,100.0	5,100.0	5,097.4	5,097.1	7.3	15.8	82.92	27.9	224.5	226.2	203.1	23.12	9.783	
5,200.0	5,200.0	5,197.7	5,197.4	7.4	15.9	83.13	27.2	225.8	227.4	204.1	23.29	9.763	
5,300.0	5,300.0	5,297.7	5,297.3	7.5	15.9	83.33	26.6	227.0	228.6	205.1	23.47	9.738	
5,400.0	5,400.0	5,397.8	5,397.5	7.6	16.0	83.47	26.1	228.2	229.7	206.1	23.66	9.708	
5,500.0	5,500.0	5,498.1	5,497.8	7.8	16.1	83.63	25.6	229.3	230.8	206.9	23.86	9.672	
5,600.0	5,600.0	5,598.3	5,597.9	7.9	16.2	83.83	24.9	230.3	231.7	207.6	24.06	9.628	
5,700.0	5,700.0	5,698.4	5,698.1	8.0	16.3	84.04	24.1	231.3	232.6	208.3	24.28	9.579	
5,800.0	5,800.0	5,798.4	5,798.0	8.1	16.4	84.22	23.5	232.2	233.3	208.8	24.50	9.526	
5,900.0	5,900.0	5,897.9	5,897.5	8.3	16.5	84.40	22.9	233.2	234.3	209.6	24.72	9.478	
6,000.0	6,000.0	5,997.2	5,996.9	8.4	16.6	84.58	22.2	234.4	235.5	210.5	24.96	9.437	
6,100.0	6,100.0	6,096.9	6,096.5	8.5	16.7	84.72	21.8	235.9	237.0	211.8	25.20	9.404	
6,200.0	6,200.0	6,197.1	6,196.7	8.6	16.8	84.84	21.5	237.4	238.4	213.0	25.45	9.369	
6,300.0	6,300.0	6,297.2	6,296.8	8.8	16.9	84.94	21.2	238.8	239.7	214.0	25.70	9.328	
6,400.0	6,400.0	6,396.9	6,396.5	8.9	17.1	85.04	20.9	240.2	241.1	215.2	25.96	9.287	
6,500.0	6,500.0	6,496.2	6,495.7	9.0	17.2	85.18	20.4	241.8	242.7	216.5	26.23	9.253	
6,600.0	6,600.0	6,596.4	6,596.0	9.1	17.4	85.34	19.9	243.6	244.4	217.9	26.51	9.221	
6,700.0	6,700.0	6,696.1	6,695.6	9.3	17.5	85.49	19.3	245.3	246.1	219.3	26.79	9.188	
6,800.0	6,800.0	6,796.3	6,795.8	9.4	17.7	85.63	18.9	247.1	247.9	220.8	27.08	9.154	
6,900.0	6,900.0	6,896.2	6,895.7	9.5	17.9	85.68	18.8	248.8	249.6	222.2	27.37	9.119	
7,000.0	7,000.0	6,996.2	6,995.6	9.6	18.0	85.66	19.0	250.6	251.3	223.6	27.67	9.083	
7,100.0	7,100.0	7,096.4	7,095.8	9.8	18.2	85.63	19.3	252.3	253.0	225.1	27.97	9.046	
7,200.0	7,200.0	7,197.0	7,196.5	9.9	18.4	85.63	19.4	253.8	254.5	226.2	28.28	8.999	
7,300.0	7,300.0	7,297.4	7,296.8	10.0	18.6	85.67	19.3	255.1	255.9	227.3	28.60	8.948	
7,400.0	7,400.0	7,398.0	7,397.4	10.1	18.8	85.71	19.2	256.2	257.0	228.1	28.92	8.885	
7,500.0	7,500.0	7,498.2	7,497.6	10.3	19.0	85.80	18.9	257.2	257.9	228.7	29.25	8.819	
7,600.0	7,600.0	7,597.9	7,597.4	10.4	19.2	85.92	18.4	258.2	258.9	229.3	29.58	8.753	
7,700.0	7,700.0	7,697.6	7,697.1	10.5	19.4	86.03	18.0	259.3	260.0	230.1	29.91	8.691	
7,800.0	7,800.0	7,798.2	7,797.6	10.6	19.6	86.13	17.6	260.4	261.0	230.8	30.25	8.629	
7,900.0	7,900.0	7,907.9	7,906.8	10.8	19.9	87.96	9.3	260.2	260.4	229.8	30.61	8.507	
8,000.0	8,000.0	8,013.3	8,008.2	10.9	20.1	94.19	-18.8	256.6	257.4	226.5	30.97	8.312	
8,078.6	8,078.6	8,089.9	8,078.6	11.0	20.3	100.94	-48.6	251.3	255.9	224.7	31.25	8.190	
8,100.0	8,100.0	8,109.7	8,096.3	11.0	20.3	102.91	-57.2	249.6	256.1	224.8	31.32	8.175	
8,200.0	8,200.0	8,188.1	8,163.4	11.1	20.5	111.85	-97.0	241.9	263.2	231.5	31.65	8.315	
8,300.0	8,300.0	8,260.9	8,221.5	11.3	20.7	120.84	-140.1	234.7	284.4	252.4	31.99	8.893	
8,400.0	8,400.0	8,329.0	8,272.6	11.4	20.9	129.19	-184.3	226.0	318.3	285.9	32.34	9.842	
8,500.0	8,500.0	8,381.5	8,308.9	11.5	21.1	135.47	-221.3	217.7	364.5	331.9	32.66	11.163	
8,600.0	8,600.0	8,420.0	8,333.3	11.6	21.3	139.85	-250.4	211.2	422.4	389.5	32.94	12.825	
8,700.0	8,700.0	8,459.2	8,356.2	11.8	21.5	143.98	-281.5	204.6	489.2	456.0	33.23	14.720	
8,714.5	8,714.5	8,464.6	8,359.2	11.8	21.5	144.53	-285.9	203.7	499.4	466.2	33.28	15.009	
8,725.0	8,725.0	8,468.5	8,361.4	11.8	21.5	-17.41	-289.1	203.0	506.9	473.6	33.30	15.220	
8,750.0	8,750.0	8,483.0	8,369.3	11.8	21.6	-15.29	-300.9	200.5	524.2	490.8	33.37	15.709	
8,775.0	8,774.8	8,483.0	8,369.3	11.8	21.6	-14.60	-300.9	200.5	540.9	507.6	33.37	16.209	
8,800.0	8,799.5	8,498.0	8,377.2	11.8	21.6	-12.84	-313.4	197.9	557.1	523.6	33.45	16.653	
8,825.0	8,824.0	8,514.0	8,385.5	11.8	21.7	-11.24	-326.8	195.1	572.6	539.1	33.53	17.076	
8,850.0	8,848.2	8,514.0	8,385.5	11.8	21.7	-10.82	-326.8	195.1	587.5	554.0	33.54	17.515	
8,875.0	8,872.0	8,527.9	8,392.5	11.8	21.8	-9.61	-338.6	192.7	601.8	568.1	33.63	17.896	
8,900.0	8,895.4	8,537.6	8,397.2	11.9	21.8	-8.76	-346.9	191.1	615.4	581.7	33.69	18.268	
8,925.0	8,918.2	8,545.0	8,400.7	11.9	21.9	-8.10	-353.3	189.9	628.4	594.6	33.74	18.624	
8,950.0	8,940.6	8,556.6	8,406.1	11.9	21.9	-7.30	-363.4	188.0	640.7	606.9	33.82	18.944	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
8,975.0	8,962.3	8,566.2	8,410.3	11.9	22.0	-6.66	-371.8	186.5	652.3	618.4	33.89	19.248	
9,000.0	8,983.3	8,577.0	8,415.1	11.9	22.0	-6.02	-381.4	184.8	663.3	629.3	33.97	19.526	
9,025.0	9,003.6	8,577.0	8,415.1	11.9	22.0	-5.88	-381.4	184.8	673.6	639.7	33.99	19.817	
9,050.0	9,023.1	8,592.5	8,421.4	12.0	22.1	-5.12	-395.3	182.5	683.2	649.0	34.11	20.030	
9,075.0	9,041.7	8,608.0	8,427.3	12.0	22.2	-4.41	-409.5	180.1	692.2	658.0	34.22	20.227	
9,100.0	9,059.5	8,608.0	8,427.3	12.0	22.2	-4.33	-409.5	180.1	700.3	666.1	34.25	20.448	
9,125.0	9,076.3	8,608.0	8,427.3	12.1	22.2	-4.26	-409.5	180.1	708.1	673.8	34.28	20.655	
9,150.0	9,092.1	8,624.5	8,432.9	12.1	22.3	-3.58	-424.8	177.4	714.8	680.4	34.41	20.772	
9,175.0	9,106.9	8,639.0	8,437.3	12.1	22.4	-3.00	-438.4	175.0	721.1	686.6	34.53	20.882	
9,200.0	9,120.6	8,639.0	8,437.3	12.2	22.4	-2.96	-438.4	175.0	726.6	692.0	34.57	21.018	
9,225.0	9,133.2	8,650.8	8,440.6	12.2	22.5	-2.51	-449.5	173.0	731.3	696.7	34.68	21.089	
9,250.0	9,144.6	8,663.0	8,443.7	12.2	22.6	-2.05	-461.1	170.9	735.4	700.6	34.79	21.135	
9,275.0	9,154.9	8,672.1	8,445.9	12.3	22.6	-1.71	-469.8	169.3	738.6	703.7	34.90	21.166	
9,300.0	9,163.9	8,683.1	8,448.4	12.3	22.7	-1.32	-480.3	167.4	741.1	706.1	35.01	21.166	
9,325.0	9,171.8	8,694.0	8,450.8	12.4	22.8	-0.93	-490.8	165.5	742.7	707.6	35.13	21.141	
9,350.0	9,178.3	8,704.7	8,452.9	12.4	22.8	-0.55	-501.1	163.6	743.6	708.3	35.26	21.089	
9,375.0	9,183.6	8,715.3	8,454.8	12.5	22.9	-0.17	-511.4	161.7	743.7	708.3	35.39	21.011	
9,400.0	9,187.6	8,726.0	8,456.6	12.6	23.0	0.20	-521.8	159.7	743.0	707.4	35.54	20.905	
9,425.0	9,190.4	8,736.1	8,458.1	12.7	23.0	0.56	-531.6	158.0	741.5	705.8	35.70	20.771	
9,450.0	9,191.8	8,746.2	8,459.5	12.8	23.1	0.92	-541.4	156.2	739.2	703.3	35.87	20.606	
9,464.6	9,192.0	8,757.0	8,460.8	12.8	23.2	1.31	-552.0	154.4	737.6	701.6	36.02	20.476	
9,500.0	9,192.0	8,771.8	8,462.4	13.1	23.3	1.65	-566.5	152.0	733.6	697.3	36.35	20.184	
9,600.0	9,192.0	8,829.5	8,467.2	14.0	23.7	3.13	-623.3	143.3	726.5	688.8	37.70	19.273	
9,663.7	9,192.0	8,864.2	8,468.5	14.7	24.0	3.96	-657.7	138.4	725.3	686.5	38.72	18.729	
9,700.0	9,192.0	8,889.2	8,468.7	15.2	24.2	4.53	-682.5	135.0	725.6	686.2	39.40	18.416	
9,800.0	9,192.0	9,021.8	8,473.0	16.6	25.3	6.53	-814.4	123.1	724.1	682.2	41.89	17.286	
9,886.6	9,192.0	9,104.3	8,476.8	17.8	26.1	6.92	-896.8	120.2	720.8	677.0	43.84	16.441	
9,900.0	9,192.0	9,115.0	8,477.2	17.9	26.2	6.95	-907.4	119.9	720.4	676.3	44.13	16.324	
10,000.0	9,192.0	9,198.6	8,478.9	19.3	27.0	7.09	-991.1	118.9	718.6	672.3	46.36	15.502	
10,054.7	9,192.0	9,247.7	8,479.0	20.1	27.5	7.05	-1,040.1	119.8	718.4	670.8	47.65	15.077	
10,100.0	9,192.0	9,292.2	8,478.8	20.8	28.0	6.95	-1,084.6	121.4	718.5	669.7	48.78	14.728	
10,200.0	9,192.0	9,389.1	8,478.2	22.3	29.1	6.64	-1,181.3	126.0	718.6	667.3	51.33	13.999	
10,300.0	9,192.0	9,481.3	8,476.8	23.8	30.1	6.44	-1,273.5	128.9	719.9	665.9	53.91	13.353	
10,400.0	9,192.0	9,585.1	8,475.0	25.3	31.3	6.43	-1,377.3	129.7	721.6	664.9	56.69	12.729	
10,500.0	9,192.0	9,698.3	8,475.0	26.9	32.7	6.52	-1,490.5	129.4	721.7	662.0	59.64	12.100	
10,578.7	9,192.0	9,771.8	8,475.5	28.1	33.7	6.48	-1,564.0	130.5	721.1	659.3	61.81	11.666	
10,600.0	9,192.0	9,789.6	8,475.4	28.5	33.9	6.46	-1,581.8	130.8	721.2	658.8	62.38	11.561	
10,700.0	9,192.0	9,880.4	8,474.0	30.1	35.1	6.33	-1,672.6	133.0	722.5	657.4	65.15	11.090	
10,800.0	9,192.0	9,979.3	8,471.8	31.6	36.4	6.12	-1,771.3	136.1	724.5	656.4	68.06	10.645	
10,900.0	9,192.0	10,086.1	8,469.8	33.2	37.9	5.88	-1,878.1	139.8	726.1	654.9	71.11	10.210	
11,000.0	9,192.0	10,191.7	8,469.1	34.8	39.3	5.82	-1,983.7	141.2	726.6	652.4	74.18	9.795	
11,100.0	9,192.0	10,267.4	8,467.9	36.5	40.4	5.87	-2,059.3	141.0	728.4	651.5	76.86	9.477	
11,200.0	9,192.0	10,400.1	8,465.7	38.1	42.3	6.14	-2,191.9	138.2	730.5	650.2	80.36	9.091	
11,237.9	9,192.0	10,431.4	8,465.9	38.7	42.7	6.21	-2,223.2	137.6	730.4	648.9	81.42	8.970	
11,300.0	9,192.0	10,483.7	8,465.6	39.7	43.5	6.29	-2,275.5	136.9	730.8	647.6	83.18	8.786	
11,400.0	9,192.0	10,605.5	8,466.6	41.3	45.3	6.59	-2,397.3	134.1	730.3	643.7	86.57	8.436	
11,500.0	9,192.0	10,704.4	8,468.7	43.0	46.7	6.84	-2,496.1	131.9	728.6	638.9	89.65	8.126	
11,600.0	9,192.0	10,793.8	8,469.7	44.6	48.0	7.02	-2,585.5	130.3	727.7	635.1	92.61	7.858	
11,601.0	9,192.0	10,794.6	8,469.7	44.6	48.0	7.02	-2,586.4	130.3	727.7	635.1	92.64	7.856	
11,700.0	9,192.0	10,888.2	8,469.2	46.2	49.4	7.17	-2,679.9	129.0	728.5	632.9	95.65	7.617	
11,800.0	9,192.0	11,000.5	8,469.8	47.8	51.1	7.30	-2,792.3	128.2	728.2	629.2	98.97	7.358	
11,900.0	9,192.0	11,096.0	8,470.7	49.5	52.6	7.34	-2,887.7	128.5	727.3	625.2	102.05	7.127	

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

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
11,920.8	9,192.0	11,114.5	8,470.7	49.8	52.8	7.35	-2,906.3	128.5	727.3	624.6	102.68	7.083	
12,000.0	9,192.0	11,190.4	8,470.5	51.1	54.0	7.39	-2,982.1	128.6	727.6	622.4	105.13	6.921	
12,100.0	9,192.0	11,288.4	8,470.1	52.8	55.5	7.45	-3,080.1	128.4	728.1	619.8	108.27	6.725	
12,200.0	9,192.0	11,391.8	8,469.4	54.4	57.1	7.46	-3,183.5	129.0	728.8	617.3	111.50	6.536	
12,300.0	9,192.0	11,491.6	8,469.2	56.1	58.6	7.43	-3,283.3	130.1	728.9	614.2	114.69	6.356	
12,400.0	9,192.0	11,596.2	8,468.9	57.7	60.3	7.31	-3,387.9	132.3	729.0	611.0	117.96	6.180	
12,436.1	9,192.0	11,629.8	8,468.9	58.3	60.8	7.25	-3,421.5	133.3	728.9	609.8	119.08	6.121	
12,500.0	9,192.0	11,684.9	8,468.4	59.3	61.6	7.15	-3,476.6	135.0	729.3	608.3	120.99	6.028	
12,600.0	9,192.0	11,788.4	8,467.0	61.0	63.3	7.05	-3,580.0	136.9	730.5	606.2	124.26	5.879	
12,700.0	9,192.0	11,893.9	8,466.9	62.6	64.9	7.20	-3,685.5	135.7	730.9	603.3	127.55	5.730	
12,800.0	9,192.0	11,996.9	8,467.6	64.3	66.5	7.42	-3,788.5	133.7	730.5	599.7	130.82	5.585	
12,838.8	9,192.0	12,033.0	8,467.8	64.9	67.1	7.48	-3,824.5	133.1	730.5	598.4	132.02	5.533	
12,900.0	9,192.0	12,092.7	8,467.8	65.9	68.0	7.58	-3,884.2	132.4	730.6	596.6	133.97	5.453	
13,000.0	9,192.0	12,200.3	8,468.8	67.6	69.7	7.70	-3,991.8	131.7	729.8	592.5	137.32	5.315	
13,047.6	9,192.0	12,241.8	8,469.1	68.4	70.4	7.73	-4,033.4	131.6	729.6	590.8	138.76	5.258	
13,100.0	9,192.0	12,295.2	8,469.0	69.2	71.2	7.76	-4,086.8	131.6	729.7	589.2	140.47	5.194	
13,200.0	9,192.0	12,398.8	8,470.2	70.9	72.9	7.82	-4,190.3	131.7	728.6	584.9	143.77	5.068	
13,230.7	9,192.0	12,424.6	8,470.3	71.4	73.3	7.84	-4,216.1	131.8	728.5	583.8	144.69	5.035	
13,300.0	9,192.0	12,485.3	8,469.9	72.5	74.2	7.87	-4,276.9	131.8	729.0	582.2	146.80	4.966	
13,400.0	9,192.0	12,585.6	8,468.4	74.2	75.8	7.90	-4,377.2	131.9	730.6	580.5	150.05	4.869	
13,500.0	9,192.0	12,694.6	8,468.3	75.9	77.6	7.96	-4,486.2	131.9	730.7	577.3	153.44	4.762	
13,600.0	9,192.0	12,817.1	8,469.4	77.5	79.6	7.87	-4,608.6	134.1	729.8	572.7	157.06	4.647	
13,700.0	9,192.0	12,914.4	8,472.6	79.2	81.1	7.83	-4,705.9	135.7	726.5	566.2	160.28	4.533	
13,800.0	9,192.0	13,003.6	8,474.5	80.8	82.5	7.89	-4,795.1	136.0	724.4	561.0	163.37	4.434	
13,895.0	9,192.0	13,089.1	8,475.5	82.4	83.9	8.11	-4,880.5	133.9	723.8	557.5	166.31	4.352	
13,900.0	9,192.0	13,093.6	8,475.5	82.5	84.0	8.13	-4,884.9	133.7	723.8	557.3	166.46	4.348	
14,000.0	9,192.0	13,187.5	8,475.7	84.1	85.5	8.49	-4,978.8	129.7	724.3	554.7	169.61	4.270	
14,100.0	9,192.0	13,283.2	8,475.2	85.8	87.0	8.88	-5,074.4	125.3	725.6	552.8	172.79	4.199	
14,200.0	9,192.0	13,380.3	8,474.5	87.4	88.5	9.36	-5,171.3	119.8	727.3	551.3	175.99	4.133	
14,300.0	9,192.0	13,475.1	8,473.4	89.1	90.1	9.87	-5,265.9	113.8	729.6	550.5	179.16	4.073	
14,400.0	9,192.0	13,590.2	8,472.5	90.8	91.9	10.43	-5,380.9	107.2	731.6	549.0	182.65	4.006	
14,500.0	9,192.0	13,728.8	8,477.1	92.4	94.1	10.84	-5,519.3	103.7	728.7	542.2	186.54	3.907	
14,600.0	9,192.0	13,818.1	8,481.5	94.1	95.6	11.04	-5,608.4	102.7	724.3	534.6	189.64	3.819	
14,700.0	9,192.0	13,903.0	8,483.2	95.7	96.9	11.16	-5,693.4	102.0	722.5	529.9	192.67	3.750	
14,800.0	9,192.0	14,000.4	8,484.4	97.4	98.5	11.30	-5,790.7	101.2	721.6	525.7	195.90	3.683	
14,897.3	9,192.0	14,092.7	8,484.9	99.0	100.0	11.35	-5,883.0	101.3	721.3	522.2	199.01	3.624	
14,900.0	9,192.0	14,095.2	8,484.9	99.1	100.0	11.35	-5,885.6	101.3	721.3	522.2	199.10	3.623	
15,000.0	9,192.0	14,186.1	8,484.5	100.7	101.5	11.36	-5,976.4	101.7	721.7	519.5	202.23	3.569	
15,100.0	9,192.0	14,273.0	8,482.5	102.4	102.9	11.35	-6,063.3	102.2	724.0	518.7	205.30	3.526	
15,200.0	9,192.0	14,375.5	8,478.9	104.0	104.6	11.33	-6,165.8	102.4	727.5	518.9	208.63	3.487	
15,300.0	9,192.0	14,488.6	8,477.1	105.7	106.4	11.22	-6,278.8	104.4	728.8	516.7	212.13	3.436	
15,400.0	9,192.0	14,583.6	8,475.7	107.3	108.0	11.10	-6,373.8	106.3	730.0	514.7	215.34	3.390	
15,500.0	9,192.0	14,687.8	8,473.8	109.0	109.7	10.99	-6,477.9	108.1	731.6	512.9	218.71	3.345	
15,600.0	9,192.0	14,791.6	8,472.9	110.7	111.4	10.90	-6,581.7	109.9	732.3	510.3	222.06	3.298	
15,700.0	9,192.0	14,885.9	8,471.7	112.3	112.9	10.73	-6,676.0	112.5	733.2	507.9	225.27	3.255	
15,800.0	9,192.0	14,996.3	8,470.5	114.0	114.7	10.56	-6,786.4	115.3	734.0	505.2	228.74	3.209	
15,900.0	9,192.0	15,111.1	8,471.8	115.7	116.6	10.56	-6,901.2	116.4	732.8	500.5	232.28	3.155	
16,000.0	9,192.0	15,213.1	8,474.3	117.3	118.3	10.55	-7,003.1	117.7	730.2	494.6	235.61	3.099	
16,100.0	9,192.0	15,303.3	8,475.7	119.0	119.8	10.47	-7,093.2	119.7	728.5	489.7	238.75	3.051	
16,175.6	9,192.0	15,371.1	8,475.9	120.2	120.9	10.41	-7,161.1	121.0	728.1	487.0	241.12	3.020	
16,200.0	9,192.0	15,394.1	8,475.8	120.6	121.3	10.39	-7,184.1	121.4	728.1	486.2	241.90	3.010	
16,300.0	9,192.0	15,490.5	8,475.0	122.3	122.9	10.28	-7,280.4	123.4	728.7	483.5	245.15	2.972	

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 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 Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
16,400.0	9,192.0	15,595.8	8,474.2	124.0	124.6	10.12	-7,385.7	126.1	729.2	480.6	248.54	2.934	
16,500.0	9,192.0	15,704.7	8,474.3	125.6	126.4	9.87	-7,494.5	130.1	728.5	476.5	251.99	2.891	
16,600.0	9,192.0	15,802.2	8,475.3	127.3	128.0	9.74	-7,591.9	132.6	727.2	471.9	255.26	2.849	
16,700.0	9,192.0	15,899.5	8,476.0	128.9	129.6	9.81	-7,689.3	132.7	726.6	468.1	258.52	2.811	
16,800.0	9,192.0	16,013.8	8,478.0	130.6	131.4	10.10	-7,803.5	130.0	725.4	463.4	262.04	2.768	
16,900.0	9,192.0	16,113.6	8,481.3	132.3	133.1	10.44	-7,903.2	127.0	722.8	457.5	265.33	2.724	
17,000.0	9,192.0	16,208.7	8,484.0	133.9	134.6	10.76	-7,998.2	124.1	720.7	452.2	268.54	2.684	
17,100.0	9,192.0	16,307.5	8,486.3	135.6	136.2	11.03	-8,097.0	121.8	719.1	447.3	271.81	2.645	
17,200.0	9,192.0	16,402.0	8,488.1	137.2	137.8	11.21	-8,191.4	120.5	717.6	442.6	275.02	2.609	
17,292.8	9,192.0	16,487.8	8,488.9	138.8	139.2	11.33	-8,277.2	119.8	717.1	439.1	277.97	2.580	
17,300.0	9,192.0	16,496.0	8,488.9	138.9	139.3	11.34	-8,285.4	119.7	717.1	438.8	278.22	2.577	
17,400.0	9,192.0	16,590.0	8,488.5	140.6	140.9	11.45	-8,379.4	119.0	717.8	436.4	281.43	2.551	
17,500.0	9,192.0	16,684.0	8,487.2	142.2	142.4	11.50	-8,473.4	118.7	719.3	434.7	284.63	2.527	
17,600.0	9,192.0	16,778.0	8,484.8	143.9	143.9	11.47	-8,567.4	119.3	721.8	434.0	287.84	2.508	
17,700.0	9,192.0	16,895.2	8,482.9	145.6	145.9	11.35	-8,684.5	121.3	723.3	431.8	291.43	2.482	
17,800.0	9,192.0	16,998.3	8,482.9	147.2	147.6	11.23	-8,787.6	123.6	722.9	428.1	294.80	2.452	
17,826.4	9,192.0	17,022.7	8,482.9	147.7	148.0	11.19	-8,812.0	124.2	722.9	427.3	295.64	2.445	
17,900.0	9,192.0	17,089.6	8,482.3	148.9	149.1	11.08	-8,878.9	126.1	723.2	425.2	297.97	2.427	
18,000.0	9,192.0	17,183.5	8,480.5	150.5	150.6	10.96	-8,972.7	128.0	724.8	423.6	301.18	2.407	
18,100.0	9,192.0	17,288.7	8,479.0	152.2	152.4	10.91	-9,077.9	129.1	726.1	421.6	304.58	2.384	
18,200.0	9,192.0	17,385.5	8,478.0	153.9	154.0	10.92	-9,174.7	129.5	727.2	419.4	307.83	2.362	
18,300.0	9,192.0	17,483.0	8,476.4	155.5	155.6	11.01	-9,272.2	128.7	729.1	418.1	311.10	2.344	
18,400.0	9,192.0	17,592.1	8,475.4	157.2	157.4	11.17	-9,381.3	127.3	730.4	415.9	314.55	2.322	
18,500.0	9,192.0	17,708.7	8,476.3	158.9	159.3	11.33	-9,497.9	126.2	730.0	411.9	318.13	2.295	
18,600.0	9,192.0	17,823.5	8,480.1	160.5	161.2	11.52	-9,612.6	125.3	727.0	405.4	321.68	2.260	
18,700.0	9,192.0	17,907.0	8,482.4	162.2	162.5	11.61	-9,696.1	125.2	724.5	399.7	324.71	2.231	
18,754.2	9,192.0	17,950.7	8,482.8	163.1	163.2	11.62	-9,739.8	125.5	724.1	397.7	326.34	2.219	
18,800.0	9,192.0	17,987.6	8,482.6	163.8	163.9	11.62	-9,776.7	125.7	724.3	396.6	327.71	2.210	
18,900.0	9,192.0	18,078.8	8,480.6	165.5	165.4	11.55	-9,867.9	126.9	726.3	395.4	330.88	2.195	
19,000.0	9,192.0	18,170.7	8,477.5	167.2	166.9	11.37	-9,959.6	129.3	729.3	395.2	334.06	2.183	
19,100.0	9,192.0	18,222.0	8,475.3	168.8	167.7	11.24	-10,010.9	130.9	734.5	397.9	336.57	2.182 SF	
19,200.0	9,192.0	18,222.0	8,475.3	170.5	167.7	11.24	-10,010.9	130.9	751.3	413.1	338.24	2.221	
19,300.0	9,192.0	18,222.0	8,475.3	172.2	167.7	11.24	-10,010.9	130.9	780.6	440.7	339.90	2.297	
19,310.8	9,192.0	18,222.0	8,475.3	172.3	167.7	11.24	-10,010.9	130.9	784.5	444.4	340.08	2.307	

CONCHO

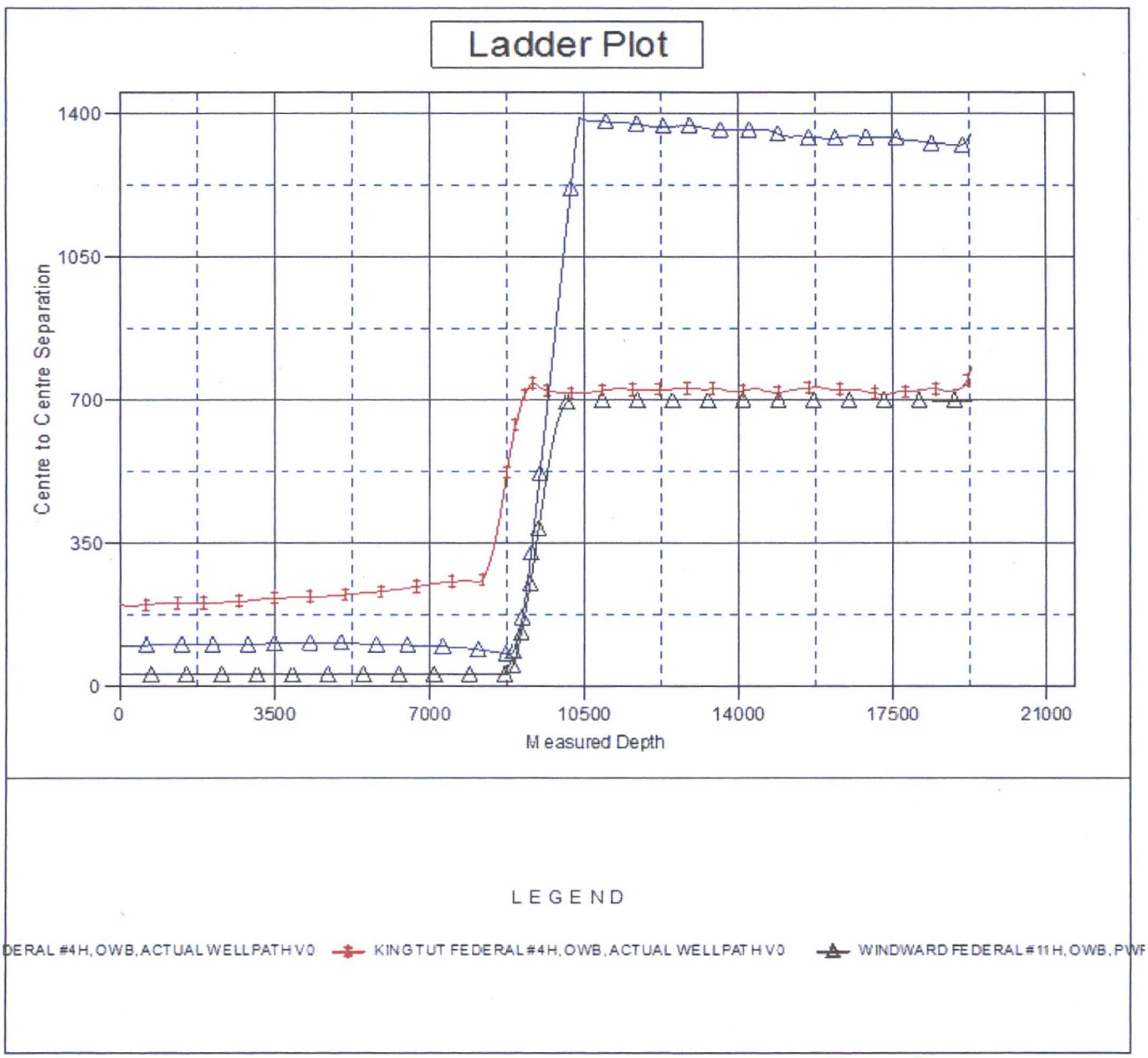
COG Operating LLC

Anticollision Report

Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 Depths are relative to RKB=3548+26 @ 3574.0usft (McVay
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: WINDWARD FEDERAL #12H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.33°



Company:	COG OPERATING LLC	**Local Co-ordinate Reference:**	Well WINDWARD FEDERAL #12H
Project:	LEA COUNTY, NM	**TVD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Reference Site:	AVALON SHALE	**MD Reference:**	RKB=3548+26 @ 3574.0usft (McVay 8)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	WINDWARD FEDERAL #12H	**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 Depths are relative to RKB=3548+26 @ 3574.0usft (McVay
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: WINDWARD FEDERAL #12H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
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