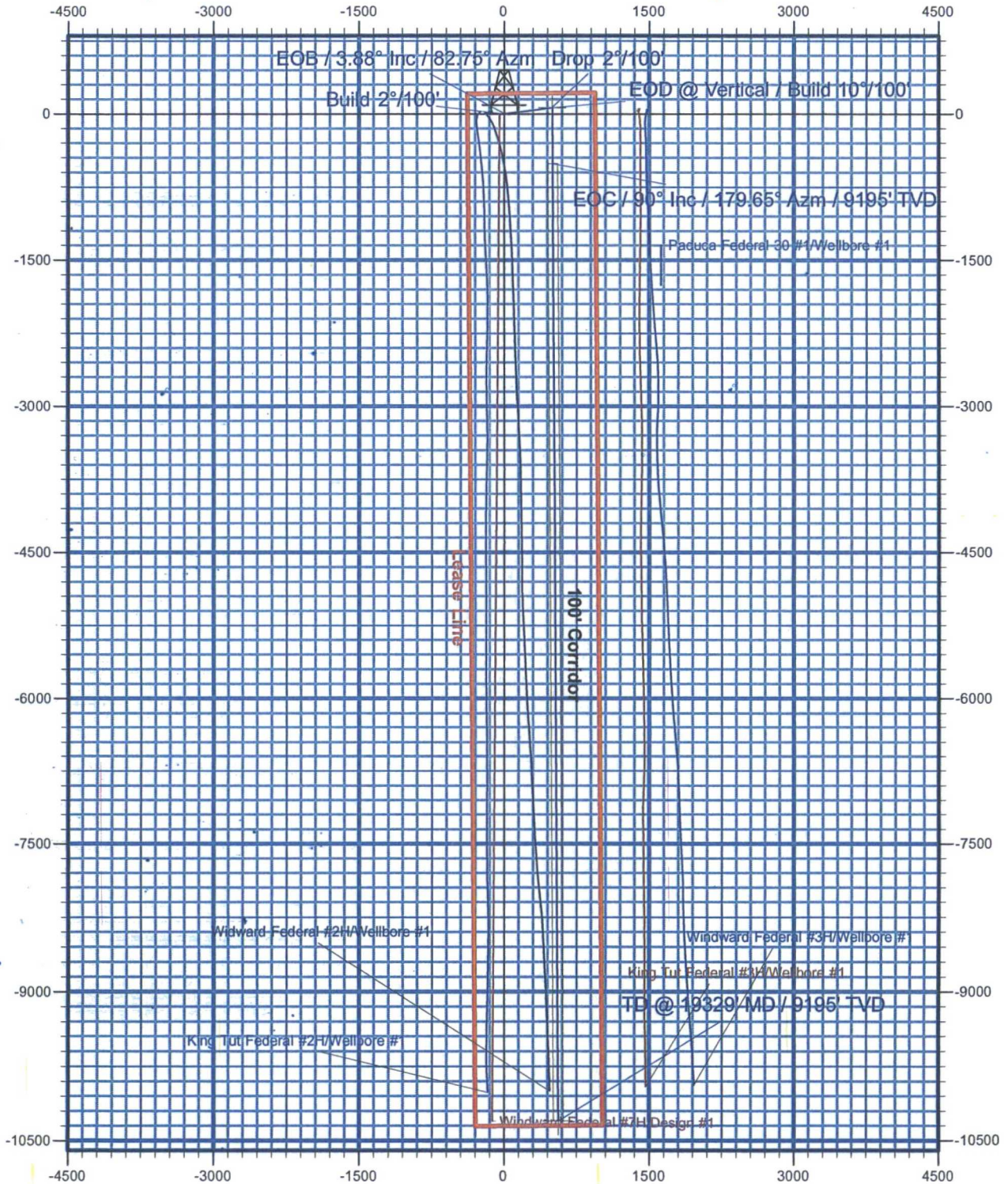


Lea County, New Mexico
Sec 30 T24-S R32-E
Windward Federal #8H
Design #1



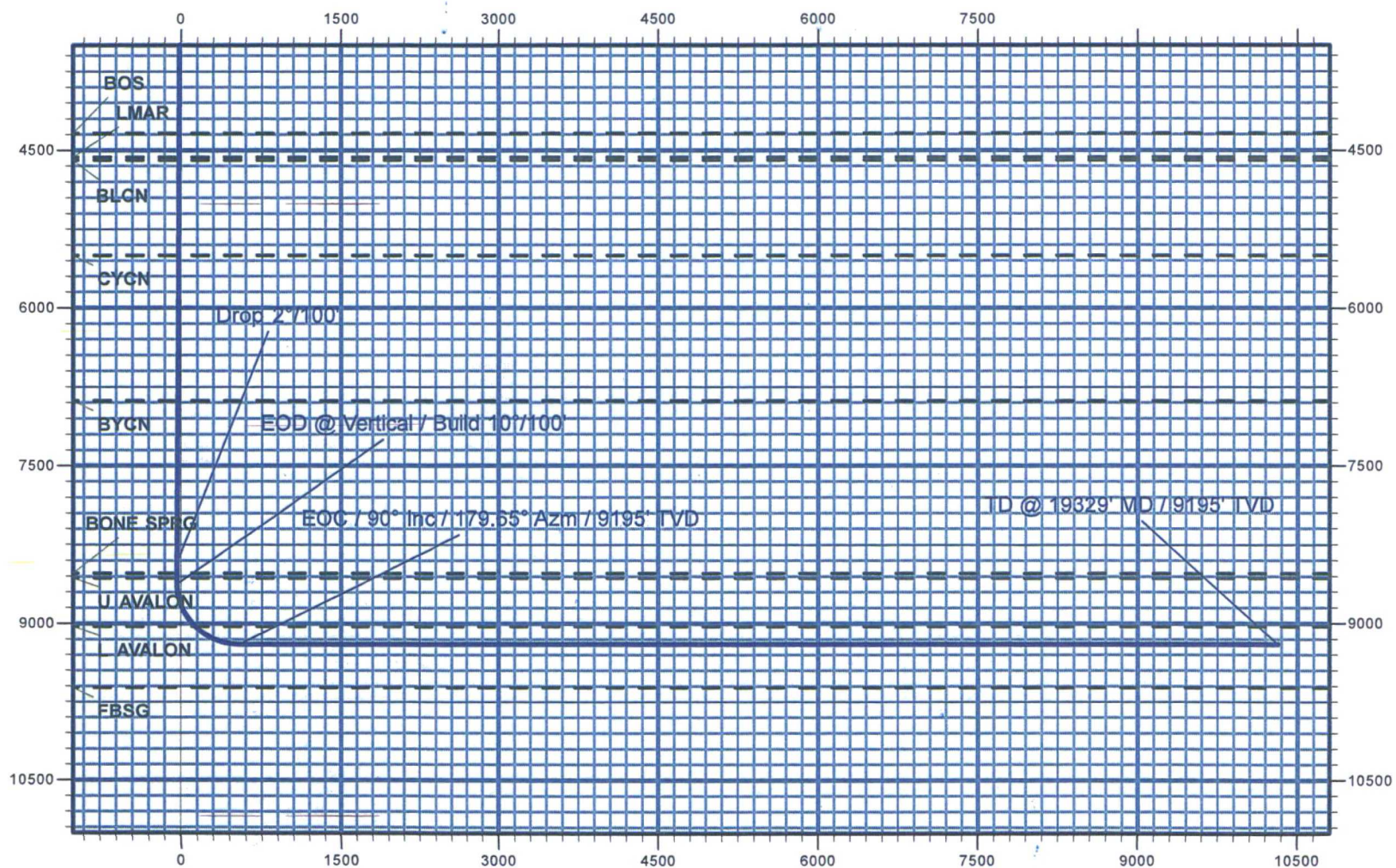


Lea County, New Mexico
Sec 30 T24-S R32-E
Windward Federal #8H

Design #1



DIRECTIONAL DRILLING





COG Production LLC

Lea County, New Mexico

Sec 30 T24-S R32-E

Windward Federal #8H

Wellbore #1

Design #1

HOBBS OCD
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QES Anticollision Report

02 May, 2016





QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference	Design #1		
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:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program		Date		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	19,329.1	Design #1 (Wellbore #1)	MWD default	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						
Sec 30 T24-S R32-E						
King Tut Federal #2H - Wellbore #1 - Wellbore #1	0.0	0.0	251.2			
King Tut Federal #2H - Wellbore #1 - Wellbore #1	300.0	296.0	251.7	251.0	381.470	ES
King Tut Federal #2H - Wellbore #1 - Wellbore #1	19,100.0	18,142.0	1,069.2	803.1	4.018	SF
King Tut Federal #3H - Wellbore #1 - Wellbore #1	8,131.7	8,058.3	916.9	881.7	26.030	CC, ES
King Tut Federal #3H - Wellbore #1 - Wellbore #1	19,100.0	18,230.0	1,183.9	893.6	4.078	SF
Paduca Federal 30 #1 - Wellbore #1 - Wellbore #1	10,538.5	9,200.9	1,111.1	256.7	1.300	Level 3, CC, ES, SF
Widward Federal #2H - Wellbore #1 - Wellbore #1	0.0	0.0	151.7			
Widward Federal #2H - Wellbore #1 - Wellbore #1	19,100.0	20,401.0	1,255.3	1,106.4	8.429	SF
Windward Federal #3H - Wellbore #1 - Wellbore #1	8,802.2	8,781.9	979.7	955.1	39.939	CC
Windward Federal #3H - Wellbore #1 - Wellbore #1	8,850.0	8,828.0	979.8	955.1	39.743	ES
Windward Federal #3H - Wellbore #1 - Wellbore #1	19,200.0	20,312.0	1,984.1	1,708.9	7.211	SF
Windward Federal #7H - Wellbore #1 - Design #1	1,000.0	993.0	50.0	45.8	11.951	CC, ES
Windward Federal #7H - Wellbore #1 - Design #1	19,329.1	19,238.2	690.0	312.8	1.829	SF

Offset Design												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 7835-MWD default												Offset Well Error:	0.0 usft
Reference	Vertical	Measured	Vertical	Semi Major Axis		Highside Toolface (")	Offset Wellbore Centre		Distance		Separation Factor	Warning	
Measured Depth (usft)	Depth (usft)	Depth (usft)	Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.0	0.0	0.0	0.0	0.0	0.0	-85.84	18.2	-250.5	251.2				
100.0	100.0	96.6	96.6	0.1	0.0	-85.87	18.1	-250.6	251.2	251.1	2,365.551		
200.0	200.0	196.5	196.5	0.3	0.1	-85.94	17.8	-250.8	251.4	251.0	656.753		
300.0	300.0	296.0	296.0	0.5	0.1	-85.98	17.6	-251.0	251.7	251.0	381.470	ES	
400.0	400.0	395.7	395.7	0.7	0.2	-86.00	17.6	-251.5	252.1	251.1	269.090		
500.0	500.0	494.4	494.4	1.0	0.2	-86.06	17.4	-252.2	252.8	251.6	208.293		
600.0	600.0	593.6	593.6	1.2	0.3	-86.18	16.9	-253.4	253.9	252.5	170.297		
700.0	700.0	693.2	693.2	1.4	0.4	-86.31	16.4	-254.8	255.3	253.5	144.318		
800.0	800.0	794.2	794.1	1.6	0.4	-86.45	15.9	-256.1	256.6	254.5	125.322		
900.0	900.0	895.3	895.2	1.9	0.5	-86.55	15.5	-257.0	257.5	255.1	110.712		
1,000.0	1,000.0	996.0	995.9	2.1	0.5	-86.62	15.2	-257.5	258.0	255.4	99.103		
1,100.0	1,100.0	1,096.3	1,096.2	2.3	0.6	-169.51	14.9	-257.8	260.0	257.1	90.744		
1,193.9	1,193.8	1,191.2	1,191.2	2.5	0.6	-169.71	14.8	-257.9	264.7	261.6	85.337		
1,200.0	1,199.8	1,197.4	1,197.4	2.5	0.6	-169.72	14.8	-257.9	265.1	262.0	85.032		
1,300.0	1,299.6	1,296.9	1,296.9	2.7	0.7	-169.99	14.7	-257.7	271.6	268.2	80.415		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - King Tut Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 7835-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
1,400.0	1,399.4	1,397.6	1,397.6	3.0	0.7	-170.28	14.4	-257.4	278.0	274.3	76.351		
1,500.0	1,499.2	1,496.0	1,496.0	3.2	0.8	-170.39	15.0	-257.2	284.4	280.5	72.830		
1,600.0	1,598.9	1,591.6	1,591.5	3.4	0.8	-170.41	16.0	-257.8	291.8	287.7	69.964		
1,700.0	1,698.7	1,692.7	1,692.7	3.6	0.9	-170.64	16.0	-259.1	299.8	295.4	67.497		
1,800.0	1,798.5	1,797.7	1,797.6	3.9	0.9	-171.01	15.2	-259.3	306.6	301.9	65.027		
1,900.0	1,898.2	1,898.4	1,898.3	4.1	1.0	-171.24	15.0	-258.4	312.4	307.4	62.636		
2,000.0	1,998.0	1,995.3	1,995.2	4.4	1.0	-171.30	15.6	-257.9	318.6	313.3	60.564		
2,100.0	2,097.8	2,091.2	2,091.1	4.6	1.1	-171.33	16.5	-258.3	325.7	320.2	58.881		
2,200.0	2,197.5	2,193.2	2,193.1	4.9	1.1	-171.46	16.7	-259.2	333.3	327.5	57.378		
2,300.0	2,297.3	2,293.5	2,293.4	5.1	1.2	-171.68	16.5	-259.5	340.3	334.2	55.925		
2,400.0	2,397.1	2,396.5	2,396.4	5.3	1.2	-171.85	16.4	-259.3	346.8	340.4	54.504		
2,500.0	2,496.9	2,495.8	2,495.7	5.6	1.3	-171.92	17.0	-258.6	352.8	346.2	53.147		
2,600.0	2,596.6	2,592.9	2,592.8	5.8	1.3	-171.92	17.9	-258.4	359.3	352.4	51.969		
2,700.0	2,696.4	2,690.8	2,690.7	6.1	1.4	-171.92	18.8	-258.9	366.5	359.3	50.967		
2,800.0	2,796.2	2,790.6	2,790.5	6.3	1.4	-172.04	19.0	-259.6	373.9	366.5	50.065		
2,900.0	2,895.9	2,892.6	2,892.5	6.6	1.5	-172.27	18.4	-260.1	381.0	373.3	49.180		
3,000.0	2,995.7	2,994.1	2,994.0	6.8	1.6	-172.50	17.8	-259.9	387.6	379.6	48.287		
3,100.0	3,095.5	3,094.5	3,094.4	7.1	1.6	-172.70	17.3	-259.5	393.9	385.6	47.419		
3,200.0	3,195.3	3,195.6	3,195.4	7.3	1.7	-172.86	17.1	-258.8	399.9	391.3	46.581		
3,300.0	3,295.0	3,295.3	3,295.2	7.6	1.7	-172.90	17.6	-258.0	405.8	396.9	45.780		
3,400.0	3,394.8	3,389.6	3,389.5	7.8	1.8	-172.87	18.6	-257.8	412.4	403.2	45.111		
3,500.0	3,494.6	3,489.2	3,489.0	8.1	1.8	-172.90	19.2	-258.5	419.7	410.3	44.553		
3,600.0	3,594.3	3,588.7	3,588.5	8.3	1.9	-173.03	19.1	-259.1	427.0	417.3	44.023		
3,700.0	3,694.1	3,691.3	3,691.2	8.6	1.9	-173.23	18.4	-259.4	434.1	424.1	43.490		
3,800.0	3,793.9	3,794.8	3,794.7	8.8	2.0	-173.38	18.1	-258.9	440.3	430.1	42.907		
3,900.0	3,893.7	3,892.2	3,892.1	9.1	2.0	-173.38	18.9	-258.3	446.4	435.9	42.348		
4,000.0	3,993.4	3,988.9	3,988.7	9.3	2.1	-173.38	19.6	-258.3	453.1	442.3	41.879		
4,100.0	4,093.2	4,088.9	4,088.8	9.6	2.1	-173.46	19.8	-258.7	460.2	449.1	41.460		
4,200.0	4,193.0	4,190.5	4,190.4	9.8	2.2	-173.58	19.6	-258.8	467.0	455.7	41.036		
4,300.0	4,292.7	4,293.0	4,292.9	10.1	2.2	-173.75	19.0	-258.4	473.4	461.7	40.588		
4,400.0	4,392.5	4,395.9	4,395.8	10.4	2.3	-173.95	18.1	-257.3	479.1	467.1	40.110		
4,500.0	4,492.3	4,493.6	4,493.4	10.6	2.3	-174.13	17.2	-256.2	484.7	472.5	39.652		
4,600.0	4,592.1	4,591.8	4,591.6	10.9	2.4	-174.28	16.7	-255.5	490.7	478.2	39.248		
4,700.0	4,691.8	4,691.6	4,691.4	11.1	2.4	-174.41	16.2	-255.0	496.9	484.2	38.873		
4,800.0	4,791.6	4,792.8	4,792.6	11.4	2.5	-174.55	15.7	-254.3	503.0	489.9	38.500		
4,900.0	4,891.4	4,894.6	4,894.4	11.6	2.5	-174.72	14.8	-253.2	508.7	495.4	38.116		
5,000.0	4,991.1	4,993.7	4,993.4	11.9	2.6	-174.92	13.8	-252.1	514.3	500.7	37.742		
5,100.0	5,090.9	5,092.9	5,092.7	12.1	2.7	-175.11	12.7	-251.0	520.1	506.2	37.393		
5,200.0	5,190.7	5,190.5	5,190.3	12.4	2.7	-175.26	11.9	-250.3	526.1	511.9	37.079		
5,300.0	5,290.5	5,291.4	5,291.2	12.6	2.8	-175.37	11.4	-249.7	532.2	517.8	36.783		
5,400.0	5,390.2	5,389.9	5,389.7	12.9	2.8	-175.48	10.9	-249.0	538.4	523.6	36.499		
5,500.0	5,490.0	5,488.5	5,488.2	13.1	2.9	-175.60	10.4	-248.6	544.7	529.7	36.243		
5,600.0	5,589.8	5,587.8	5,587.6	13.4	2.9	-175.69	10.0	-248.4	551.3	536.0	36.005		
5,700.0	5,689.5	5,688.0	5,687.7	13.6	3.0	-175.79	9.6	-248.2	557.8	542.2	35.776		
5,800.0	5,789.3	5,786.4	5,786.2	13.9	3.0	-175.89	9.1	-248.1	564.4	548.6	35.560		
5,900.0	5,889.1	5,885.1	5,884.9	14.2	3.1	-175.98	8.7	-248.1	571.3	555.1	35.366		
6,000.0	5,988.8	5,984.5	5,984.3	14.4	3.1	-176.08	8.1	-248.3	578.3	561.8	35.186		
6,100.0	6,088.6	6,083.0	6,082.8	14.7	3.2	-176.18	7.5	-248.6	585.4	568.6	35.019		
6,200.0	6,188.4	6,181.5	6,181.2	14.9	3.2	-176.28	6.9	-249.2	592.7	575.7	34.872		
6,300.0	6,288.2	6,279.7	6,279.4	15.2	3.3	-176.37	6.4	-249.9	600.2	583.0	34.743		
6,400.0	6,387.9	6,376.3	6,376.1	15.4	3.3	-176.46	5.8	-251.0	608.2	590.6	34.640		
6,500.0	6,487.7	6,475.5	6,475.2	15.7	3.4	-176.55	5.1	-252.5	616.4	598.6	34.559		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - King Tut Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 7835-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
6,600.0	6,587.5	6,573.9	6,573.6	15.9	3.4	-176.64	4.5	-254.0	624.8	606.7	34.483		
6,700.0	6,687.2	6,671.7	6,671.4	16.2	3.5	-176.73	3.8	-255.8	633.4	615.0	34.425		
6,800.0	6,787.0	6,770.4	6,770.1	16.4	3.5	-176.85	2.7	-257.8	642.2	623.5	34.380		
6,900.0	6,886.8	6,870.1	6,869.8	16.7	3.6	-176.97	1.4	-259.9	651.1	632.2	34.339		
7,000.0	6,986.6	6,971.9	6,971.5	16.9	3.6	-177.09	0.3	-261.8	659.9	640.7	34.290		
7,100.0	7,086.3	7,072.6	7,072.1	17.2	3.7	-177.21	-0.9	-263.5	668.3	648.8	34.226		
7,200.0	7,186.1	7,170.4	7,170.0	17.5	3.7	-177.34	-2.2	-265.1	676.8	657.0	34.170		
7,300.0	7,285.9	7,267.3	7,266.9	17.7	3.8	-177.47	-3.6	-267.0	685.7	665.6	34.134		
7,400.0	7,385.6	7,366.6	7,366.1	18.0	3.9	-177.62	-5.3	-269.3	694.9	674.5	34.111		
7,500.0	7,485.4	7,467.5	7,466.9	18.2	3.9	-177.76	-6.9	-271.4	703.9	683.3	34.081		
7,600.0	7,585.2	7,570.4	7,569.8	18.5	4.0	-177.91	-8.6	-273.4	712.7	691.7	34.036		
7,700.0	7,685.0	7,671.1	7,670.5	18.7	4.0	-178.04	-10.2	-274.8	721.0	699.8	33.975		
7,800.0	7,784.7	7,768.5	7,767.9	19.0	4.1	-178.18	-11.9	-276.3	729.4	707.9	33.924		
7,900.0	7,884.5	7,853.5	7,852.7	19.2	4.1	-178.48	-15.8	-278.4	739.1	717.4	33.989		
8,000.0	7,984.3	7,929.0	7,926.7	19.5	4.1	-179.58	-30.3	-280.9	751.3	729.3	34.154		
8,100.0	8,084.0	7,992.0	7,986.5	19.7	4.2	178.98	-49.8	-284.8	768.4	746.1	34.481		
8,200.0	8,183.8	8,130.5	8,109.7	20.0	4.5	174.46	-111.8	-285.5	784.6	761.7	34.288		
8,300.0	8,283.6	8,219.9	8,179.6	20.3	5.0	170.46	-167.0	-278.7	801.9	778.3	33.921		
8,400.0	8,383.4	8,280.1	8,222.9	20.5	5.5	167.52	-208.3	-272.4	824.1	799.8	33.846		
8,445.0	8,428.2	8,306.0	8,240.5	20.6	5.7	166.20	-227.1	-269.5	836.3	811.7	33.878		
8,500.0	8,483.2	8,326.8	8,254.0	20.7	6.0	165.20	-242.8	-267.0	852.7	827.7	34.102		
8,600.0	8,583.1	8,368.0	8,279.0	20.9	6.4	163.19	-275.1	-262.1	886.0	860.4	34.623		
8,638.9	8,622.0	8,376.3	8,283.8	21.0	6.5	-114.42	-281.8	-261.2	900.1	873.5	33.868		
8,650.0	8,633.1	8,379.7	8,285.8	21.0	6.5	65.35	-284.5	-260.8	904.2	878.4	35.076		
8,700.0	8,683.0	8,400.0	8,297.6	21.1	6.8	62.54	-301.0	-258.9	922.9	896.9	35.476		
8,750.0	8,732.4	8,422.5	8,310.4	21.2	7.0	59.81	-319.4	-256.8	941.4	915.1	35.890		
8,800.0	8,781.0	8,445.1	8,322.8	21.2	7.3	57.28	-338.1	-254.7	959.1	932.7	36.345		
8,850.0	8,828.4	8,463.0	8,332.2	21.3	7.5	55.12	-353.2	-252.9	976.1	949.6	36.936		
8,900.0	8,874.2	8,485.5	8,343.4	21.4	7.8	53.00	-372.6	-250.7	992.2	965.7	37.541		
8,950.0	8,918.0	8,506.7	8,353.5	21.5	8.1	51.15	-391.1	-248.7	1,007.2	980.9	38.250		
9,000.0	8,959.7	8,525.0	8,361.8	21.6	8.4	49.58	-407.4	-247.1	1,021.0	994.9	39.082		
9,050.0	8,998.7	8,546.8	8,371.1	21.6	8.7	48.12	-427.0	-245.3	1,033.4	1,007.6	39.937		
9,100.0	9,034.9	8,567.3	8,379.2	21.7	9.0	46.89	-445.7	-243.6	1,044.5	1,019.0	40.873		
9,150.0	9,068.0	8,588.0	8,386.5	21.9	9.3	45.83	-465.0	-241.7	1,054.0	1,028.8	41.846		
9,200.0	9,097.6	8,615.0	8,394.7	22.0	9.7	44.84	-490.6	-239.0	1,062.0	1,037.1	42.731		
9,250.0	9,123.7	8,629.4	8,398.5	22.2	10.0	44.20	-504.5	-237.4	1,068.2	1,043.8	43.767		
9,300.0	9,145.9	8,647.0	8,402.6	22.4	10.3	43.67	-521.4	-235.5	1,072.7	1,048.6	44.674		
9,350.0	9,164.1	8,678.0	8,408.9	22.6	10.8	43.16	-551.5	-231.8	1,075.1	1,051.3	45.176		
9,400.0	9,178.2	8,710.0	8,414.3	22.9	11.3	42.87	-582.9	-228.1	1,075.4	1,051.7	45.383		
9,450.0	9,188.1	8,741.0	8,419.1	23.2	11.8	42.83	-613.3	-224.7	1,073.5	1,049.8	45.242		
9,500.0	9,193.6	8,772.0	8,423.5	23.5	12.3	43.05	-643.9	-221.8	1,069.3	1,045.3	44.661		
9,538.9	9,195.0	8,789.7	8,425.8	23.8	12.6	43.39	-661.3	-220.4	1,064.5	1,040.3	44.020		
9,600.0	9,195.0	8,830.1	8,430.5	24.2	13.3	43.47	-701.4	-217.6	1,056.7	1,031.7	42.183		
9,700.0	9,195.0	8,866.0	8,433.6	25.1	13.9	43.51	-737.1	-215.4	1,047.3	1,021.1	40.019		
9,800.0	9,195.0	8,927.8	8,434.5	26.0	15.0	43.42	-798.8	-212.0	1,043.1	1,015.4	37.721		
9,900.0	9,195.0	9,004.3	8,433.5	27.1	16.3	43.30	-875.2	-209.5	1,042.1	1,012.8	35.497		
10,000.0	9,195.0	9,119.7	8,432.5	28.2	18.1	43.16	-990.6	-206.3	1,041.2	1,009.7	33.056		
10,100.0	9,195.0	9,217.5	8,433.0	29.4	19.6	43.11	-1,088.4	-203.8	1,039.5	1,006.0	30.992		
10,200.0	9,195.0	9,312.0	8,432.2	30.6	21.2	43.00	-1,182.8	-201.4	1,038.8	1,003.2	29.155		
10,300.0	9,195.0	9,416.2	8,431.2	31.9	22.9	42.85	-1,286.9	-197.8	1,037.6	999.7	27.401		
10,400.0	9,195.0	9,519.8	8,429.5	33.3	24.7	42.64	-1,390.4	-193.7	1,036.5	996.4	25.841		
10,500.0	9,195.0	9,640.2	8,428.4	34.7	26.7	42.38	-1,510.7	-187.5	1,034.1	991.6	24.324		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandriil Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandriil Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Sec 30 T24-S R32-E - King Tut Federal #2H - Wellbore #1 - Wellbore #1												Offset Well Error:	0.0 usft
Survey Program: 100-Good_gyro, 7835-MWD default													
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
10,600.0	9,195.0	9,745.0	8,429.9	36.1	28.4	42.23	-1,615.3	-181.8	1,029.8	985.0	22.990		
10,700.0	9,195.0	9,839.0	8,430.6	37.6	30.1	42.08	-1,709.2	-177.0	1,026.2	979.2	21.833		
10,800.0	9,195.0	9,926.7	8,430.4	39.1	31.5	41.95	-1,796.7	-173.5	1,024.0	974.9	20.835		
10,868.0	9,195.0	9,972.5	8,430.3	40.1	32.3	41.91	-1,842.6	-172.3	1,023.2	972.7	20.272		
10,900.0	9,195.0	9,993.0	8,430.2	40.6	32.7	41.90	-1,863.1	-172.2	1,023.4	972.3	20.029		
11,000.0	9,195.0	10,075.7	8,428.8	42.2	34.0	41.92	-1,945.8	-173.3	1,025.9	972.5	19.240		
11,100.0	9,195.0	10,197.1	8,427.2	43.7	36.1	41.94	-2,067.1	-174.5	1,028.0	972.0	18.346		
11,200.0	9,195.0	10,293.0	8,427.4	45.3	37.7	42.00	-2,163.0	-175.1	1,028.7	970.2	17.592		
11,300.0	9,195.0	10,386.8	8,427.7	46.9	39.3	42.10	-2,256.8	-176.9	1,030.1	969.2	16.898		
11,400.0	9,195.0	10,470.6	8,426.9	48.5	40.8	42.16	-2,340.6	-178.5	1,032.6	969.3	16.308		
11,500.0	9,195.0	10,590.1	8,424.7	50.2	42.8	42.19	-2,460.1	-180.5	1,035.5	969.5	15.669		
11,600.0	9,195.0	10,699.6	8,425.2	51.8	44.6	42.29	-2,569.5	-181.8	1,036.4	967.6	15.068		
11,700.0	9,195.0	10,797.8	8,425.7	53.5	46.3	42.37	-2,667.8	-182.7	1,037.0	965.7	14.535		
11,800.0	9,195.0	10,898.7	8,425.8	55.1	48.0	42.41	-2,768.6	-182.9	1,037.5	963.6	14.032		
11,900.0	9,195.0	10,995.3	8,424.6	56.8	49.7	42.37	-2,865.2	-182.5	1,038.6	962.2	13.594		
12,000.0	9,195.0	11,105.4	8,424.1	58.5	51.6	42.33	-2,975.3	-181.3	1,038.5	959.5	13.142		
12,005.7	9,195.0	11,110.5	8,424.0	58.6	51.7	42.32	-2,980.4	-181.2	1,038.5	959.4	13.119		
12,100.0	9,195.0	11,206.6	8,422.7	60.2	53.3	42.23	-3,076.5	-179.4	1,038.7	957.3	12.749		
12,200.0	9,195.0	11,320.4	8,421.9	61.9	55.3	42.10	-3,190.2	-176.3	1,037.8	953.8	12.350		
12,300.0	9,195.0	11,407.3	8,422.2	63.6	56.7	42.06	-3,277.1	-174.7	1,036.7	950.3	12.004		
12,312.0	9,195.0	11,416.8	8,422.2	63.8	56.9	42.06	-3,286.6	-174.6	1,036.7	950.1	11.966		
12,400.0	9,195.0	11,500.4	8,422.6	65.3	58.3	42.12	-3,370.3	-175.0	1,037.1	948.2	11.668		
12,500.0	9,195.0	11,594.8	8,424.4	67.1	59.9	42.29	-3,464.6	-177.2	1,037.6	946.1	11.331		
12,600.0	9,195.0	11,679.4	8,424.8	68.8	61.4	42.41	-3,549.2	-179.2	1,039.3	945.1	11.043		
12,700.0	9,195.0	11,787.9	8,423.5	70.5	63.3	42.48	-3,657.6	-181.3	1,042.0	945.1	10.756		
12,800.0	9,195.0	11,889.9	8,424.1	72.2	65.0	42.61	-3,759.6	-183.3	1,043.2	943.5	10.469		
12,900.0	9,195.0	11,975.2	8,423.7	74.0	66.5	42.68	-3,844.9	-184.9	1,045.3	943.1	10.233		
13,000.0	9,195.0	12,089.4	8,422.4	75.7	68.4	42.74	-3,959.0	-187.1	1,047.9	942.9	9.979		
13,100.0	9,195.0	12,195.3	8,422.5	77.5	70.2	42.83	-4,064.9	-188.5	1,049.1	941.3	9.732		
13,200.0	9,195.0	12,312.2	8,424.0	79.2	72.2	42.93	-4,181.8	-188.8	1,048.7	938.0	9.469		
13,238.1	9,195.0	12,343.2	8,424.3	79.9	72.8	42.95	-4,212.8	-188.8	1,048.6	936.9	9.389		
13,300.0	9,195.0	12,395.8	8,424.3	81.0	73.7	42.96	-4,265.4	-188.8	1,048.9	935.7	9.267		
13,400.0	9,195.0	12,496.2	8,423.0	82.7	75.4	42.92	-4,365.8	-188.5	1,050.0	934.3	9.071		
13,493.8	9,195.0	12,599.0	8,423.2	84.4	77.2	42.93	-4,468.6	-188.0	1,049.9	931.6	8.873		
13,500.0	9,195.0	12,604.0	8,423.2	84.5	77.3	42.93	-4,473.6	-187.9	1,049.9	931.4	8.862		
13,600.0	9,195.0	12,706.6	8,422.7	86.3	79.0	42.93	-4,576.2	-187.8	1,050.7	929.5	8.675		
13,700.0	9,195.0	12,822.1	8,425.6	88.0	81.0	43.07	-4,691.6	-187.8	1,049.1	925.0	8.451		
13,775.6	9,195.0	12,880.8	8,426.8	89.4	82.0	43.13	-4,750.4	-187.9	1,048.3	922.3	8.319		
13,800.0	9,195.0	12,897.0	8,426.9	89.8	82.3	43.14	-4,766.5	-187.9	1,048.4	921.9	8.283		
13,900.0	9,195.0	12,984.6	8,425.2	91.6	83.8	43.12	-4,854.2	-188.4	1,050.5	921.5	8.144		
14,000.0	9,195.0	13,092.4	8,424.3	93.3	85.7	43.12	-4,961.9	-188.5	1,051.6	919.8	7.984		
14,100.0	9,195.0	13,205.3	8,423.2	95.1	87.6	43.10	-5,074.8	-188.3	1,052.7	918.2	7.829		
14,157.5	9,195.0	13,262.0	8,423.3	96.1	88.6	43.10	-5,131.5	-188.0	1,052.6	916.6	7.742		
14,200.0	9,195.0	13,299.0	8,423.0	96.9	89.2	43.08	-5,168.5	-187.5	1,052.7	915.7	7.686		
14,300.0	9,195.0	13,413.0	8,421.7	98.7	91.2	42.99	-5,282.5	-185.8	1,052.9	913.3	7.542		
14,400.0	9,195.0	13,507.0	8,422.6	100.4	92.8	43.05	-5,376.5	-185.8	1,052.6	910.4	7.401		
14,401.7	9,195.0	13,507.0	8,422.6	100.5	92.8	43.05	-5,376.5	-185.8	1,052.6	910.3	7.400		
14,500.0	9,195.0	13,585.8	8,422.7	102.2	94.1	43.10	-5,455.2	-186.6	1,053.6	908.9	7.282		
14,600.0	9,195.0	13,705.3	8,422.0	104.0	96.2	43.12	-5,574.8	-187.0	1,054.8	907.2	7.147		
14,700.0	9,195.0	13,806.4	8,422.0	105.8	97.9	43.12	-5,675.8	-186.3	1,054.6	904.4	7.020		
14,709.7	9,195.0	13,815.0	8,422.0	106.0	98.1	43.11	-5,684.5	-186.2	1,054.6	904.1	7.009		
14,800.0	9,195.0	13,896.0	8,421.7	107.6	99.5	43.11	-5,765.4	-185.9	1,055.0	902.3	6.909		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Sec 30 T24-S R32-E - King Tut Federal #2H - Wellbore #1 - Wellbore #1												Offset Well Error:	0.0 usft
Survey Program: 100-Goody_gyro. 7835-MWD default													
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
14,900.0	9,195.0	13,992.4	8,420.3	109.3	101.2	43.07	-5,861.8	-185.5	1,056.2	901.0	6.805		
15,000.0	9,195.0	14,101.6	8,419.7	111.1	103.0	43.05	-5,971.1	-184.9	1,056.6	898.7	6.691		
15,100.0	9,195.0	14,206.1	8,418.2	112.9	104.8	42.97	-6,075.5	-183.8	1,057.4	897.0	6.591		
15,200.0	9,195.0	14,309.0	8,418.7	114.7	106.6	42.95	-6,178.4	-182.1	1,056.4	893.3	6.479		
15,212.7	9,195.0	14,318.6	8,418.6	114.9	106.8	42.94	-6,188.0	-182.0	1,056.3	893.0	6.468		
15,300.0	9,195.0	14,422.4	8,418.0	116.5	108.6	42.90	-6,291.8	-180.7	1,056.4	890.7	6.375		
15,400.0	9,195.0	14,506.8	8,419.5	118.3	110.0	42.93	-6,376.2	-179.8	1,055.0	886.7	6.271		
15,404.6	9,195.0	14,510.0*	8,419.5	118.4	110.1	42.93	-6,379.3	-179.7	1,055.0	886.6	6.267		
15,500.0	9,195.0	14,596.3	8,418.6	120.1	111.5	42.91	-6,465.7	-179.4	1,055.8	885.1	6.187		
15,600.0	9,195.0	14,694.6	8,418.5	121.9	113.2	42.94	-6,563.9	-179.8	1,056.5	883.2	6.095		
15,700.0	9,195.0	14,824.0	8,418.5	123.7	115.5	42.94	-6,693.3	-178.9	1,056.6	880.3	5.992		
15,776.3	9,195.0	14,881.7	8,419.2	125.0	116.4	42.95	-6,751.1	-178.3	1,055.8	877.6	5.927		
15,800.0	9,195.0	14,898.3	8,419.1	125.5	116.7	42.95	-6,767.7	-178.2	1,055.8	877.2	5.910		
15,900.0	9,195.0	15,012.0	8,418.8	127.3	118.7	42.95	-6,881.3	-177.8	1,056.3	874.8	5.821		
15,937.4	9,195.0	15,042.8	8,419.2	127.9	119.2	42.98	-6,912.2	-177.9	1,056.1	873.7	5.789		
16,000.0	9,195.0	15,089.6	8,419.3	129.1	120.0	43.01	-6,959.0	-178.2	1,056.6	872.6	5.744		
16,100.0	9,195.0	15,185.9	8,418.1	130.9	121.7	43.01	-7,055.2	-179.0	1,058.5	871.9	5.674		
16,200.0	9,195.0	15,330.7	8,420.8	132.7	124.2	43.15	-7,199.9	-179.0	1,057.2	867.1	5.562		
16,300.0	9,195.0	15,420.6	8,423.9	134.5	125.7	43.31	-7,289.8	-179.5	1,055.5	862.5	5.469		
16,400.0	9,195.0	15,527.3	8,426.8	136.3	127.6	43.44	-7,396.5	-179.4	1,053.9	857.9	5.375		
16,500.0	9,195.0	15,630.0	8,429.3	138.1	129.4	43.50	-7,499.1	-177.9	1,051.5	852.6	5.286		
16,600.0	9,195.0	15,707.7	8,430.4	139.9	130.7	43.51	-7,576.8	-176.6	1,049.9	848.6	5.215		
16,606.0	9,195.0	15,711.6	8,430.4	140.0	130.8	43.51	-7,580.7	-176.6	1,049.9	848.5	5.212		
16,700.0	9,195.0	15,779.4	8,429.1	141.7	132.0	43.46	-7,648.5	-176.3	1,051.3	847.8	5.167		
16,800.0	9,195.0	15,883.0	8,425.6	143.5	133.8	43.32	-7,752.0	-175.4	1,053.6	847.7	5.119		
16,900.0	9,195.0	15,983.7	8,421.6	145.3	135.5	43.14	-7,852.7	-173.9	1,055.8	847.8	5.076		
17,000.0	9,195.0	16,110.0	8,418.9	147.1	137.7	43.01	-7,978.8	-172.6	1,057.2	846.6	5.020		
17,100.0	9,195.0	16,247.5	8,420.5	148.9	140.0	42.94	-8,116.3	-168.3	1,054.5	841.0	4.939		
17,200.0	9,195.0	16,328.0	8,421.9	150.7	141.4	42.92	-8,196.7	-166.0	1,051.7	835.9	4.873		
17,275.3	9,195.0	16,381.4	8,421.9	152.0	142.3	42.89	-8,250.1	-165.1	1,051.0	833.6	4.834		
17,300.0	9,195.0	16,400.4	8,421.6	152.5	142.7	42.87	-8,269.1	-164.7	1,051.1	833.1	4.822		
17,400.0	9,195.0	16,481.2	8,419.5	154.3	144.1	42.78	-8,349.9	-163.8	1,052.6	832.5	4.783		
17,500.0	9,195.0	16,580.7	8,417.2	156.1	145.8	42.75	-8,449.3	-164.6	1,055.3	832.7	4.741		
17,600.0	9,195.0	16,687.7	8,416.3	157.9	147.6	42.81	-8,556.4	-166.2	1,057.3	831.8	4.689		
17,700.0	9,195.0	16,801.5	8,415.4	159.7	149.6	42.81	-8,670.1	-166.4	1,058.4	830.1	4.637		
17,800.0	9,195.0	16,892.0	8,415.7	161.5	151.1	42.84	-8,760.6	-166.5	1,058.8	827.9	4.586		
17,900.0	9,195.0	16,986.0	8,415.9	163.3	152.7	42.95	-8,854.6	-168.3	1,060.3	826.6	4.536		
18,000.0	9,195.0	17,082.9	8,415.9	165.1	154.3	43.09	-8,951.5	-171.3	1,062.8	826.1	4.489		
18,100.0	9,195.0	17,179.5	8,415.9	166.9	156.0	43.22	-9,048.0	-174.0	1,065.2	825.4	4.443		
18,200.0	9,195.0	17,274.9	8,414.6	168.7	157.7	43.27	-9,143.4	-176.1	1,068.0	825.5	4.403		
18,300.0	9,195.0	17,401.9	8,415.4	170.5	159.8	43.43	-9,270.3	-178.5	1,069.2	823.2	4.346		
18,400.0	9,195.0	17,494.8	8,416.9	172.3	161.4	43.58	-9,363.3	-180.3	1,069.8	820.7	4.295		
18,500.0	9,195.0	17,587.8	8,416.9	174.2	163.0	43.66	-9,456.2	-182.0	1,071.5	819.6	4.254		
18,600.0	9,195.0	17,699.5	8,417.0	176.0	164.9	43.74	-9,567.9	-183.3	1,072.6	817.7	4.207		
18,700.0	9,195.0	17,802.2	8,417.0	177.8	166.7	43.77	-9,670.6	-183.3	1,073.0	815.3	4.163		
18,800.0	9,195.0	17,919.6	8,416.2	179.6	168.8	43.69	-9,788.0	-181.4	1,072.9	812.5	4.120		
18,900.0	9,195.0	18,029.8	8,414.9	181.4	170.7	43.49	-9,898.0	-176.7	1,071.2	808.7	4.081		
19,000.0	9,195.0	18,142.0	8,415.4	183.2	172.6	43.32	-10,010.1	-171.2	1,067.9	803.1	4.033		
19,035.4	9,195.0	18,142.0	8,415.4	183.8	172.6	43.32	-10,010.1	-171.2	1,067.3	802.1	4.024		
19,100.0	9,195.0	18,142.0	8,415.4	185.0	172.6	43.32	-10,010.1	-171.2	1,069.2	803.1	4.018 SF		
19,200.0	9,195.0	18,142.0	8,415.4	186.8	172.6	43.32	-10,010.1	-171.2	1,079.9	812.4	4.038		
19,300.0	9,195.0	18,142.0	8,415.4	188.6	172.6	43.32	-10,010.1	-171.2	1,099.6	830.8	4.091		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandrill Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandrill Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - King Tut Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 7835-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
19,329.1	9,195.0	18,142.0	8,415.4	189.2	172.6	43.32	-10,010.1	-171.2	1,107.0	837.8	4.112		



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - King Tut Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 196-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	88.71	31.3	1,387.1	1,387.5				
100.0	100.0	95.9	95.9	0.1	0.1	88.70	31.5	1,387.3	1,387.6	1,387.5	8.408.617		
200.0	200.0	190.9	190.9	0.3	0.2	88.68	32.0	1,387.8	1,388.2	1,387.7	2.873.620		
300.0	300.0	292.2	292.2	0.5	0.4	88.65	32.7	1,388.5	1,388.9	1,388.0	1.529.572		
400.0	400.0	393.1	393.1	0.7	0.6	88.63	33.1	1,389.1	1,389.5	1,388.2	1.037.401		
500.0	500.0	500.3	500.3	1.0	0.8	88.62	33.4	1,389.3	1,389.7	1,387.9	776.518		
600.0	600.0	594.7	594.7	1.2	1.0	88.61	33.8	1,389.5	1,390.0	1,387.8	628.593		
700.0	700.0	693.6	693.6	1.4	1.2	88.59	34.2	1,390.0	1,390.5	1,387.8	525.596		
800.0	800.0	796.4	796.3	1.6	1.4	88.59	34.3	1,390.5	1,391.0	1,387.9	450.108		
900.0	900.0	901.9	901.9	1.9	1.7	88.59	34.1	1,390.7	1,391.1	1,387.6	393.110		
1,000.0	1,000.0	1,002.6	1,002.6	2.1	1.9	88.60	33.9	1,390.5	1,390.9	1,387.0	350.017		
1,100.0	1,100.0	1,105.9	1,105.9	2.3	2.1	5.88	33.6	1,390.4	1,389.0	1,384.7	315.774		
1,193.9	1,193.8	1,197.0	1,197.0	2.5	2.3	5.93	33.2	1,390.1	1,384.0	1,379.2	289.951		
1,200.0	1,199.8	1,202.8	1,202.8	2.5	2.3	5.93	33.2	1,390.1	1,383.5	1,378.7	288.386		
1,300.0	1,299.6	1,301.4	1,301.4	2.7	2.5	5.96	33.0	1,390.0	1,376.7	1,371.5	264.316		
1,400.0	1,399.4	1,398.6	1,398.6	3.0	2.7	6.00	32.9	1,390.0	1,370.0	1,364.4	243.656		
1,500.0	1,499.2	1,496.2	1,496.2	3.2	2.9	6.03	32.9	1,390.2	1,363.5	1,357.5	225.775		
1,600.0	1,598.9	1,594.0	1,594.0	3.4	3.1	6.05	33.2	1,390.5	1,357.1	1,350.6	210.195		
1,700.0	1,698.7	1,690.3	1,690.3	3.6	3.3	6.07	33.3	1,391.0	1,350.8	1,344.0	196.490		
1,800.0	1,798.5	1,789.2	1,789.2	3.9	3.5	6.09	33.5	1,391.7	1,344.8	1,337.5	184.181		
1,900.0	1,898.2	1,883.2	1,883.2	4.1	3.7	6.09	34.3	1,392.6	1,339.1	1,331.4	173.466		
2,000.0	1,998.0	1,986.3	1,986.2	4.4	3.9	6.07	35.6	1,393.8	1,333.6	1,325.4	163.455		
2,100.0	2,097.8	2,108.1	2,108.0	4.6	4.2	6.01	37.7	1,393.5	1,326.6	1,318.0	153.624		
2,200.0	2,197.5	2,200.0	2,199.9	4.9	4.4	5.94	40.0	1,393.0	1,319.4	1,310.3	145.730		
2,300.0	2,297.3	2,290.5	2,290.3	5.1	4.6	5.84	42.9	1,393.3	1,313.0	1,303.5	138.633		
2,400.0	2,397.1	2,389.3	2,389.1	5.3	4.8	5.77	45.3	1,393.9	1,306.9	1,297.0	131.954		
2,500.0	2,496.9	2,485.4	2,485.2	5.6	5.0	5.70	47.5	1,394.5	1,301.0	1,290.6	125.890		
2,600.0	2,596.6	2,579.2	2,578.9	5.8	5.2	5.62	50.0	1,395.6	1,295.5	1,284.7	120.391		
2,700.0	2,696.4	2,684.0	2,683.8	6.1	5.4	5.59	51.4	1,397.1	1,290.2	1,279.0	115.132		
2,800.0	2,796.2	2,783.5	2,783.2	6.3	5.6	5.59	51.9	1,397.9	1,284.3	1,272.6	110.338		
2,900.0	2,895.9	2,881.9	2,881.6	6.6	5.8	5.60	52.4	1,399.2	1,278.8	1,266.8	105.925		
3,000.0	2,995.7	3,013.3	3,013.0	6.8	6.1	5.67	51.9	1,399.5	1,272.4	1,259.8	101.211		
3,100.0	3,095.5	3,113.7	3,113.4	7.1	6.3	5.75	50.6	1,398.1	1,264.3	1,251.3	97.211		
3,200.0	3,195.3	3,204.0	3,203.7	7.3	6.5	5.80	50.3	1,397.3	1,256.6	1,243.2	93.618		
3,300.0	3,295.0	3,299.6	3,299.3	7.6	6.7	5.80	50.7	1,396.9	1,249.5	1,235.7	90.189		
3,400.0	3,394.8	3,419.4	3,419.1	7.8	6.9	5.85	50.6	1,395.4	1,241.5	1,227.2	86.608		
3,500.0	3,494.6	3,518.5	3,518.1	8.1	7.1	5.88	50.5	1,393.5	1,232.9	1,218.1	83.461		
3,600.0	3,594.3	3,616.2	3,615.8	8.3	7.4	5.89	50.9	1,391.8	1,224.4	1,209.2	80.506		
3,700.0	3,694.1	3,715.6	3,715.2	8.6	7.6	5.90	51.5	1,390.2	1,216.0	1,200.4	77.703		
3,800.0	3,793.9	3,816.4	3,816.0	8.8	7.8	5.98	50.3	1,388.5	1,207.6	1,191.6	75.054		
3,900.0	3,893.7	3,910.0	3,909.6	9.1	8.0	6.12	48.0	1,387.0	1,199.3	1,182.8	72.613		
4,000.0	3,993.4	4,002.5	4,002.1	9.3	8.2	6.24	46.2	1,386.3	1,191.7	1,174.8	70.341		
4,100.0	4,093.2	4,096.0	4,095.5	9.6	8.4	6.35	44.6	1,385.9	1,184.5	1,167.2	68.188		
4,200.0	4,193.0	4,183.9	4,183.4	9.8	8.5	6.45	43.3	1,386.2	1,178.2	1,160.4	66.227		
4,300.0	4,292.7	4,272.8	4,272.2	10.1	8.7	6.58	41.2	1,387.5	1,172.9	1,154.7	64.414		
4,400.0	4,392.5	4,377.7	4,377.1	10.4	9.0	6.81	37.3	1,389.6	1,168.1	1,149.4	62.600		
4,500.0	4,492.3	4,488.7	4,488.0	10.6	9.2	7.07	33.2	1,390.4	1,162.1	1,143.0	60.773		
4,600.0	4,592.1	4,588.0	4,587.3	10.9	9.4	7.29	29.5	1,390.8	1,155.8	1,136.3	59.081		
4,700.0	4,691.8	4,699.9	4,699.1	11.1	9.6	7.49	26.3	1,391.0	1,149.3	1,129.2	57.366		
4,800.0	4,791.6	4,801.0	4,800.1	11.4	9.8	7.60	25.2	1,390.3	1,141.9	1,121.4	55.751		
4,900.0	4,891.4	4,903.9	4,903.1	11.6	10.1	7.70	24.0	1,389.5	1,134.4	1,113.5	54.194		
5,000.0	4,991.1	5,004.0	5,003.1	11.9	10.3	7.83	22.4	1,388.5	1,126.8	1,105.4	52.717		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - King Tut Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 198-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore +N/-S (usft)	Centre +E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
5,100.0	5,090.9	5,112.5	5,111.6	12.1	10.5	7.91	21.8	1,387.0	1,118.6	1,096.8	51.226		
5,200.0	5,190.7	5,213.0	5,212.1	12.4	10.7	7.92	22.6	1,385.1	1,110.1	1,087.8	49.814		
5,300.0	5,290.5	5,312.7	5,311.8	12.6	10.9	7.91	23.9	1,383.3	1,101.6	1,078.9	48.461		
5,400.0	5,390.2	5,412.2	5,411.3	12.9	11.1	7.90	24.9	1,381.5	1,093.0	1,069.9	47.163		
5,500.0	5,490.0	5,511.1	5,510.1	13.1	11.3	7.91	25.7	1,379.7	1,084.6	1,060.9	45.922		
5,600.0	5,589.8	5,609.5	5,608.5	13.4	11.5	7.92	26.5	1,378.0	1,076.1	1,052.1	44.727		
5,700.0	5,689.5	5,707.7	5,706.7	13.6	11.7	7.91	27.6	1,376.5	1,067.9	1,043.4	43.580		
5,800.0	5,789.3	5,808.1	5,807.1	13.9	11.9	7.89	28.8	1,375.0	1,059.7	1,034.7	42.466		
5,900.0	5,889.1	5,894.7	5,893.6	14.2	12.1	7.89	29.7	1,373.9	1,051.7	1,026.4	41.456		
6,000.0	5,988.8	5,982.9	5,981.9	14.4	12.3	7.89	30.6	1,374.4	1,045.5	1,019.8	40.541		
6,100.0	6,088.6	6,081.9	6,080.9	14.7	12.5	7.90	31.3	1,375.1	1,039.5	1,013.3	39.627		
6,200.0	6,188.4	6,182.6	6,181.5	14.9	12.7	7.92	31.8	1,376.0	1,033.8	1,007.1	38.749		
6,300.0	6,288.2	6,290.2	6,289.2	15.2	13.0	7.93	32.6	1,376.5	1,027.5	1,000.3	37.858		
6,400.0	6,387.9	6,391.0	6,390.0	15.4	13.2	7.94	33.5	1,376.3	1,020.6	993.0	36.995		
6,500.0	6,487.7	6,490.4	6,489.4	15.7	13.4	7.94	34.3	1,376.3	1,013.8	985.8	36.165		
6,600.0	6,587.5	6,591.9	6,590.9	15.9	13.6	7.96	35.0	1,376.1	1,007.0	978.5	35.355		
6,700.0	6,687.2	6,688.5	6,687.4	16.2	13.8	7.98	35.5	1,376.0	1,000.2	971.3	34.583		
6,800.0	6,787.0	6,788.1	6,787.1	16.4	14.0	8.02	35.7	1,376.2	993.6	964.2	33.832		
6,900.0	6,886.8	6,885.0	6,884.0	16.7	14.2	8.07	35.8	1,376.4	987.2	957.4	33.117		
7,000.0	6,986.6	6,980.0	6,979.0	16.9	14.4	8.12	35.8	1,377.1	981.2	951.0	32.438		
7,100.0	7,086.3	7,078.4	7,077.4	17.2	14.6	8.17	35.8	1,378.0	975.5	944.8	31.779		
7,200.0	7,186.1	7,183.2	7,182.1	17.5	14.8	8.24	35.7	1,378.8	969.5	938.4	31.122		
7,300.0	7,285.9	7,284.5	7,283.4	17.7	15.0	8.29	35.9	1,379.3	963.3	931.7	30.482		
7,400.0	7,385.6	7,386.7	7,385.7	18.0	15.2	8.34	36.0	1,379.4	956.7	924.7	29.847		
7,500.0	7,485.4	7,483.9	7,482.8	18.2	15.5	8.40	35.9	1,379.7	950.3	917.8	29.241		
7,600.0	7,585.2	7,584.9	7,583.9	18.5	15.7	8.48	35.7	1,380.1	944.0	911.0	28.649		
7,700.0	7,685.0	7,688.5	7,687.4	18.7	15.9	8.57	35.2	1,380.1	937.3	903.9	28.058		
7,800.0	7,784.7	7,788.8	7,787.8	19.0	16.1	8.67	34.6	1,379.8	930.4	896.5	27.481		
7,900.0	7,884.5	7,883.7	7,882.7	19.2	16.3	8.79	33.6	1,379.8	923.7	889.4	26.932		
8,000.0	7,984.3	7,956.5	7,955.3	19.5	16.4	9.10	29.4	1,380.9	918.7	884.0	26.485		
8,100.0	8,084.0	8,030.0	8,027.9	19.7	16.6	9.81	18.7	1,384.1	916.9	881.9	26.136		
8,131.7	8,115.6	8,058.3	8,055.6	19.8	16.7	10.18	12.9	1,385.6	916.9	881.7	26.030 CC, ES		
8,200.0	8,183.8	8,106.0	8,101.6	20.0	16.8	10.97	0.7	1,388.3	917.5	882.0	25.849		
8,300.0	8,283.6	8,184.7	8,174.8	20.3	16.9	12.78	-27.7	1,393.6	921.3	885.4	25.637		
8,400.0	8,383.4	8,254.5	8,235.9	20.5	17.1	14.86	-61.0	1,398.4	928.7	892.3	25.528		
8,445.0	8,428.2	8,290.8	8,265.9	20.6	17.2	16.11	-81.1	1,400.6	933.3	896.7	25.497		
8,500.0	8,483.2	8,333.6	8,299.1	20.7	17.4	17.80	-108.0	1,402.2	940.5	903.6	25.490		
8,600.0	8,583.1	8,391.0	8,339.3	20.9	17.6	20.42	-149.0	1,403.0	960.1	922.8	25.729		
8,638.9	8,622.0	8,405.4	8,348.7	21.0	17.6	103.90	-159.9	1,403.0	970.4	933.4	26.229		
8,650.0	8,633.1	8,409.8	8,351.5	21.0	17.6	-75.24	-163.3	1,403.0	973.5	936.0	25.967		
8,700.0	8,683.0	8,430.1	8,364.1	21.1	17.7	-72.89	-179.2	1,403.2	988.1	950.4	26.227		
8,750.0	8,732.4	8,455.0	8,379.0	21.2	17.8	-70.42	-199.2	1,403.4	1,003.0	965.2	26.516		
8,800.0	8,781.0	8,469.6	8,387.3	21.2	17.9	-68.41	-211.2	1,403.5	1,018.0	980.2	26.889		
8,850.0	8,828.4	8,486.0	8,396.1	21.3	18.0	-66.38	-225.0	1,403.7	1,033.1	995.3	27.325		
8,900.0	8,874.2	8,507.0	8,406.7	21.4	18.1	-64.31	-243.1	1,403.9	1,048.0	1,010.4	27.821		
8,950.0	8,918.0	8,517.0	8,411.4	21.5	18.2	-62.66	-252.0	1,404.0	1,062.6	1,025.3	28.427		
9,000.0	8,959.7	8,549.0	8,425.1	21.6	18.4	-60.56	-280.9	1,404.2	1,076.6	1,039.6	29.060		
9,050.0	8,998.7	8,564.0	8,430.7	21.6	18.4	-59.02	-294.7	1,404.3	1,089.9	1,053.4	29.808		
9,100.0	9,034.9	8,580.0	8,436.2	21.7	18.5	-57.58	-309.8	1,404.3	1,102.5	1,066.5	30.609		
9,150.0	9,068.0	8,612.0	8,445.3	21.9	18.8	-55.99	-340.5	1,404.1	1,114.1	1,078.6	31.372		
9,200.0	9,097.6	8,612.0	8,445.3	22.0	18.8	-55.10	-340.5	1,404.1	1,124.7	1,089.8	32.203		
9,250.0	9,123.7	8,644.0	8,451.8	22.2	19.0	-53.83	-371.8	1,403.8	1,134.3	1,099.9	32.946		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - King Tut Federal #3H - Wellbore #1 - Wellbore #1											Offset Site Error:	0.0 usft
Survey Program: 196-MWD default											Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning
9,300.0	9,145.9	8,650.8	8,452.7	22.4	19.0	-53.06	-378.5	1,403.7	1,142.8	1,108.8	33.663	
9,350.0	9,164.1	8,660.0	8,453.8	22.6	19.1	-52.35	-387.7	1,403.6	1,150.3	1,116.7	34.260	
9,400.0	9,178.2	8,689.4	8,456.3	22.9	19.3	-51.61	-416.9	1,403.5	1,156.3	1,122.9	34.586	
9,450.0	9,188.1	8,710.3	8,457.3	23.2	19.5	-51.12	-437.9	1,403.6	1,160.9	1,127.5	34.694	
9,500.0	9,193.6	8,736.0	8,457.7	23.5	19.7	-50.79	-463.5	1,403.9	1,164.1	1,130.4	34.498	
9,538.9	9,195.0	8,761.2	8,457.5	23.8	19.9	-50.68	-488.7	1,404.3	1,165.4	1,131.2	34.081	
9,600.0	9,195.0	8,816.5	8,457.0	24.2	20.4	-50.68	-544.0	1,405.3	1,166.3	1,131.3	33.285	
9,700.0	9,195.0	8,953.1	8,458.2	25.1	21.7	-50.76	-680.6	1,407.4	1,166.4	1,129.5	31.604	
9,800.0	9,195.0	9,048.1	8,460.2	26.0	22.7	-50.84	-775.5	1,408.0	1,165.1	1,126.5	30.173	
9,865.2	9,195.0	9,102.7	8,460.3	26.7	23.3	-50.84	-830.1	1,408.1	1,164.8	1,125.1	29.313	
9,900.0	9,195.0	9,133.9	8,460.0	27.1	23.7	-50.82	-861.3	1,408.1	1,164.9	1,124.5	28.859	
10,000.0	9,195.0	9,225.5	8,458.6	28.2	24.8	-50.75	-952.9	1,408.2	1,165.5	1,123.2	27.572	
10,100.0	9,195.0	9,321.4	8,455.5	29.4	26.1	-50.62	-1,048.8	1,408.4	1,167.1	1,122.8	26.360	
10,200.0	9,195.0	9,471.1	8,455.5	30.6	27.9	-50.54	-1,198.5	1,406.7	1,165.6	1,118.7	24.864	
10,300.0	9,195.0	9,564.0	8,455.1	31.9	29.2	-50.41	-1,291.3	1,403.7	1,162.8	1,113.8	23.741	
10,400.0	9,195.0	9,640.7	8,453.5	33.3	30.3	-50.26	-1,368.0	1,401.4	1,161.5	1,110.5	22.788	
10,411.2	9,195.0	9,649.0	8,453.2	33.5	30.4	-50.24	-1,376.2	1,401.2	1,161.4	1,110.3	22.689	
10,500.0	9,195.0	9,734.8	8,449.7	34.7	31.7	-50.04	-1,462.0	1,399.4	1,161.9	1,108.8	21.872	
10,600.0	9,195.0	9,829.3	8,447.2	36.1	33.0	-49.88	-1,556.5	1,398.1	1,162.1	1,106.8	21.003	
10,700.0	9,195.0	9,950.4	8,444.3	37.6	34.7	-49.72	-1,677.5	1,397.1	1,162.7	1,104.8	20.087	
10,800.0	9,195.0	10,041.7	8,444.0	39.1	36.0	-49.67	-1,768.7	1,396.3	1,161.8	1,101.6	19.307	
10,826.6	9,195.0	10,064.6	8,443.9	39.5	36.4	-49.66	-1,791.7	1,396.3	1,161.7	1,101.0	19.112	
10,900.0	9,195.0	10,127.7	8,443.1	40.6	37.3	-49.62	-1,854.8	1,396.4	1,162.1	1,099.6	18.599	
11,000.0	9,195.0	10,209.1	8,440.4	42.2	38.6	-49.50	-1,936.1	1,396.3	1,163.7	1,099.0	17.979	
11,100.0	9,195.0	10,305.4	8,435.4	43.7	40.1	-49.29	-2,032.3	1,396.4	1,166.7	1,099.6	17.391	
11,200.0	9,195.0	10,435.0	8,431.2	45.3	42.0	-49.10	-2,161.8	1,396.2	1,168.2	1,098.4	16.735	
11,300.0	9,195.0	10,516.9	8,429.8	46.9	43.3	-49.04	-2,243.7	1,396.3	1,169.0	1,096.9	16.213	
11,400.0	9,195.0	10,647.2	8,429.6	48.5	45.4	-49.04	-2,374.0	1,397.3	1,169.2	1,094.1	15.570	
11,427.4	9,195.0	10,666.8	8,429.8	49.0	45.7	-49.05	-2,393.5	1,397.5	1,169.0	1,093.3	15.440	
11,500.0	9,195.0	10,726.0	8,429.7	50.2	46.6	-49.07	-2,452.8	1,398.5	1,169.6	1,092.2	15.100	
11,600.0	9,195.0	10,815.7	8,428.7	51.8	48.1	-49.08	-2,542.5	1,400.5	1,171.6	1,091.6	14.649	
11,700.0	9,195.0	10,932.5	8,429.9	53.5	49.9	-49.20	-2,659.1	1,403.7	1,172.5	1,089.5	14.140	
11,800.0	9,195.0	11,021.4	8,431.9	55.1	51.3	-49.37	-2,748.0	1,407.0	1,173.3	1,087.8	13.709	
11,900.0	9,195.0	11,111.7	8,432.8	56.8	52.8	-49.51	-2,838.2	1,411.0	1,175.5	1,087.2	13.313	
12,000.0	9,195.0	11,227.4	8,434.6	58.5	54.7	-49.67	-2,953.9	1,414.9	1,176.6	1,085.2	12.876	
12,100.0	9,195.0	11,317.5	8,434.8	60.2	56.2	-49.74	-3,043.9	1,417.3	1,178.0	1,083.9	12.526	
12,200.0	9,195.0	11,427.8	8,434.1	61.9	58.0	-49.78	-3,154.2	1,420.0	1,179.9	1,082.9	12.167	
12,300.0	9,195.0	11,539.2	8,434.2	63.6	59.8	-49.79	-3,265.6	1,420.9	1,179.9	1,080.0	11.817	
12,320.4	9,195.0	11,559.1	8,434.3	64.0	60.1	-49.79	-3,285.5	1,421.0	1,179.9	1,079.5	11.752	
12,400.0	9,195.0	11,632.2	8,434.5	65.3	61.3	-49.81	-3,358.6	1,421.9	1,180.1	1,077.6	11.510	
12,500.0	9,195.0	11,738.2	8,434.1	67.1	63.1	-49.81	-3,464.5	1,422.9	1,180.5	1,075.2	11.205	
12,600.0	9,195.0	11,846.0	8,433.5	68.8	64.9	-49.75	-3,572.3	1,422.4	1,180.1	1,071.9	10.913	
12,700.0	9,195.0	11,940.0	8,433.6	70.5	66.4	-49.74	-3,666.3	1,422.4	1,179.6	1,068.8	10.647	
12,800.0	9,195.0	12,047.2	8,432.6	72.2	68.2	-49.65	-3,773.6	1,421.6	1,179.1	1,065.6	10.384	
12,900.0	9,195.0	12,158.7	8,431.2	74.0	70.0	-49.51	-3,885.0	1,419.4	1,178.0	1,061.8	10.132	
13,000.0	9,195.0	12,290.9	8,432.6	75.7	72.2	-49.44	-4,017.1	1,416.4	1,175.2	1,055.9	9.849	
13,100.0	9,195.0	12,390.8	8,436.5	77.5	73.8	-49.49	-4,116.9	1,414.1	1,170.4	1,048.3	9.582	
13,200.0	9,195.0	12,466.0	8,438.2	79.2	75.1	-49.49	-4,192.1	1,412.4	1,166.9	1,042.3	9.365	
13,300.0	9,195.0	12,548.1	8,437.5	81.0	76.5	-49.40	-4,274.2	1,411.0	1,165.6	1,038.6	9.177	
13,400.0	9,195.0	12,643.7	8,436.8	82.7	78.1	-49.33	-4,369.8	1,410.2	1,165.0	1,035.3	8.987	
13,464.0	9,195.0	12,702.8	8,436.6	83.9	79.0	-49.31	-4,428.9	1,410.2	1,164.8	1,033.5	8.871	
13,500.0	9,195.0	12,733.6	8,436.5	84.5	79.6	-49.31	-4,459.6	1,410.4	1,164.9	1,032.7	8.810	

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Sec 30 T24-S R32-E - King Tut Federal #3H - Wellbore #1 - Wellbore #1												Offset Well Error:	0.0 usft
Survey Program: 196-MWD default													
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
13,600.0	9,195.0	12,818.8	8,435.7	86.3	81.0	-49.30	-4,544.8	1,411.5	1,166.0	1,031.2	8.649		
13,700.0	9,195.0	12,913.9	8,434.1	88.0	82.7	-49.29	-4,639.9	1,413.6	1,168.3	1,030.8	8.494		
13,800.0	9,195.0	13,029.5	8,433.4	89.8	84.6	-49.30	-4,755.5	1,415.5	1,169.4	1,028.8	8.319		
13,900.0	9,195.0	13,142.3	8,433.0	91.6	86.5	-49.30	-4,868.3	1,416.6	1,169.9	1,026.4	8.152		
14,000.0	9,195.0	13,249.6	8,434.5	93.3	88.3	-49.36	-4,975.6	1,417.4	1,169.2	1,022.7	7.982		
14,055.2	9,195.0	13,294.2	8,435.1	94.3	89.0	-49.38	-5,020.2	1,417.8	1,168.9	1,021.0	7.902		
14,100.0	9,195.0	13,327.4	8,435.1	95.1	89.6	-49.39	-5,053.3	1,418.3	1,169.1	1,020.1	7.845		
14,200.0	9,195.0	13,414.4	8,434.0	96.9	91.1	-49.39	-5,140.4	1,420.0	1,170.9	1,019.2	7.721		
14,300.0	9,195.0	13,511.6	8,433.3	98.7	92.7	-49.44	-5,237.5	1,422.8	1,173.1	1,018.6	7.593		
14,400.0	9,195.0	13,620.6	8,433.1	100.4	94.5	-49.52	-5,346.5	1,426.3	1,175.2	1,017.7	7.459		
14,500.0	9,195.0	13,716.4	8,433.6	102.2	96.2	-49.61	-5,442.2	1,429.3	1,176.8	1,016.4	7.333		
14,600.0	9,195.0	13,812.8	8,433.5	104.0	97.8	-49.69	-5,538.6	1,432.6	1,179.0	1,015.5	7.215		
14,700.0	9,195.0	13,917.8	8,433.5	105.8	99.6	-49.78	-5,643.5	1,436.1	1,181.0	1,014.6	7.095		
14,800.0	9,195.0	14,017.9	8,434.0	107.6	101.3	-49.89	-5,743.5	1,439.4	1,182.8	1,013.4	6.980		
14,900.0	9,195.0	14,123.2	8,433.3	109.3	103.1	-49.91	-5,848.8	1,441.8	1,184.5	1,012.1	6.870		
15,000.0	9,195.0	14,240.3	8,432.7	111.1	105.0	-49.89	-5,965.9	1,442.5	1,184.8	1,009.4	6.754		
15,021.6	9,195.0	14,260.9	8,432.7	111.5	105.4	-49.89	-5,986.5	1,442.6	1,184.8	1,008.8	6.731		
15,100.0	9,195.0	14,334.5	8,432.6	112.9	106.6	-49.89	-6,060.1	1,443.1	1,184.9	1,006.8	6.650		
15,200.0	9,195.0	14,434.4	8,432.3	114.7	108.3	-49.90	-6,160.0	1,444.3	1,185.5	1,004.5	6.549		
15,300.0	9,195.0	14,537.3	8,432.9	116.5	110.1	-49.94	-6,262.9	1,445.5	1,185.6	1,001.6	6.444		
15,400.0	9,195.0	14,639.9	8,433.0	118.3	111.8	-49.95	-6,365.5	1,446.6	1,185.9	999.0	6.345		
15,471.5	9,195.0	14,710.4	8,433.2	119.6	113.0	-49.96	-6,436.0	1,447.0	1,185.7	996.8	6.276		
15,500.0	9,195.0	14,733.6	8,433.2	120.1	113.4	-49.96	-6,459.1	1,447.2	1,185.8	996.1	6.252		
15,600.0	9,195.0	14,836.9	8,432.7	121.9	115.2	-49.96	-6,562.5	1,448.5	1,186.6	994.0	6.162		
15,700.0	9,195.0	14,940.4	8,432.6	123.7	117.0	-49.95	-6,666.0	1,448.8	1,186.4	990.9	6.071		
15,800.0	9,195.0	15,073.2	8,431.5	125.5	119.2	-49.81	-6,798.8	1,446.5	1,185.2	986.8	5.973		
15,900.0	9,195.0	15,188.6	8,432.6	127.3	121.1	-49.70	-6,914.1	1,442.4	1,181.4	980.2	5.872		
16,000.0	9,195.0	15,290.1	8,433.2	129.1	122.8	-49.57	-7,015.4	1,438.0	1,177.2	973.5	5.778		
16,100.0	9,195.0	15,386.7	8,435.5	130.9	124.5	-49.54	-7,111.9	1,435.1	1,172.9	966.5	5.682		
16,200.0	9,195.0	15,464.2	8,437.2	132.7	125.8	-49.54	-7,189.5	1,433.6	1,169.6	960.6	5.597		
16,269.5	9,195.0	15,509.2	8,437.8	133.9	126.6	-49.56	-7,234.5	1,433.7	1,168.9	958.2	5.549		
16,300.0	9,195.0	15,530.3	8,437.9	134.5	126.9	-49.57	-7,255.6	1,434.1	1,169.0	957.6	5.530		
16,400.0	9,195.0	15,620.0	8,438.0	136.3	128.5	-49.62	-7,345.2	1,435.9	1,170.1	955.9	5.462		
16,500.0	9,195.0	15,715.0	8,437.1	138.1	130.2	-49.64	-7,440.2	1,438.2	1,172.0	954.9	5.399		
16,600.0	9,195.0	15,834.7	8,435.5	139.9	132.2	-49.60	-7,559.8	1,439.7	1,173.4	953.3	5.331		
16,696.3	9,195.0	15,936.0	8,434.9	141.6	133.9	-49.56	-7,661.2	1,439.7	1,173.3	950.5	5.266		
16,700.0	9,195.0	15,939.3	8,434.9	141.7	134.0	-49.56	-7,664.4	1,439.7	1,173.3	950.4	5.264		
16,800.0	9,195.0	16,038.2	8,434.0	143.5	135.7	-49.52	-7,763.4	1,440.1	1,173.7	948.1	5.202		
16,900.0	9,195.0	16,150.4	8,435.9	145.3	137.6	-49.62	-7,875.5	1,441.6	1,173.2	944.3	5.126		
17,000.0	9,195.0	16,243.0	8,438.3	147.1	139.2	-49.74	-7,968.0	1,443.2	1,172.4	940.5	5.056		
17,022.4	9,195.0	16,262.1	8,438.6	147.5	139.5	-49.76	-7,987.2	1,443.6	1,172.4	939.8	5.041		
17,100.0	9,195.0	16,330.7	8,439.5	148.9	140.7	-49.83	-8,055.8	1,445.1	1,172.7	937.9	4.994		
17,200.0	9,195.0	16,430.0	8,439.3	150.7	142.4	-49.86	-8,155.0	1,446.9	1,173.7	936.0	4.937		
17,300.0	9,195.0	16,528.0	8,438.7	152.5	144.1	-49.85	-8,253.0	1,447.9	1,174.5	933.9	4.883		
17,400.0	9,195.0	16,634.6	8,437.1	154.3	145.9	-49.79	-8,359.6	1,448.6	1,175.4	932.1	4.831		
17,500.0	9,195.0	16,718.5	8,436.2	156.1	147.3	-49.76	-8,443.5	1,449.2	1,176.3	930.4	4.785		
17,600.0	9,195.0	16,800.2	8,433.2	157.9	148.7	-49.66	-8,525.1	1,450.1	1,179.0	930.8	4.751		
17,700.0	9,195.0	16,957.4	8,428.6	159.7	151.4	-49.48	-8,682.2	1,451.0	1,181.4	930.0	4.700		
17,800.0	9,195.0	17,069.7	8,430.3	161.5	153.3	-49.50	-8,794.5	1,450.0	1,179.3	924.9	4.636		
17,900.0	9,195.0	17,172.9	8,432.8	163.3	155.1	-49.54	-8,897.7	1,449.1	1,176.6	919.2	4.571		
18,000.0	9,195.0	17,257.8	8,434.6	165.1	156.5	-49.56	-8,982.5	1,448.3	1,174.1	914.0	4.514		
18,053.0	9,195.0	17,293.1	8,434.6	166.1	157.1	-49.55	-9,017.9	1,448.2	1,173.7	912.4	4.492		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandrill Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandrill Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Survey Program: 196-MWD default												Offset Well Error:	0.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface [°]	Offset Wellbore Centre		Distance		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)			
18,100.0	9,195.0	17,325.1	8,434.1	166.9	157.7	-49.53	-9,049.8	1,448.2	1,174.0	911.6	4.475		
18,200.0	9,195.0	17,422.0	8,432.0	168.7	159.3	-49.45	-9,146.7	1,448.9	1,175.5	910.5	4.436		
18,300.0	9,195.0	17,526.6	8,430.5	170.5	161.1	-49.42	-9,251.3	1,450.1	1,176.8	909.0	4.395		
18,400.0	9,195.0	17,631.3	8,430.9	172.3	162.9	-49.49	-9,356.0	1,452.5	1,177.9	907.0	4.349		
18,500.0	9,195.0	17,740.1	8,432.2	174.2	164.7	-49.58	-9,464.7	1,454.5	1,177.9	903.9	4.298		
18,600.0	9,195.0	17,837.4	8,432.5	176.0	166.4	-49.61	-9,562.0	1,455.7	1,178.2	901.2	4.254		
18,700.0	9,195.0	17,940.3	8,433.8	177.8	168.2	-49.69	-9,664.9	1,457.4	1,178.2	898.1	4.206		
18,709.3	9,195.0	17,949.5	8,433.9	177.9	168.3	-49.70	-9,674.1	1,457.6	1,178.2	897.8	4.202		
18,800.0	9,195.0	18,037.8	8,435.3	179.6	169.8	-49.79	-9,762.3	1,459.4	1,178.3	895.1	4.160		
18,900.0	9,195.0	18,136.0	8,435.5	181.4	171.5	-49.82	-9,860.6	1,460.6	1,178.6	892.5	4.119		
19,000.0	9,195.0	18,230.0	8,435.1	183.2	173.1	-49.80	-9,954.6	1,461.1	1,178.8	890.0	4.081		
19,100.0	9,195.0	18,230.0	8,435.1	185.0	173.1	-49.80	-9,954.6	1,461.1	1,183.9	893.6	4.078 SF		
19,200.0	9,195.0	18,230.0	8,435.1	186.8	173.1	-49.80	-9,954.6	1,461.1	1,197.4	905.6	4.104		
19,300.0	9,195.0	18,230.0	8,435.1	188.6	173.1	-49.80	-9,954.6	1,461.1	1,218.9	925.7	4.157		
19,329.1	9,195.0	18,230.0	8,435.1	189.2	173.1	-49.80	-9,954.6	1,461.1	1,226.7	933.0	4.177		



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Paduca Federal 30 #1 - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 285-INC												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	1.0	1.0	0.0	0.0	137.31	-1,756.4	1,620.2	2,389.6				
100.0	100.0	103.8	103.8	0.1	1.4	137.31	-1,756.4	1,620.2	2,389.5	2,388.1	1,668.003		
200.0	200.0	206.6	206.6	0.3	2.8	137.31	-1,756.1	1,620.2	2,389.3	2,386.3	794.970		
300.0	300.0	309.5	309.5	0.5	4.8	137.30	-1,755.7	1,620.2	2,389.1	2,384.0	473.298		
400.0	400.0	413.2	413.2	0.7	8.5	137.29	-1,755.1	1,620.2	2,388.6	2,380.0	277.308		
500.0	500.0	516.8	516.8	1.0	12.2	137.28	-1,754.3	1,620.2	2,388.0	2,375.9	195.987		
600.0	600.0	620.5	620.4	1.2	15.9	137.26	-1,753.2	1,620.2	2,387.3	2,371.5	151.511		
700.0	700.0	724.0	724.0	1.4	19.7	137.24	-1,752.0	1,620.2	2,386.4	2,367.0	123.238		
800.0	800.0	826.3	826.2	1.6	24.8	137.21	-1,750.6	1,620.2	2,385.4	2,361.5	99.979		
900.0	900.0	928.5	928.4	1.9	29.9	137.19	-1,749.0	1,620.2	2,384.3	2,355.9	84.040		
1,000.0	1,000.0	1,030.7	1,030.6	2.1	35.0	137.16	-1,747.3	1,620.2	2,383.1	2,350.2	72.453		
1,100.0	1,100.0	1,131.5	1,131.5	2.3	40.5	54.46	-1,745.6	1,620.2	2,380.8	2,346.5	69.442		
1,193.9	1,193.8	1,225.3	1,225.2	2.5	45.9	54.59	-1,744.0	1,620.2	2,376.8	2,338.5	62.112		
1,200.0	1,199.8	1,231.4	1,231.3	2.5	46.3	54.60	-1,743.9	1,620.2	2,376.5	2,338.0	61.683		
1,300.0	1,299.6	1,331.1	1,331.0	2.7	52.0	54.70	-1,742.1	1,620.2	2,371.3	2,328.5	55.393		
1,400.0	1,399.4	1,430.9	1,430.8	3.0	57.7	54.81	-1,740.4	1,620.2	2,366.1	2,319.0	50.246		
1,500.0	1,499.2	1,530.7	1,530.6	3.2	63.5	54.91	-1,738.6	1,620.2	2,360.9	2,309.5	45.932		
1,600.0	1,598.9	1,630.5	1,630.3	3.4	69.3	55.02	-1,736.9	1,620.2	2,355.7	2,300.0	42.278		
1,700.0	1,698.7	1,730.2	1,730.1	3.6	75.1	55.13	-1,735.1	1,620.2	2,350.6	2,290.5	39.155		
1,800.0	1,798.5	1,830.0	1,829.8	3.9	80.9	55.23	-1,733.4	1,620.2	2,345.4	2,281.1	36.456		
1,900.0	1,898.2	1,930.2	1,930.0	4.1	86.7	55.34	-1,731.7	1,620.2	2,340.2	2,271.6	34.087		
2,000.0	1,998.0	2,044.3	2,044.1	4.4	96.8	55.46	-1,729.2	1,620.2	2,334.8	2,259.2	30.905		
2,100.0	2,097.8	2,159.3	2,159.1	4.6	110.0	55.56	-1,725.7	1,620.2	2,328.7	2,244.3	27.588		
2,200.0	2,197.5	2,274.3	2,273.9	4.9	123.3	55.64	-1,721.2	1,620.2	2,321.9	2,228.6	24.887		
2,300.0	2,297.3	2,389.2	2,388.7	5.1	136.5	55.71	-1,715.7	1,620.2	2,314.5	2,212.3	22.643		
2,400.0	2,397.1	2,488.9	2,488.3	5.3	152.6	55.76	-1,710.5	1,620.2	2,306.8	2,193.9	20.434		
2,500.0	2,496.9	2,588.6	2,587.9	5.6	168.8	55.81	-1,705.3	1,620.2	2,299.1	2,175.5	18.601		
2,600.0	2,596.6	2,688.3	2,687.4	5.8	185.0	55.87	-1,700.0	1,620.2	2,291.4	2,157.1	17.058		
2,700.0	2,696.4	2,807.2	2,806.1	6.1	207.0	55.92	-1,692.9	1,620.2	2,283.1	2,134.2	15.340		
2,800.0	2,796.2	2,897.9	2,896.6	6.3	224.4	55.95	-1,687.3	1,620.2	2,274.7	2,114.4	14.190		
2,900.0	2,895.9	2,994.8	2,993.3	6.6	241.7	56.00	-1,681.8	1,620.2	2,266.6	2,094.8	13.196		
3,000.0	2,995.7	3,100.1	3,098.5	6.8	260.9	56.04	-1,675.7	1,620.2	2,258.5	2,074.0	12.242		
3,100.0	3,095.5	3,194.7	3,192.9	7.1	278.3	56.09	-1,670.1	1,620.2	2,250.3	2,054.2	11.480		
3,200.0	3,195.3	3,297.5	3,295.5	7.3	297.3	56.13	-1,664.0	1,620.2	2,242.0	2,033.5	10.750		
3,300.0	3,295.0	3,393.4	3,391.3	7.6	314.7	56.18	-1,658.5	1,620.2	2,233.9	2,013.9	10.152		
3,400.0	3,394.8	3,499.4	3,497.1	7.8	334.1	56.22	-1,652.4	1,620.2	2,225.8	1,993.0	9.561		
3,500.0	3,494.6	3,595.1	3,592.6	8.1	351.8	56.27	-1,646.7	1,620.2	2,217.5	1,973.1	9.070		
3,600.0	3,594.3	3,695.9	3,693.2	8.3	370.4	56.31	-1,640.9	1,620.2	2,209.4	1,952.7	8.606		
3,700.0	3,694.1	3,799.3	3,796.5	8.6	389.9	56.36	-1,634.6	1,620.2	2,201.1	1,931.7	8.168		
3,800.0	3,793.9	3,898.9	3,895.9	8.8	409.0	56.40	-1,628.5	1,620.2	2,192.8	1,910.7	7.774		
3,900.0	3,893.7	3,996.6	3,993.4	9.1	427.5	56.44	-1,622.6	1,620.2	2,184.4	1,890.2	7.425		
4,000.0	3,993.4	4,086.0	4,082.7	9.3	443.5	56.49	-1,617.5	1,620.2	2,176.4	1,871.7	7.144		
4,100.0	4,093.2	4,180.1	4,176.6	9.6	458.8	56.55	-1,612.6	1,620.2	2,168.8	1,854.1	6.893		
4,200.0	4,193.0	4,273.8	4,270.3	9.8	473.3	56.61	-1,608.1	1,620.2	2,161.3	1,837.3	6.669		
4,300.0	4,292.7	4,358.9	4,355.2	10.1	484.5	56.67	-1,604.5	1,620.2	2,154.4	1,823.1	6.503		
4,400.0	4,392.5	4,459.8	4,456.1	10.4	497.3	56.76	-1,600.8	1,620.2	2,147.9	1,808.5	6.328		
4,500.0	4,492.3	4,567.7	4,563.8	10.6	510.8	56.85	-1,596.4	1,620.2	2,141.1	1,793.1	6.153		
4,600.0	4,592.1	4,662.4	4,658.5	10.9	522.6	56.92	-1,592.4	1,620.2	2,134.2	1,778.7	6.003		
4,700.0	4,691.8	4,756.5	4,752.6	11.1	534.4	57.00	-1,588.8	1,620.2	2,127.6	1,764.6	5.862		
4,800.0	4,791.6	4,851.9	4,847.9	11.4	545.4	57.09	-1,585.4	1,620.2	2,121.2	1,751.3	5.735		
4,900.0	4,891.4	4,948.9	4,944.8	11.6	555.6	57.18	-1,582.2	1,620.2	2,115.0	1,738.8	5.622		
5,000.0	4,991.1	5,045.9	5,041.8	11.9	565.7	57.28	-1,579.1	1,620.2	2,108.9	1,726.4	5.514		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
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Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Paduca Federal 30 #1 - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 285-INC												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
5,100.0	5,090.9	5,145.3	5,141.1	12.1	575.6	57.38	-1,576.1	1,620.2	2,102.9	1,714.5	5.414		
5,200.0	5,190.7	5,245.0	5,240.8	12.4	585.3	57.48	-1,573.0	1,620.2	2,096.9	1,702.6	5.317		
5,300.0	5,290.5	5,344.8	5,340.5	12.6	595.1	57.59	-1,570.0	1,620.2	2,090.9	1,690.7	5.224		
5,400.0	5,390.2	5,444.5	5,440.2	12.9	604.9	57.69	-1,566.9	1,620.2	2,085.0	1,678.8	5.134		
5,500.0	5,490.0	5,543.0	5,538.7	13.1	614.0	57.79	-1,564.0	1,620.2	2,079.0	1,667.5	5.052		
5,600.0	5,589.8	5,641.3	5,636.9	13.4	622.9	57.90	-1,561.1	1,620.2	2,073.2	1,656.3	4.974		
5,700.0	5,689.5	5,739.6	5,735.2	13.6	631.9	58.00	-1,558.3	1,620.2	2,067.4	1,645.3	4.898		
5,800.0	5,789.3	5,837.9	5,833.4	13.9	640.9	58.11	-1,555.6	1,620.2	2,061.7	1,634.4	4.825		
5,900.0	5,889.1	5,936.1	5,931.6	14.2	649.7	58.22	-1,553.0	1,620.2	2,056.0	1,623.7	4.755		
6,000.0	5,988.8	6,033.8	6,029.3	14.4	657.3	58.34	-1,550.5	1,620.2	2,050.5	1,613.8	4.696		
6,100.0	6,088.6	6,131.6	6,127.0	14.7	664.9	58.45	-1,548.1	1,620.2	2,045.1	1,604.1	4.638		
6,200.0	6,188.4	6,229.3	6,224.7	14.9	672.5	58.57	-1,545.9	1,620.2	2,039.7	1,594.6	4.582		
6,300.0	6,288.2	6,329.6	6,325.0	15.2	680.3	58.70	-1,543.7	1,620.2	2,034.5	1,585.1	4.527		
6,400.0	6,387.9	6,431.2	6,426.5	15.4	688.2	58.82	-1,541.3	1,620.2	2,029.2	1,575.5	4.473		
6,500.0	6,487.7	6,532.7	6,528.0	15.7	696.1	58.94	-1,538.9	1,620.2	2,023.8	1,565.8	4.419		
6,600.0	6,587.5	6,634.2	6,629.5	15.9	704.0	59.07	-1,536.3	1,620.2	2,018.3	1,556.1	4.366		
6,700.0	6,687.2	6,733.1	6,728.4	16.2	711.7	59.19	-1,533.7	1,620.2	2,012.8	1,546.4	4.316		
6,800.0	6,787.0	6,831.2	6,826.4	16.4	719.3	59.31	-1,531.3	1,620.2	2,007.4	1,536.9	4.267		
6,900.0	6,886.8	6,929.3	6,924.5	16.7	726.9	59.43	-1,529.0	1,620.2	2,002.0	1,527.6	4.220		
7,000.0	6,986.6	7,027.4	7,022.5	16.9	734.6	59.55	-1,526.8	1,620.2	1,996.8	1,518.4	4.174		
7,100.0	7,086.3	7,124.3	7,119.5	17.2	740.8	59.68	-1,524.7	1,620.2	1,991.7	1,510.1	4.136		
7,200.0	7,186.1	7,220.7	7,215.9	17.5	746.4	59.81	-1,522.8	1,620.2	1,986.7	1,502.5	4.103		
7,300.0	7,285.9	7,317.2	7,312.3	17.7	751.9	59.94	-1,521.2	1,620.2	1,982.0	1,495.1	4.071		
7,400.0	7,385.6	7,413.6	7,408.7	18.0	757.5	60.08	-1,519.7	1,620.2	1,977.4	1,488.0	4.041		
7,500.0	7,485.4	7,511.9	7,507.0	18.2	762.4	60.23	-1,518.4	1,620.2	1,973.0	1,481.5	4.014		
7,600.0	7,585.2	7,611.7	7,606.8	18.5	766.8	60.37	-1,517.1	1,620.2	1,968.6	1,475.3	3.991		
7,700.0	7,685.0	7,711.5	7,706.5	18.7	771.2	60.52	-1,515.8	1,620.2	1,964.2	1,469.2	3.968		
7,800.0	7,784.7	7,811.2	7,806.3	19.0	775.7	60.67	-1,514.5	1,620.2	1,959.8	1,463.1	3.946		
7,900.0	7,884.5	7,911.0	7,906.1	19.2	780.1	60.82	-1,513.2	1,620.2	1,955.4	1,457.0	3.924		
8,000.0	7,984.3	8,009.2	8,004.2	19.5	783.8	60.97	-1,511.9	1,620.2	1,951.1	1,451.4	3.905		
8,100.0	8,084.0	8,107.2	8,102.3	19.7	787.5	61.12	-1,510.8	1,620.2	1,946.9	1,446.0	3.887		
8,200.0	8,183.8	8,205.3	8,200.3	20.0	791.2	61.27	-1,509.8	1,620.2	1,942.8	1,440.7	3.869		
8,300.0	8,283.6	8,303.4	8,298.4	20.3	794.9	61.43	-1,508.9	1,620.2	1,938.8	1,435.5	3.852		
8,400.0	8,383.4	8,403.0	8,398.1	20.5	798.0	61.59	-1,508.0	1,620.2	1,934.8	1,430.8	3.838		
8,445.0	8,428.2	8,447.9	8,443.0	20.6	799.4	61.66	-1,507.6	1,620.2	1,933.1	1,428.7	3.832		
8,500.0	8,483.2	8,502.8	8,497.9	20.7	801.1	61.70	-1,507.1	1,620.2	1,931.2	1,425.4	3.818		
8,600.0	8,583.1	8,602.8	8,597.8	20.9	804.2	61.73	-1,506.2	1,620.2	1,929.0	1,420.7	3.795		
8,638.9	8,622.0	8,641.7	8,636.7	21.0	805.4	144.47	-1,505.9	1,620.2	1,928.6	1,423.2	3.816		
8,650.0	8,633.1	8,652.8	8,647.8	21.0	805.8	-35.19	-1,505.8	1,620.2	1,928.4	1,418.8	3.784		
8,700.0	8,683.0	8,702.6	8,697.6	21.1	807.3	-35.42	-1,505.4	1,620.2	1,925.5	1,412.8	3.756		
8,750.0	8,732.4	8,751.5	8,746.5	21.2	808.6	-35.94	-1,505.0	1,620.2	1,919.0	1,400.7	3.702		
8,800.0	8,781.0	8,799.1	8,794.2	21.2	809.8	-36.75	-1,504.6	1,620.2	1,909.1	1,382.5	3.625		
8,850.0	8,828.4	8,845.6	8,840.6	21.3	810.9	-37.87	-1,504.2	1,620.2	1,895.9	1,358.2	3.526		
8,900.0	8,874.2	8,890.5	8,885.6	21.4	812.0	-39.32	-1,503.9	1,620.2	1,879.5	1,327.7	3.406		
8,950.0	8,918.0	8,933.6	8,928.6	21.5	813.1	-41.13	-1,503.6	1,620.2	1,860.0	1,290.8	3.268		
9,000.0	8,959.7	8,974.4	8,969.4	21.6	814.1	-43.34	-1,503.4	1,620.2	1,837.7	1,247.6	3.114		
9,050.0	8,998.7	9,012.7	9,007.7	21.6	815.0	-45.98	-1,503.1	1,620.2	1,812.7	1,198.3	2.950		
9,100.0	9,034.9	9,048.1	9,043.1	21.7	815.9	-49.06	-1,502.9	1,620.2	1,785.5	1,143.3	2.780		
9,150.0	9,068.0	9,080.5	9,075.5	21.9	816.7	-52.63	-1,502.8	1,620.2	1,756.1	1,083.4	2.610		
9,200.0	9,097.6	9,109.6	9,104.6	22.0	817.4	-56.66	-1,502.6	1,620.2	1,725.1	1,019.9	2.446		
9,250.0	9,123.7	9,135.4	9,130.4	22.2	818.1	-61.16	-1,502.5	1,620.2	1,692.6	954.5	2.293		
9,300.0	9,145.9	9,157.9	9,153.0	22.4	818.8	-66.06	-1,502.4	1,620.2	1,659.0	889.6	2.156		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Paduca Federal 30 #1 - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 285-INC												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
9,350.0	9,164.1	9,176.3	9,171.4	22.6	819.3	-71.22	-1,502.3	1,620.2	1,624.6	827.8	2.039		
9,400.0	9,178.2	9,190.5	9,185.5	22.9	819.8	-76.49	-1,502.3	1,620.2	1,589.9	771.4	1.942		
9,450.0	9,188.1	9,200.3	9,195.3	23.2	820.1	-81.70	-1,502.2	1,620.2	1,555.2	721.9	1.866		
9,500.0	9,193.6	9,205.7	9,200.7	23.5	820.3	-86.68	-1,502.2	1,620.2	1,520.9	678.8	1.808		
9,538.9	9,195.0	9,206.8	9,201.8	23.8	820.3	-90.30	-1,502.2	1,620.2	1,494.6	651.8	1.773		
9,600.0	9,195.0	9,206.4	9,201.4	24.2	820.3	-90.28	-1,502.2	1,620.2	1,454.4	611.2	1.725		
9,700.0	9,195.0	9,205.8	9,200.8	25.1	820.3	-90.25	-1,502.2	1,620.2	1,392.0	548.0	1.649		
9,800.0	9,195.0	9,205.2	9,200.2	26.0	820.2	-90.22	-1,502.2	1,620.2	1,334.2	489.2	1.579		
9,900.0	9,195.0	9,204.6	9,199.6	27.1	820.2	-90.19	-1,502.2	1,620.2	1,281.5	435.5	1.515		
10,000.0	9,195.0	9,204.0	9,199.1	28.2	820.2	-90.16	-1,502.2	1,620.2	1,234.7	387.5	1.457	Level 3	
10,100.0	9,195.0	9,203.5	9,198.5	29.4	820.2	-90.13	-1,502.2	1,620.2	1,194.5	346.1	1.408	Level 3	
10,200.0	9,195.0	9,202.9	9,197.9	30.6	820.2	-90.10	-1,502.2	1,620.2	1,161.5	311.9	1.367	Level 3	
10,300.0	9,195.0	9,202.3	9,197.3	31.9	820.2	-90.07	-1,502.2	1,620.2	1,136.4	285.4	1.335	Level 3	
10,400.0	9,195.0	9,201.7	9,196.7	33.3	820.1	-90.04	-1,502.2	1,620.2	1,119.7	267.3	1.314	Level 3	
10,500.0	9,195.0	9,201.1	9,196.1	34.7	820.1	-90.01	-1,502.2	1,620.2	1,111.8	258.0	1.302	Level 3	
10,538.5	9,195.0	9,200.9	9,195.9	35.2	820.1	-90.00	-1,502.2	1,620.2	1,111.1	256.7	1.300	Level 3, CC, ES, SF	
10,600.0	9,195.0	9,200.6	9,195.6	36.1	820.1	-89.98	-1,502.2	1,620.2	1,112.8	257.5	1.301	Level 3	
10,700.0	9,195.0	9,200.0	9,195.0	37.6	820.1	-89.95	-1,502.2	1,620.2	1,122.8	266.0	1.311	Level 3	
10,800.0	9,195.0	9,199.4	9,194.4	39.1	820.1	-89.92	-1,502.2	1,620.2	1,141.5	283.2	1.330	Level 3	
10,900.0	9,195.0	9,198.8	9,193.9	40.6	820.0	-89.89	-1,502.2	1,620.2	1,168.4	308.6	1.359	Level 3	
11,000.0	9,195.0	9,198.3	9,193.3	42.2	820.0	-89.86	-1,502.2	1,620.2	1,203.1	341.8	1.397	Level 3	
11,100.0	9,195.0	9,197.7	9,192.7	43.7	820.0	-89.83	-1,502.2	1,620.2	1,244.9	382.0	1.443	Level 3	
11,200.0	9,195.0	9,197.1	9,192.2	45.3	820.0	-89.80	-1,502.2	1,620.2	1,293.1	428.6	1.496	Level 3	
11,300.0	9,195.0	9,196.6	9,191.6	46.9	820.0	-89.78	-1,502.2	1,620.2	1,347.0	480.8	1.555		
11,400.0	9,195.0	9,196.0	9,191.0	48.5	820.0	-89.75	-1,502.2	1,620.2	1,405.9	538.2	1.620		
11,500.0	9,195.0	9,195.5	9,190.5	50.2	819.9	-89.72	-1,502.2	1,620.2	1,469.3	599.9	1.690		
11,600.0	9,195.0	9,194.9	9,189.9	51.8	819.9	-89.69	-1,502.2	1,620.2	1,536.6	665.6	1.764		
11,700.0	9,195.0	9,194.4	9,189.4	53.5	819.9	-89.66	-1,502.2	1,620.2	1,607.3	734.6	1.842		
11,800.0	9,195.0	9,193.8	9,188.8	55.1	819.9	-89.63	-1,502.2	1,620.2	1,681.0	806.6	1.922		
11,900.0	9,195.0	9,193.3	9,188.3	56.8	819.9	-89.60	-1,502.2	1,620.2	1,757.3	881.2	2.006		
12,000.0	9,195.0	9,192.7	9,187.7	58.5	819.9	-89.58	-1,502.2	1,620.2	1,835.9	958.1	2.092		
12,100.0	9,195.0	9,192.2	9,187.2	60.2	819.8	-89.55	-1,502.2	1,620.2	1,916.4	1,037.0	2.179		
12,200.0	9,195.0	9,191.6	9,186.6	61.9	819.8	-89.52	-1,502.2	1,620.2	1,998.7	1,117.6	2.268		
12,300.0	9,195.0	9,191.1	9,186.1	63.6	819.8	-89.49	-1,502.2	1,620.2	2,082.6	1,199.8	2.359		
12,400.0	9,195.0	9,190.5	9,185.6	65.3	819.8	-89.46	-1,502.3	1,620.2	2,167.8	1,283.3	2.451		
12,500.0	9,195.0	9,190.0	9,185.0	67.1	819.8	-89.44	-1,502.3	1,620.2	2,254.3	1,368.0	2.544		
12,600.0	9,195.0	9,189.5	9,184.5	68.8	819.8	-89.41	-1,502.3	1,620.2	2,341.8	1,453.8	2.637		
12,700.0	9,195.0	9,188.9	9,184.0	70.5	819.7	-89.38	-1,502.3	1,620.2	2,430.3	1,540.6	2.732		
12,800.0	9,195.0	9,188.4	9,183.4	72.2	819.7	-89.35	-1,502.3	1,620.2	2,519.7	1,628.2	2.826		
12,900.0	9,195.0	9,187.9	9,182.9	74.0	819.7	-89.33	-1,502.3	1,620.2	2,609.8	1,716.6	2.922		
13,000.0	9,195.0	9,187.4	9,182.4	75.7	819.7	-89.30	-1,502.3	1,620.2	2,700.6	1,805.7	3.018		
13,100.0	9,195.0	9,186.8	9,181.8	77.5	819.7	-89.27	-1,502.3	1,620.2	2,792.0	1,895.4	3.114		
13,200.0	9,195.0	9,186.3	9,181.3	79.2	819.7	-89.24	-1,502.3	1,620.2	2,884.1	1,985.7	3.210		
13,300.0	9,195.0	9,185.8	9,180.8	81.0	819.6	-89.22	-1,502.3	1,620.2	2,976.6	2,076.5	3.307		
13,400.0	9,195.0	9,185.3	9,180.3	82.7	819.6	-89.19	-1,502.3	1,620.2	3,069.6	2,167.7	3.404		
13,500.0	9,195.0	9,184.7	9,179.8	84.5	819.6	-89.16	-1,502.3	1,620.2	3,163.0	2,259.4	3.500		
13,600.0	9,195.0	9,184.2	9,179.2	86.3	819.6	-89.14	-1,502.3	1,620.2	3,256.8	2,351.5	3.597		
13,700.0	9,195.0	9,183.7	9,178.7	88.0	819.6	-89.11	-1,502.3	1,620.2	3,351.0	2,443.9	3.694		
13,800.0	9,195.0	9,183.2	9,178.2	89.8	819.6	-89.08	-1,502.3	1,620.2	3,445.5	2,536.6	3.791		
13,900.0	9,195.0	9,182.7	9,177.7	91.6	819.5	-89.06	-1,502.3	1,620.2	3,540.3	2,629.7	3.888		
14,000.0	9,195.0	9,182.2	9,177.2	93.3	819.5	-89.03	-1,502.3	1,620.2	3,635.4	2,723.0	3.985		
14,100.0	9,195.0	9,181.7	9,176.7	95.1	819.5	-89.01	-1,502.3	1,620.2	3,730.7	2,816.6	4.081		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Paduca Federal 30 #1 - Wellbore #1 - Wellbore #1											Offset Site Error:	0.0 usft
Survey Program: 285-INC											Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
14,200.0	9,195.0	9,181.2	9,176.2	96.9	819.5	-88.98	-1,502.3	1,620.2	3,826.3	2,910.4		
14,300.0	9,195.0	9,180.7	9,175.7	98.7	819.5	-88.95	-1,502.3	1,620.2	3,922.1	3,004.4		
14,400.0	9,195.0	9,180.2	9,175.2	100.4	819.5	-88.93	-1,502.3	1,620.2	4,018.1	3,098.7		
14,500.0	9,195.0	9,179.7	9,174.7	102.2	819.4	-88.90	-1,502.3	1,620.2	4,114.3	3,193.1		
14,600.0	9,195.0	9,179.2	9,174.2	104.0	819.4	-88.88	-1,502.3	1,620.2	4,210.7	3,287.7		
14,700.0	9,195.0	9,178.7	9,173.7	105.8	819.4	-88.85	-1,502.3	1,620.2	4,307.2	3,382.5		
14,800.0	9,195.0	9,178.2	9,173.2	107.6	819.4	-88.82	-1,502.3	1,620.2	4,403.9	3,477.4		
14,900.0	9,195.0	9,177.7	9,172.7	109.3	819.4	-88.80	-1,502.3	1,620.2	4,500.7	3,572.5		
15,000.0	9,195.0	9,177.2	9,172.2	111.1	819.4	-88.77	-1,502.3	1,620.2	4,597.7	3,667.7		
15,100.0	9,195.0	9,176.7	9,171.7	112.9	819.4	-88.75	-1,502.3	1,620.2	4,694.8	3,763.0		
15,200.0	9,195.0	9,176.2	9,171.2	114.7	819.3	-88.72	-1,502.3	1,620.2	4,792.0	3,858.4		
15,300.0	9,195.0	9,175.7	9,170.7	116.5	819.3	-88.70	-1,502.3	1,620.2	4,889.3	3,954.0		
15,400.0	9,195.0	9,175.2	9,170.2	118.3	819.3	-88.67	-1,502.3	1,620.2	4,986.8	4,049.7		
15,500.0	9,195.0	9,174.7	9,169.7	120.1	819.3	-88.65	-1,502.3	1,620.2	5,084.3	4,145.4		
15,600.0	9,195.0	9,174.3	9,169.3	121.9	819.3	-88.62	-1,502.3	1,620.2	5,181.9	4,241.3		
15,700.0	9,195.0	9,173.8	9,168.8	123.7	819.3	-88.60	-1,502.3	1,620.2	5,279.6	4,337.2		
15,800.0	9,195.0	9,173.3	9,168.3	125.5	819.2	-88.57	-1,502.3	1,620.2	5,377.4	4,433.3		
15,900.0	9,195.0	9,172.8	9,167.8	127.3	819.2	-88.55	-1,502.3	1,620.2	5,475.3	4,529.4		
16,000.0	9,195.0	9,172.3	9,167.4	129.1	819.2	-88.52	-1,502.3	1,620.2	5,573.3	4,625.5		
16,100.0	9,195.0	9,171.9	9,166.9	130.9	819.2	-88.50	-1,502.4	1,620.2	5,671.3	4,721.8		
16,200.0	9,195.0	9,171.4	9,166.4	132.7	819.2	-88.48	-1,502.4	1,620.2	5,769.4	4,818.1		
16,300.0	9,195.0	9,170.9	9,165.9	134.5	819.2	-88.45	-1,502.4	1,620.2	5,867.5	4,914.5		
16,400.0	9,195.0	9,170.5	9,165.5	136.3	819.2	-88.43	-1,502.4	1,620.2	5,965.8	5,010.9		
16,500.0	9,195.0	9,170.0	9,165.0	138.1	819.1	-88.40	-1,502.4	1,620.2	6,064.0	5,107.4		
16,600.0	9,195.0	9,169.5	9,164.5	139.9	819.1	-88.38	-1,502.4	1,620.2	6,162.4	5,204.0		
16,700.0	9,195.0	9,169.1	9,164.1	141.7	819.1	-88.36	-1,502.4	1,620.2	6,260.8	5,300.6		
16,800.0	9,195.0	9,168.6	9,163.6	143.5	819.1	-88.33	-1,502.4	1,620.2	6,359.2	5,397.2		
16,900.0	9,195.0	9,168.1	9,163.1	145.3	819.1	-88.31	-1,502.4	1,620.2	6,457.7	5,494.0		
17,000.0	9,195.0	9,167.7	9,162.7	147.1	819.1	-88.28	-1,502.4	1,620.2	6,556.2	5,590.7		
17,100.0	9,195.0	9,167.2	9,162.2	148.9	819.1	-88.26	-1,502.4	1,620.2	6,654.8	5,687.5		
17,200.0	9,195.0	9,166.7	9,161.8	150.7	819.0	-88.24	-1,502.4	1,620.2	6,753.4	5,784.3		
17,300.0	9,195.0	9,166.3	9,161.3	152.5	819.0	-88.21	-1,502.4	1,620.2	6,852.1	5,881.2		
17,400.0	9,195.0	9,165.8	9,160.8	154.3	819.0	-88.19	-1,502.4	1,620.2	6,950.8	5,978.1		
17,500.0	9,195.0	9,165.4	9,160.4	156.1	819.0	-88.17	-1,502.4	1,620.2	7,049.5	6,075.1		
17,600.0	9,195.0	9,164.9	9,159.9	157.9	819.0	-88.14	-1,502.4	1,620.2	7,148.3	6,172.1		
17,700.0	9,195.0	9,164.5	9,159.5	159.7	819.0	-88.12	-1,502.4	1,620.2	7,247.1	6,269.1		
17,800.0	9,195.0	9,164.0	9,159.0	161.5	819.0	-88.10	-1,502.4	1,620.2	7,345.9	6,366.1		
17,900.0	9,195.0	9,163.6	9,158.6	163.3	818.9	-88.07	-1,502.4	1,620.2	7,444.7	6,463.2		
18,000.0	9,195.0	9,163.1	9,158.2	165.1	818.9	-88.05	-1,502.4	1,620.2	7,543.6	6,560.3		
18,100.0	9,195.0	9,162.7	9,157.7	166.9	818.9	-88.03	-1,502.4	1,620.2	7,642.6	6,657.5		
18,200.0	9,195.0	9,162.3	9,157.3	168.7	818.9	-88.01	-1,502.4	1,620.2	7,741.5	6,754.6		
18,300.0	9,195.0	9,161.8	9,156.8	170.5	818.9	-87.98	-1,502.4	1,620.2	7,840.5	6,851.8		
18,400.0	9,195.0	9,161.4	9,156.4	172.3	818.9	-87.96	-1,502.4	1,620.2	7,939.5	6,949.0		
18,500.0	9,195.0	9,160.9	9,155.9	174.2	818.9	-87.94	-1,502.4	1,620.2	8,038.5	7,046.3		
18,600.0	9,195.0	9,160.5	9,155.5	176.0	818.8	-87.91	-1,502.4	1,620.2	8,137.6	7,143.5		
18,700.0	9,195.0	9,160.1	9,155.1	177.8	818.8	-87.89	-1,502.4	1,620.2	8,236.6	7,240.8		
18,800.0	9,195.0	9,159.6	9,154.6	179.6	818.8	-87.87	-1,502.4	1,620.2	8,335.7	7,338.1		
18,900.0	9,195.0	9,159.2	9,154.2	181.4	818.8	-87.85	-1,502.4	1,620.2	8,434.9	7,435.5		
19,000.0	9,195.0	9,158.8	9,153.8	183.2	818.8	-87.83	-1,502.4	1,620.2	8,534.0	7,532.8		
19,100.0	9,195.0	9,158.3	9,153.3	185.0	818.8	-87.80	-1,502.4	1,620.2	8,633.1	7,630.2		
19,200.0	9,195.0	9,157.9	9,152.9	186.8	818.8	-87.78	-1,502.4	1,620.2	8,732.3	7,727.6		
19,300.0	9,195.0	9,125.0	9,120.0	188.6	817.7	-86.09	-1,502.6	1,620.2	8,831.6	7,827.6		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Paduca Federal 30 #1 - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 285-INC												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
19,329.1	9,195.0	9,125.0	9,120.0	189.2	817.7	-86.09	-1,502.6	1,620.2	8,860.5	7,855.9	8.820		



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #2H - Wellbore #1 - Wellbore #1											Offset Site Error:	0.0 usft
Survey Program: 100-Good gyro, 9743-MWD default											Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	-82.80	19.0	-150.5	151.7			
100.0	100.0	97.4	97.4	0.1	0.0	-83.04	18.4	-150.7	151.8	1,423.509		
200.0	200.0	196.7	196.7	0.3	0.1	-83.51	17.2	-151.4	152.4	397.438		
300.0	300.0	297.1	297.1	0.5	0.1	-83.96	16.1	-152.2	153.1	231.560		
400.0	400.0	397.0	397.0	0.7	0.2	-84.38	15.1	-152.9	153.6	163.703		
500.0	500.0	497.2	497.1	1.0	0.3	-84.79	14.0	-153.5	154.2	126.797		
600.0	600.0	597.3	597.3	1.2	0.3	-85.15	13.1	-154.1	154.6	103.555		
700.0	700.0	696.8	696.8	1.4	0.4	-85.48	12.2	-154.7	155.2	87.656		
800.0	800.0	795.7	795.7	1.6	0.4	-85.86	11.3	-155.8	156.3	76.299		
900.0	900.0	897.2	897.1	1.9	0.5	-86.47	9.7	-157.0	157.3	67.599		
1,000.0	1,000.0	998.6	998.5	2.1	0.5	-87.25	7.6	-157.1	157.3	60.410		
1,012.7	1,012.7	1,011.4	1,011.3	2.1	0.5	-170.09	7.3	-157.1	157.3	59.423		
1,100.0	1,100.0	1,099.1	1,099.0	2.3	0.6	-170.81	5.6	-156.7	158.5	55.046		
1,193.9	1,193.8	1,194.7	1,194.6	2.5	0.6	-171.67	3.9	-155.5	162.1	51.971		
1,200.0	1,199.8	1,200.9	1,200.8	2.5	0.6	-171.72	3.8	-155.4	162.4	51.802		
1,300.0	1,299.6	1,300.0	1,299.8	2.7	0.7	-172.75	1.7	-153.9	167.6	49.325		
1,400.0	1,399.4	1,400.3	1,400.1	3.0	0.7	-173.62	-0.1	-152.5	172.9	47.228		
1,500.0	1,499.2	1,500.7	1,500.5	3.2	0.8	-174.25	-1.2	-150.7	177.9	45.280		
1,600.0	1,598.9	1,600.7	1,600.4	3.4	0.8	-174.81	-2.3	-148.7	182.7	43.524		
1,700.0	1,698.7	1,700.0	1,699.7	3.6	0.9	-175.22	-3.0	-146.9	187.5	41.995		
1,800.0	1,798.5	1,799.3	1,799.0	3.9	0.9	-175.50	-3.3	-145.3	192.7	40.693		
1,900.0	1,898.2	1,898.3	1,898.0	4.1	1.0	-175.63	-3.1	-144.2	198.3	39.615		
2,000.0	1,998.0	1,998.9	1,998.6	4.4	1.0	-175.56	-2.3	-143.1	203.9	38.646		
2,100.0	2,097.8	2,098.4	2,098.1	4.6	1.1	-175.37	-1.1	-141.9	209.5	37.749		
2,200.0	2,197.5	2,198.9	2,198.5	4.9	1.1	-175.09	0.6	-140.7	214.9	36.920		
2,300.0	2,297.3	2,301.1	2,300.7	5.1	1.2	-174.70	2.8	-138.8	219.7	36.042		
2,400.0	2,397.1	2,400.9	2,400.5	5.3	1.3	-174.32	5.0	-136.4	223.9	35.159		
2,500.0	2,496.9	2,501.2	2,500.7	5.6	1.3	-174.07	6.7	-133.9	228.2	34.332		
2,600.0	2,596.6	2,600.8	2,600.2	5.8	1.4	-173.93	8.0	-131.4	232.4	33.568		
2,700.0	2,696.4	2,700.0	2,699.4	6.1	1.4	-173.81	9.3	-129.3	236.9	32.909		
2,800.0	2,796.2	2,800.0	2,799.4	6.3	1.5	-173.72	10.4	-127.0	241.4	32.286		
2,900.0	2,895.9	2,897.3	2,896.7	6.6	1.5	-173.66	11.4	-125.2	246.2	31.760		
3,000.0	2,995.7	2,993.2	2,992.6	6.8	1.6	-173.58	12.5	-124.9	252.6	31.458		
3,100.0	3,095.5	3,091.7	3,091.1	7.1	1.6	-173.44	13.9	-125.6	260.0	31.299		
3,200.0	3,195.3	3,190.5	3,189.9	7.3	1.7	-173.25	15.5	-126.6	267.8	31.191		
3,300.0	3,295.0	3,291.8	3,291.1	7.6	1.7	-173.04	17.3	-127.6	275.4	31.074		
3,400.0	3,394.8	3,390.5	3,389.8	7.8	1.8	-172.82	19.2	-128.4	283.0	30.947		
3,500.0	3,494.6	3,490.8	3,490.1	8.1	1.8	-172.57	21.3	-129.4	290.6	30.840		
3,600.0	3,594.3	3,591.0	3,590.2	8.3	1.9	-172.33	23.4	-130.1	298.1	30.716		
3,700.0	3,694.1	3,690.3	3,689.5	8.6	1.9	-172.09	25.6	-130.8	305.5	30.597		
3,800.0	3,793.9	3,790.2	3,789.4	8.8	2.0	-171.80	28.1	-131.6	313.0	30.488		
3,900.0	3,893.7	3,890.6	3,889.7	9.1	2.0	-171.50	30.8	-132.2	320.3	30.371		
4,000.0	3,993.4	3,992.9	3,992.0	9.3	2.1	-171.34	32.7	-132.4	327.2	30.215		
4,100.0	4,093.2	4,093.3	4,092.5	9.6	2.1	-171.36	33.6	-132.0	333.6	30.023		
4,200.0	4,193.0	4,194.3	4,193.4	9.8	2.2	-171.39	34.5	-131.4	339.7	29.818		
4,300.0	4,292.7	4,294.8	4,293.9	10.1	2.2	-171.51	34.7	-130.5	345.5	29.602		
4,400.0	4,392.5	4,396.1	4,395.3	10.4	2.3	-171.79	34.0	-129.4	351.1	29.371		
4,500.0	4,492.3	4,494.0	4,493.1	10.6	2.3	-172.09	33.1	-128.3	356.7	29.159		
4,600.0	4,592.1	4,593.1	4,592.2	10.9	2.4	-172.34	32.4	-127.6	362.6	28.986		
4,700.0	4,691.8	4,691.9	4,691.0	11.1	2.5	-172.55	32.0	-127.1	368.9	28.838		
4,800.0	4,791.6	4,791.4	4,790.5	11.4	2.5	-172.77	31.4	-126.8	375.3	28.712		
4,900.0	4,891.4	4,890.4	4,889.5	11.6	2.6	-173.04	30.4	-126.7	381.8	28.602		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design											Offset Site Error:	0.0 usft
Sec 30 T24-S R32-E - Windward Federal #2H - Wellbore #1 - Wellbore #1											Offset Well Error:	0.0 usft
Survey Program: 100-Good_gyro, 9743-MWD default												
Reference	Measured	Vertical	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore	Distance	Distance	Separation	Warning
Depth	Depth	Depth	Depth	Depth	Reference	Offset	Toolface	+N/-S	Between	Between	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	Centres	Ellipses		
								(usft)	(usft)	(usft)		
5,000.0	4,991.1	4,988.7	4,987.8	11.9	2.6	-173.29	29.6	-126.8	388.7	375.0	28.517	
5,100.0	5,090.9	5,087.0	5,086.0	12.1	2.7	-173.50	28.9	-127.3	395.9	382.0	28.464	
5,200.0	5,190.7	5,187.2	5,186.3	12.4	2.7	-173.69	28.3	-127.9	403.3	389.1	28.422	
5,300.0	5,290.5	5,285.4	5,284.4	12.6	2.8	-173.85	27.9	-128.7	410.7	396.3	28.387	
5,400.0	5,390.2	5,385.5	5,384.6	12.9	2.8	-174.00	27.5	-129.6	418.4	403.7	28.367	
5,500.0	5,490.0	5,484.0	5,483.1	13.1	2.9	-174.17	26.9	-130.5	426.1	411.1	28.349	
5,600.0	5,589.8	5,584.5	5,583.6	13.4	2.9	-174.40	25.8	-131.6	433.9	418.6	28.339	
5,700.0	5,689.5	5,681.9	5,681.0	13.6	3.0	-174.61	24.8	-132.6	441.8	426.2	28.336	
5,800.0	5,789.3	5,782.4	5,781.4	13.9	3.0	-174.79	24.0	-134.1	449.9	434.1	28.350	
5,900.0	5,889.1	5,882.5	5,881.5	14.2	3.1	-174.92	23.5	-135.3	457.9	441.7	28.348	
6,000.0	5,988.8	5,980.2	5,979.3	14.4	3.1	-175.08	22.8	-136.6	466.0	449.5	28.358	
6,100.0	6,088.6	6,077.9	6,076.9	14.7	3.2	-175.22	22.1	-138.3	474.5	457.8	28.395	
6,200.0	6,188.4	6,177.0	6,176.0	14.9	3.2	-175.35	21.5	-140.4	483.4	466.4	28.447	
6,300.0	6,288.2	6,279.3	6,278.3	15.2	3.3	-175.43	21.3	-142.4	492.0	474.8	28.483	
6,400.0	6,387.9	6,381.9	6,380.9	15.4	3.3	-175.50	21.2	-143.7	500.1	482.5	28.481	
6,500.0	6,487.7	6,480.2	6,479.1	15.7	3.4	-175.66	20.2	-144.7	507.9	490.0	28.471	
6,600.0	6,587.5	6,580.4	6,579.3	15.9	3.4	-175.79	19.5	-145.9	515.9	497.8	28.472	
6,700.0	6,687.2	6,677.7	6,676.6	16.2	3.5	-175.87	19.2	-147.2	524.0	505.6	28.477	
6,800.0	6,787.0	6,775.8	6,774.7	16.4	3.5	-175.87	19.5	-149.0	532.5	513.8	28.508	
6,900.0	6,886.8	6,877.5	6,876.4	16.7	3.6	-175.89	19.8	-150.8	541.1	522.1	28.534	
7,000.0	6,986.6	6,976.3	6,975.1	16.9	3.6	-175.90	20.0	-152.4	549.3	530.1	28.547	
7,100.0	7,086.3	7,076.6	7,075.4	17.2	3.7	-175.91	20.4	-154.1	557.8	538.3	28.568	
7,200.0	7,186.1	7,176.9	7,175.8	17.5	3.7	-175.91	20.8	-155.6	566.0	546.2	28.577	
7,300.0	7,285.9	7,278.4	7,277.2	17.7	3.8	-175.90	21.3	-157.0	574.1	554.0	28.577	
7,400.0	7,385.6	7,386.7	7,385.6	18.0	3.9	-175.85	22.3	-157.6	581.3	561.0	28.532	
7,500.0	7,485.4	7,488.3	7,487.1	18.2	3.9	-175.77	23.6	-157.1	587.5	566.9	28.440	
7,600.0	7,585.2	7,589.0	7,587.8	18.5	4.0	-175.71	24.8	-156.4	593.5	572.6	28.345	
7,700.0	7,685.0	7,692.1	7,690.9	18.7	4.0	-175.68	25.7	-155.4	599.2	578.0	28.235	
7,800.0	7,784.7	7,795.1	7,793.9	19.0	4.1	-175.70	26.0	-153.8	604.4	582.9	28.102	
7,900.0	7,884.5	7,894.6	7,893.3	19.2	4.1	-175.78	25.8	-151.9	609.3	587.5	27.965	
8,000.0	7,984.3	7,990.0	7,988.8	19.5	4.2	-175.88	25.3	-150.5	614.6	592.5	27.851	
8,100.0	8,084.0	8,086.6	8,085.3	19.7	4.2	-176.00	24.5	-149.7	620.5	598.2	27.769	
8,200.0	8,183.8	8,184.2	8,183.0	20.0	4.3	-176.09	24.0	-149.3	626.9	604.3	27.707	
8,300.0	8,283.6	8,280.9	8,279.6	20.3	4.3	-176.21	23.1	-149.3	633.7	610.8	27.664	
8,400.0	8,383.4	8,384.7	8,383.4	20.5	4.4	-176.36	21.9	-149.3	640.5	617.3	27.621	
8,445.0	8,428.2	8,428.4	8,427.1	20.6	4.4	-176.44	21.3	-149.1	643.4	620.1	27.595	
8,500.0	8,483.2	8,479.5	8,478.2	20.7	4.4	-176.53	20.4	-149.1	646.7	623.2	27.572	
8,600.0	8,583.1	8,572.9	8,571.6	20.9	4.5	-176.70	18.6	-149.9	650.7	627.1	27.506	
8,638.9	8,622.0	8,610.1	8,608.7	21.0	4.5	-94.02	17.9	-150.4	651.6	627.5	26.981	
8,650.0	8,633.1	8,621.3	8,619.9	21.0	4.5	86.31	17.7	-150.6	651.8	628.1	27.434	
8,700.0	8,683.0	8,671.7	8,670.3	21.1	4.5	86.44	16.7	-151.4	652.4	628.6	27.331	
8,750.0	8,732.4	8,719.6	8,718.3	21.2	4.6	86.94	15.7	-152.1	652.8	628.9	27.222	
8,800.0	8,781.0	8,764.1	8,762.7	21.2	4.6	87.73	14.9	-153.0	653.4	629.3	27.122	
8,850.0	8,828.4	8,808.1	8,806.7	21.3	4.6	88.81	14.1	-154.2	654.3	630.1	27.035	
8,900.0	8,874.2	8,853.5	8,852.1	21.4	4.6	90.20	13.4	-155.6	655.8	631.5	26.965	
8,950.0	8,918.0	8,897.2	8,895.8	21.5	4.6	91.74	12.6	-157.0	658.0	633.6	26.922	
9,000.0	8,959.7	8,938.2	8,936.7	21.6	4.7	93.32	12.0	-158.3	661.4	636.8	26.926	
9,050.0	8,998.7	8,976.5	8,975.0	21.6	4.7	94.86	11.5	-159.6	666.3	641.6	26.993	
9,100.0	9,034.9	9,012.7	9,011.1	21.7	4.7	96.27	11.1	-160.8	673.1	648.2	27.001	
9,150.0	9,068.0	9,046.7	9,045.2	21.9	4.7	97.50	10.8	-162.0	682.2	657.0	27.039	
9,200.0	9,097.6	9,077.1	9,075.6	22.0	4.7	98.37	10.6	-162.9	693.9	668.4	27.173	
9,250.0	9,123.7	9,103.7	9,102.2	22.2	4.8	98.77	10.5	-163.8	708.4	682.5	27.410	

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002.
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 9743-MWD default												Offset Well Error:	0.0 usft
Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
9,300.0	9,145.9	9,126.6	9,125.0	22.4	4.8	98.65	10.4	-164.4	725.8	699.6	27.756		
9,350.0	9,164.1	9,145.4	9,143.8	22.6	4.8	97.91	10.4	-165.0	746.2	719.7	28.219		
9,400.0	9,178.2	9,160.1	9,158.5	22.9	4.8	96.48	10.3	-165.4	769.4	742.7	28.814		
9,450.0	9,188.1	9,170.4	9,168.8	23.2	4.8	94.32	10.3	-165.7	795.4	768.5	29.578		
9,500.0	9,193.6	9,176.4	9,174.8	23.5	4.8	91.39	10.2	-165.9	823.7	796.8	30.565		
9,538.9	9,195.0	9,177.9	9,176.3	23.8	4.8	88.58	10.2	-165.9	847.2	820.1	31.225		
9,600.0	9,195.0	9,178.2	9,176.6	24.2	4.8	88.60	10.2	-166.0	886.3	858.6	32.087		
9,700.0	9,195.0	9,178.7	9,177.1	25.1	4.8	88.64	10.2	-166.0	955.2	926.7	33.501		
9,800.0	9,195.0	9,179.2	9,177.6	26.0	4.8	88.68	10.2	-166.0	1,029.3	999.8	34.881		
9,900.0	9,195.0	9,179.7	9,178.1	27.1	4.8	88.73	10.2	-166.0	1,107.4	1,076.8	36.189		
10,000.0	9,195.0	9,180.2	9,178.5	28.2	4.8	88.77	10.2	-166.0	1,188.8	1,157.0	37.334		
10,100.0	9,195.0	9,180.6	9,179.0	29.4	4.8	88.81	10.2	-166.0	1,272.9	1,239.7	38.392		
10,200.0	9,195.0	9,181.1	9,179.5	30.6	4.8	88.85	10.2	-166.0	1,359.1	1,324.6	39.362		
10,300.0	9,195.0	9,181.6	9,180.0	31.9	4.8	88.90	10.2	-166.0	1,447.1	1,411.2	40.247		
10,400.0	9,195.0	11,840.4	10,600.3	33.3	27.3	163.08	-1,452.0	80.6	1,473.2	1,444.6	51.477		
10,500.0	9,195.0	11,946.9	10,594.3	34.7	29.1	163.15	-1,558.2	84.8	1,466.9	1,436.7	48.601		
10,600.0	9,195.0	12,016.3	10,591.4	36.1	30.2	163.18	-1,627.6	87.2	1,462.0	1,430.5	46.448		
10,700.0	9,195.0	12,080.0	10,590.4	37.6	31.2	163.25	-1,691.2	89.6	1,459.5	1,426.8	44.612		
10,800.0	9,195.0	12,184.7	10,589.9	39.1	33.0	163.38	-1,795.8	93.8	1,458.1	1,423.9	42.561		
10,900.0	9,195.0	12,275.6	10,589.6	40.6	34.5	163.48	-1,886.6	97.3	1,456.9	1,421.2	40.792		
11,000.0	9,195.0	12,387.4	10,589.0	42.2	36.4	163.62	-1,998.3	101.7	1,455.4	1,418.1	38.995		
11,100.0	9,195.0	12,488.8	10,588.4	43.7	38.1	163.76	-2,099.7	106.2	1,453.8	1,415.0	37.421		
11,200.0	9,195.0	12,597.0	10,586.6	45.3	39.9	163.85	-2,207.8	109.7	1,451.4	1,410.9	35.861		
11,300.0	9,195.0	12,690.0	10,585.1	46.9	41.5	163.91	-2,300.7	112.3	1,449.3	1,407.3	34.509		
11,400.0	9,195.0	12,806.0	10,583.1	48.5	43.4	163.97	-2,416.7	115.1	1,447.2	1,403.5	33.106		
11,500.0	9,195.0	12,920.0	10,578.9	50.2	45.4	163.99	-2,530.6	117.5	1,443.1	1,397.6	31.746		
11,600.0	9,195.0	13,014.0	10,575.7	51.8	47.0	164.03	-2,624.5	120.2	1,439.3	1,392.3	30.615		
11,700.0	9,195.0	13,107.1	10,573.8	53.5	48.6	164.12	-2,717.5	123.6	1,436.4	1,387.9	29.603		
11,800.0	9,195.0	13,203.0	10,571.6	55.1	50.2	164.24	-2,813.3	127.8	1,433.2	1,383.2	28.645		
11,900.0	9,195.0	13,279.6	10,570.8	56.8	51.5	164.36	-2,889.8	131.8	1,431.0	1,379.6	27.855		
12,000.0	9,195.0	13,369.2	10,571.5	58.5	53.0	164.55	-2,979.2	137.0	1,430.4	1,377.6	27.111		
12,100.0	9,195.0	13,500.9	10,571.5	60.2	55.3	164.82	-3,110.6	144.7	1,429.0	1,374.6	26.263		
12,200.0	9,195.0	13,611.7	10,569.5	61.9	57.2	165.01	-3,221.3	150.9	1,426.0	1,370.0	25.481		
12,300.0	9,195.0	13,713.2	10,566.9	63.6	59.0	165.17	-3,322.6	156.3	1,422.3	1,364.8	24.751		
12,400.0	9,195.0	13,799.2	10,565.1	65.3	60.5	165.27	-3,408.5	160.0	1,419.3	1,360.4	24.103		
12,500.0	9,195.0	13,890.2	10,564.0	67.1	62.0	165.37	-3,499.5	163.5	1,417.2	1,356.9	23.486		
12,600.0	9,195.0	14,009.1	10,561.6	68.8	64.1	165.47	-3,618.3	167.2	1,414.7	1,352.7	22.801		
12,700.0	9,195.0	14,115.3	10,558.1	70.5	65.9	165.50	-3,724.3	169.6	1,411.1	1,347.4	22.151		
12,800.0	9,195.0	14,210.4	10,555.0	72.2	67.5	165.53	-3,819.4	171.7	1,407.5	1,342.3	21.566		
12,900.0	9,195.0	14,301.4	10,552.6	74.0	69.0	165.57	-3,910.4	173.9	1,404.5	1,337.7	21.029		
13,000.0	9,195.0	14,384.5	10,551.0	75.7	70.4	165.60	-3,993.4	175.7	1,402.3	1,334.0	20.546		
13,100.0	9,195.0	14,467.9	10,550.6	77.5	71.8	165.65	-4,076.8	177.4	1,401.5	1,331.8	20.106		
13,200.0	9,195.0	14,579.9	10,550.6	79.2	73.7	165.70	-4,188.8	179.3	1,401.3	1,329.9	19.628		
13,300.0	9,195.0	14,673.0	10,549.4	81.0	75.3	165.73	-4,281.8	181.1	1,399.8	1,326.8	19.192		
13,326.0	9,195.0	14,691.3	10,549.4	81.4	75.7	165.74	-4,300.1	181.4	1,399.7	1,326.4	19.099		
13,400.0	9,195.0	14,774.7	10,549.7	82.7	77.1	165.79	-4,383.5	183.1	1,399.7	1,325.2	18.783		
13,500.0	9,195.0	14,881.6	10,548.4	84.5	78.9	165.81	-4,490.4	184.5	1,398.3	1,322.1	18.351		
13,587.0	9,195.0	14,950.7	10,547.9	86.0	80.1	165.81	-4,559.5	185.2	1,397.6	1,320.2	18.039		
13,600.0	9,195.0	14,960.3	10,547.9	86.3	80.3	165.81	-4,569.1	185.2	1,397.7	1,320.0	17.996		
13,700.0	9,195.0	15,032.8	10,548.7	88.0	81.5	165.81	-4,641.5	185.3	1,398.9	1,319.8	17.687		
13,800.0	9,195.0	15,105.6	10,550.9	89.8	82.7	165.78	-4,714.4	184.7	1,402.1	1,321.6	17.408		
13,900.0	9,195.0	15,191.0	10,554.7	91.6	84.2	165.78	-4,799.7	184.2	1,406.7	1,324.6	17.140		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good gyro, 9743-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
14,000.0	9,195.0	15,420.8	10,560.6	93.3	88.1	165.99	-5,029.2	189.4	1,410.8	1,326.3	16.698		
14,100.0	9,195.0	15,540.2	10,555.8	95.1	90.2	166.14	-5,148.4	195.0	1,405.8	1,319.7	16.331		
14,200.0	9,195.0	15,647.5	10,551.0	96.9	92.0	166.33	-5,255.3	201.7	1,400.1	1,312.6	16.000		
14,300.0	9,195.0	15,733.0	10,547.3	98.7	93.5	166.49	-5,340.5	207.1	1,394.6	1,305.8	15.707		
14,400.0	9,195.0	15,809.8	10,545.0	100.4	94.8	166.63	-5,417.2	211.6	1,390.5	1,300.5	15.444		
14,500.0	9,195.0	15,923.0	10,542.6	102.2	96.8	166.80	-5,530.3	217.0	1,387.6	1,296.1	15.160		
14,600.0	9,195.0	16,035.0	10,538.0	104.0	98.7	166.92	-5,642.1	221.7	1,382.7	1,289.6	14.855		
14,700.0	9,195.0	16,136.0	10,533.3	105.8	100.5	167.03	-5,742.8	226.1	1,377.4	1,282.8	14.568		
14,800.0	9,195.0	16,231.0	10,529.3	107.6	102.1	167.12	-5,837.7	230.0	1,372.5	1,276.5	14.300		
14,900.0	9,195.0	16,337.3	10,524.9	109.3	104.0	167.22	-5,943.9	234.1	1,367.7	1,270.2	14.028		
15,000.0	9,195.0	16,427.5	10,521.3	111.1	105.5	167.35	-6,033.8	238.6	1,362.9	1,264.0	13.788		
15,100.0	9,195.0	16,532.7	10,517.4	112.9	107.4	167.53	-6,138.8	244.4	1,358.2	1,258.0	13.551		
15,200.0	9,195.0	16,639.7	10,513.0	114.7	109.2	167.74	-6,245.5	251.1	1,353.0	1,251.4	13.322		
15,300.0	9,195.0	16,728.2	10,509.5	116.5	110.8	167.95	-6,333.7	257.4	1,347.7	1,244.9	13.116		
15,400.0	9,195.0	16,796.0	10,508.1	118.3	111.9	168.11	-6,401.3	262.2	1,344.3	1,240.5	12.946		
15,500.0	9,195.0	16,902.7	10,506.6	120.1	113.8	168.35	-6,507.8	268.8	1,341.8	1,236.7	12.765		
15,600.0	9,195.0	16,994.8	10,505.4	121.9	115.4	168.54	-6,599.7	274.2	1,339.5	1,233.1	12.596		
15,700.0	9,195.0	17,091.1	10,504.5	123.7	117.1	168.75	-6,695.9	279.9	1,337.5	1,229.9	12.433		
15,800.0	9,195.0	17,181.4	10,504.2	125.5	118.6	168.95	-6,786.0	285.2	1,336.2	1,227.4	12.283		
15,900.0	9,195.0	17,292.5	10,503.5	127.3	120.5	169.17	-6,897.0	291.2	1,334.7	1,224.6	12.122		
16,000.0	9,195.0	17,402.6	10,501.9	129.1	122.5	169.35	-7,006.9	296.6	1,332.4	1,221.0	11.953		
16,100.0	9,195.0	17,534.8	10,498.2	130.9	124.8	169.57	-7,138.9	303.1	1,329.0	1,216.0	11.765		
16,200.0	9,195.0	17,638.2	10,493.3	132.7	126.6	169.71	-7,242.1	308.0	1,323.6	1,209.2	11.576		
16,300.0	9,195.0	17,722.5	10,490.0	134.5	128.0	169.87	-7,326.2	312.8	1,318.8	1,203.3	11.416		
16,400.0	9,195.0	17,823.1	10,487.0	136.3	129.8	170.10	-7,426.4	319.4	1,314.8	1,198.1	11.264		
16,500.0	9,195.0	17,908.5	10,484.6	138.1	131.2	170.29	-7,511.7	324.7	1,311.1	1,193.2	11.123		
16,600.0	9,195.0	18,037.1	10,480.9	139.9	133.5	170.61	-7,639.9	333.6	1,307.3	1,188.1	10.971		
16,700.0	9,195.0	18,131.1	10,477.3	141.7	135.1	170.90	-7,733.5	341.3	1,302.2	1,182.0	10.832		
16,800.0	9,195.0	18,219.5	10,474.7	143.5	136.7	171.21	-7,821.5	349.5	1,298.0	1,176.8	10.709		
16,900.0	9,195.0	18,309.0	10,472.3	145.3	138.2	171.56	-7,910.5	358.5	1,294.0	1,171.9	10.595		
17,000.0	9,195.0	18,404.0	10,470.8	147.1	139.9	171.96	-8,005.0	368.2	1,291.1	1,168.0	10.491		
17,100.0	9,195.0	18,473.6	10,471.1	148.9	141.1	172.25	-8,074.3	375.3	1,290.0	1,166.0	10.408		
17,113.4	9,195.0	18,484.2	10,471.2	149.1	141.3	172.30	-8,084.7	376.4	1,289.9	1,165.9	10.398		
17,200.0	9,195.0	18,553.2	10,472.5	150.7	142.5	172.58	-8,153.5	383.1	1,290.5	1,165.7	10.337		
17,300.0	9,195.0	18,639.2	10,475.2	152.5	144.0	172.89	-8,239.1	390.3	1,292.6	1,166.7	10.271		
17,400.0	9,195.0	18,748.5	10,478.7	154.3	145.9	173.23	-8,348.0	398.2	1,295.1	1,168.1	10.199		
17,500.0	9,195.0	18,857.2	10,480.8	156.1	147.8	173.49	-8,456.6	404.6	1,296.4	1,168.1	10.110		
17,600.0	9,195.0	18,991.1	10,481.4	157.9	150.1	173.75	-8,590.3	411.3	1,296.4	1,166.7	9.998		
17,700.0	9,195.0	19,127.8	10,478.2	159.7	152.5	174.02	-8,726.7	418.5	1,293.5	1,162.4	9.865		
17,800.0	9,195.0	19,220.8	10,474.4	161.5	154.1	174.17	-8,819.6	422.9	1,289.1	1,156.7	9.738		
17,900.0	9,195.0	19,348.0	10,469.5	163.3	156.3	174.38	-8,946.6	429.0	1,285.0	1,151.1	9.602		
18,000.0	9,195.0	19,456.7	10,462.9	165.1	158.2	174.55	-9,054.9	434.0	1,278.5	1,143.3	9.457		
18,100.0	9,195.0	19,534.0	10,458.8	166.9	159.5	174.68	-9,132.0	437.7	1,272.8	1,136.4	9.334		
18,200.0	9,195.0	19,611.6	10,456.1	168.7	160.9	174.82	-9,209.4	441.7	1,268.9	1,131.4	9.226		
18,300.0	9,195.0	19,722.0	10,452.4	170.5	162.8	175.00	-9,319.7	446.7	1,265.2	1,126.3	9.109		
18,400.0	9,195.0	19,817.0	10,449.1	172.3	164.4	175.13	-9,414.5	450.3	1,261.5	1,121.3	8.997		
18,500.0	9,195.0	19,927.3	10,445.3	174.2	166.3	175.28	-9,524.7	454.6	1,257.8	1,116.2	8.881		
18,600.0	9,195.0	20,005.0	10,442.7	176.0	167.7	175.37	-9,602.3	457.4	1,254.3	1,111.5	8.781		
18,700.0	9,195.0	20,090.0	10,441.3	177.8	169.1	175.49	-9,687.3	460.6	1,252.4	1,108.3	8.691		
18,800.0	9,195.0	20,186.0	10,440.5	179.6	170.8	175.65	-9,783.2	464.7	1,251.3	1,105.9	8.607		
18,858.1	9,195.0	20,231.9	10,440.4	180.6	171.6	175.72	-9,829.0	466.5	1,250.9	1,104.9	8.563		
18,900.0	9,195.0	20,263.9	10,440.6	181.4	172.1	175.76	-9,860.9	467.7	1,251.1	1,104.5	8.535		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandriil Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandriil Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 9743-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
19,000.0	9,195.0	20,351.8	10,442.0	183.2	173.7	175.87	-9,948.8	470.5	1,252.5	1,104.7	8.470		
19,100.0	9,195.0	20,401.0	10,442.9	185.0	174.5	175.92	-9,998.0	471.9	1,255.3	1,106.4	8.429	SF	
19,200.0	9,195.0	20,401.0	10,442.9	186.8	174.5	175.92	-9,998.0	471.9	1,265.1	1,115.4	8.453		
19,300.0	9,195.0	20,401.0	10,442.9	188.6	174.5	175.92	-9,998.0	471.9	1,282.6	1,132.2	8.527		
19,329.1	9,195.0	20,401.0	10,442.9	189.2	174.5	175.92	-9,998.0	471.9	1,289.1	1,138.4	8.558		



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 9900-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	1.1	1.1	0.0	0.0	88.75	32.4	1,487.1	1,487.5				
100.0	100.0	109.3	109.3	0.1	0.0	88.74	32.7	1,486.8	1,487.1	1,487.0	N/A		
200.0	200.0	208.9	208.9	0.3	0.1	88.73	33.0	1,486.2	1,486.6	1,486.2	3,794.213		
300.0	300.0	316.2	316.2	0.5	0.2	88.72	33.2	1,485.3	1,485.8	1,485.1	2,205.910		
400.0	400.0	414.6	414.6	0.7	0.2	88.71	33.5	1,484.4	1,484.8	1,483.9	1,562.243		
500.0	500.0	517.6	517.6	1.0	0.3	88.70	33.7	1,483.4	1,483.8	1,482.6	1,206.296		
600.0	600.0	619.3	619.3	1.2	0.3	88.70	33.6	1,482.1	1,482.6	1,481.1	982.446		
700.0	700.0	716.4	716.4	1.4	0.4	88.71	33.4	1,481.0	1,481.5	1,479.7	829.755		
800.0	800.0	812.4	812.4	1.6	0.4	88.70	33.5	1,480.2	1,480.6	1,478.5	718.394		
900.0	900.0	909.7	909.6	1.9	0.5	88.70	33.6	1,479.5	1,479.9	1,477.6	633.300		
1,000.0	1,000.0	1,003.8	1,003.7	2.1	0.5	88.70	33.5	1,479.1	1,479.5	1,476.9	566.751		
1,100.0	1,100.0	1,104.8	1,104.7	2.3	0.6	5.97	33.4	1,478.9	1,477.6	1,474.7	512.573		
1,193.9	1,193.8	1,198.0	1,197.9	2.5	0.6	6.01	33.3	1,478.7	1,472.6	1,469.4	470.291		
1,200.0	1,199.8	1,204.0	1,203.9	2.5	0.6	6.01	33.2	1,478.7	1,472.1	1,469.0	467.814		
1,300.0	1,299.6	1,300.0	1,300.0	2.7	0.7	6.04	33.0	1,478.6	1,465.3	1,461.9	430.372		
1,400.0	1,399.4	1,396.1	1,396.1	3.0	0.7	6.08	32.8	1,478.7	1,458.7	1,455.0	397.902		
1,500.0	1,499.2	1,495.2	1,495.2	3.2	0.8	6.11	32.7	1,479.0	1,452.2	1,448.3	369.405		
1,600.0	1,598.9	1,593.3	1,593.3	3.4	0.8	6.14	32.7	1,479.4	1,445.9	1,441.7	344.397		
1,700.0	1,698.7	1,696.2	1,696.2	3.6	0.9	6.17	32.8	1,479.8	1,439.6	1,435.1	322.059		
1,800.0	1,798.5	1,796.7	1,796.7	3.9	0.9	6.19	33.0	1,480.0	1,433.1	1,428.3	302.233		
1,900.0	1,898.2	1,896.1	1,896.1	4.1	1.0	6.21	33.3	1,480.2	1,426.5	1,421.5	284.516		
2,000.0	1,998.0	1,997.4	1,997.4	4.4	1.0	6.22	33.8	1,480.3	1,420.0	1,414.7	268.512		
2,100.0	2,097.8	2,097.5	2,097.4	4.6	1.1	6.23	34.3	1,480.4	1,413.4	1,407.8	254.064		
2,200.0	2,197.5	2,197.2	2,197.2	4.9	1.1	6.23	34.9	1,480.5	1,406.7	1,400.9	240.947		
2,300.0	2,297.3	2,298.6	2,298.5	5.1	1.2	6.24	35.5	1,480.5	1,400.1	1,393.9	228.950		
2,400.0	2,297.1	2,299.9	2,299.8	5.3	1.2	6.26	35.7	1,480.5	1,393.3	1,386.9	217.955		
2,500.0	2,496.9	2,500.6	2,500.6	5.6	1.3	6.26	36.3	1,480.3	1,386.4	1,379.7	207.850		
2,600.0	2,596.6	2,599.5	2,599.5	5.8	1.3	6.27	36.8	1,480.1	1,379.5	1,372.6	198.571		
2,700.0	2,696.4	2,700.0	2,699.9	6.1	1.4	6.29	37.2	1,479.9	1,372.5	1,365.3	189.961		
2,800.0	2,796.2	2,797.7	2,797.6	6.3	1.5	6.30	37.5	1,479.7	1,365.7	1,358.2	182.026		
2,900.0	2,895.9	2,897.4	2,897.4	6.6	1.5	6.32	37.8	1,479.7	1,358.9	1,351.1	174.643		
3,000.0	2,995.7	2,996.8	2,996.7	6.8	1.6	6.34	38.2	1,479.7	1,352.2	1,344.1	167.770		
3,100.0	3,095.5	3,096.2	3,096.2	7.1	1.6	6.35	38.6	1,479.7	1,345.5	1,337.1	161.355		
3,200.0	3,195.3	3,194.8	3,194.7	7.3	1.7	6.36	39.1	1,479.7	1,338.8	1,330.2	155.363		
3,300.0	3,295.0	3,294.3	3,294.3	7.6	1.7	6.37	39.8	1,479.8	1,332.2	1,323.3	149.742		
3,400.0	3,394.8	3,397.1	3,397.1	7.8	1.8	6.38	40.3	1,479.9	1,325.5	1,316.3	144.422		
3,500.0	3,494.6	3,505.0	3,504.9	8.1	1.8	6.39	40.8	1,479.4	1,318.4	1,308.9	139.333		
3,600.0	3,594.3	3,603.2	3,603.1	8.3	1.9	6.43	40.7	1,478.8	1,311.0	1,301.3	134.584		
3,700.0	3,694.1	3,700.0	3,699.9	8.6	1.9	6.46	40.7	1,478.3	1,303.8	1,293.8	130.127		
3,800.0	3,793.9	3,797.2	3,797.1	8.8	2.0	6.48	40.9	1,478.1	1,296.9	1,286.6	125.928		
3,900.0	3,893.7	3,896.5	3,896.4	9.1	2.0	6.51	41.1	1,478.0	1,290.0	1,279.4	121.944		
4,000.0	3,993.4	3,995.2	3,995.1	9.3	2.1	6.54	41.1	1,477.9	1,283.2	1,272.3	118.174		
4,100.0	4,093.2	4,091.1	4,091.0	9.6	2.1	6.58	40.9	1,478.0	1,276.6	1,265.4	114.624		
4,200.0	4,193.0	4,197.1	4,197.0	9.8	2.2	6.62	40.8	1,478.0	1,269.9	1,258.5	111.190		
4,300.0	4,292.7	4,294.7	4,294.7	10.1	2.2	6.65	40.9	1,477.8	1,263.0	1,251.3	107.944		
4,400.0	4,392.5	4,393.7	4,393.6	10.4	2.3	6.68	41.2	1,477.8	1,256.2	1,244.3	104.853		
4,500.0	4,492.3	4,493.5	4,493.4	10.6	2.3	6.70	41.5	1,477.8	1,249.5	1,237.3	101.902		
4,600.0	4,592.1	4,593.2	4,593.1	10.9	2.4	6.72	41.8	1,477.8	1,242.8	1,230.3	99.083		
4,700.0	4,691.8	4,692.3	4,692.2	11.1	2.4	6.74	42.2	1,477.8	1,236.1	1,223.3	96.391		
4,800.0	4,791.6	4,792.0	4,791.9	11.4	2.5	6.76	42.6	1,477.8	1,229.4	1,216.3	93.815		
4,900.0	4,891.4	4,892.0	4,892.0	11.6	2.6	6.78	42.9	1,477.9	1,222.8	1,209.4	91.345		
5,000.0	4,991.1	4,990.6	4,990.5	11.9	2.6	6.80	43.2	1,477.9	1,216.1	1,202.5	88.983		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 9900-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
5,100.0	5,090.9	5,089.1	5,089.1	12.1	2.7	6.83	43.5	1,478.1	1,209.6	1,195.6	86.724		
5,200.0	5,190.7	5,192.7	5,192.6	12.4	2.7	6.86	43.7	1,478.2	1,203.0	1,188.8	84.533		
5,300.0	5,290.5	5,296.4	5,296.3	12.6	2.8	6.89	43.9	1,478.0	1,196.0	1,181.5	82.402		
5,400.0	5,390.2	5,393.2	5,393.2	12.9	2.8	6.93	43.8	1,477.7	1,189.0	1,174.2	80.370		
5,500.0	5,490.0	5,491.1	5,491.0	13.1	2.9	6.98	43.5	1,477.6	1,182.2	1,167.1	78.424		
5,600.0	5,589.8	5,591.2	5,591.1	13.4	2.9	7.04	43.2	1,477.6	1,175.5	1,160.1	76.548		
5,700.0	5,689.5	5,691.5	5,691.4	13.6	3.0	7.09	42.9	1,477.6	1,168.7	1,153.1	74.736		
5,800.0	5,789.3	5,792.2	5,792.1	13.9	3.0	7.15	42.6	1,477.4	1,161.9	1,146.0	72.982		
5,900.0	5,889.1	5,891.8	5,891.7	14.2	3.1	7.20	42.4	1,477.3	1,155.1	1,138.9	71.291		
6,000.0	5,988.8	5,990.7	5,990.6	14.4	3.1	7.26	42.1	1,477.2	1,148.2	1,131.8	69.661		
6,100.0	6,088.6	6,087.7	6,087.6	14.7	3.2	7.32	41.8	1,477.2	1,141.6	1,124.8	68.098		
6,200.0	6,188.4	6,185.6	6,185.5	14.9	3.2	7.37	41.6	1,477.5	1,135.1	1,118.1	66.598		
6,300.0	6,288.2	6,286.4	6,286.3	15.2	3.3	7.41	41.7	1,477.8	1,128.7	1,111.4	65.143		
6,400.0	6,387.9	6,385.7	6,385.6	15.4	3.3	7.44	41.9	1,478.1	1,122.3	1,104.7	63.735		
6,500.0	6,487.7	6,486.7	6,486.6	15.7	3.4	7.48	42.1	1,478.3	1,115.8	1,097.9	62.368		
6,600.0	6,587.5	6,585.5	6,585.4	15.9	3.4	7.51	42.3	1,478.5	1,109.4	1,091.2	61.045		
6,700.0	6,687.2	6,684.8	6,684.7	16.2	3.5	7.55	42.4	1,478.8	1,103.0	1,084.5	59.766		
6,800.0	6,787.0	6,784.5	6,784.4	16.4	3.5	7.60	42.4	1,479.2	1,096.6	1,077.8	58.526		
6,900.0	6,886.8	6,883.9	6,883.8	16.7	3.6	7.65	42.4	1,479.5	1,090.2	1,071.2	57.325		
7,000.0	6,986.6	6,987.7	6,987.6	16.9	3.6	7.71	42.1	1,479.7	1,083.7	1,064.4	56.144		
7,100.0	7,086.3	7,088.7	7,088.7	17.2	3.7	7.77	41.8	1,479.7	1,076.9	1,057.4	54.987		
7,200.0	7,186.1	7,188.8	7,188.7	17.5	3.8	7.84	41.6	1,479.5	1,070.1	1,050.2	53.861		
7,300.0	7,285.9	7,289.8	7,289.8	17.7	3.8	7.90	41.4	1,479.3	1,063.2	1,043.0	52.762		
7,400.0	7,385.6	7,388.5	7,388.4	18.0	3.9	7.96	41.2	1,479.1	1,056.3	1,035.8	51.695		
7,500.0	7,485.4	7,488.8	7,488.7	18.2	3.9	8.02	41.0	1,478.9	1,049.4	1,026.7	50.658		
7,600.0	7,585.2	7,588.8	7,588.7	18.5	4.0	8.08	40.8	1,478.6	1,042.4	1,021.5	49.646		
7,700.0	7,685.0	7,688.3	7,688.2	18.7	4.0	8.13	40.8	1,478.4	1,035.5	1,014.2	48.662		
7,800.0	7,784.7	7,786.7	7,786.6	19.0	4.1	8.18	41.0	1,478.3	1,028.7	1,007.1	47.709		
7,900.0	7,884.5	7,887.9	7,887.8	19.2	4.1	8.22	41.3	1,478.1	1,021.8	1,000.0	46.778		
8,000.0	7,984.3	7,988.0	7,988.0	19.5	4.2	8.27	41.3	1,477.9	1,014.9	992.8	45.866		
8,100.0	8,084.0	8,082.4	8,082.3	19.7	4.2	8.33	41.2	1,477.8	1,008.2	985.8	44.994		
8,200.0	8,183.8	8,181.1	8,181.1	20.0	4.3	8.40	40.9	1,478.2	1,001.9	979.2	44.156		
8,300.0	8,283.6	8,281.5	8,281.4	20.3	4.3	8.48	40.5	1,478.5	995.5	972.5	43.336		
8,400.0	8,383.4	8,383.2	8,383.1	20.5	4.4	8.56	40.1	1,478.8	989.1	965.8	42.530		
8,445.0	8,428.2	8,428.4	8,428.3	20.6	4.4	8.60	39.9	1,478.8	986.1	962.7	42.171		
8,500.0	8,483.2	8,483.1	8,483.1	20.7	4.4	8.63	39.6	1,478.9	983.0	959.4	41.602		
8,600.0	8,583.1	8,582.3	8,582.2	20.9	4.5	8.68	39.2	1,479.0	980.1	956.0	40.782		
8,633.3	8,616.4	8,615.6	8,615.5	21.0	4.5	8.69	39.0	1,479.1	979.9	955.7	40.550		
8,638.9	8,622.0	8,621.3	8,621.2	21.0	4.5	91.44	39.0	1,479.1	979.9	956.1	41.243		
8,650.0	8,633.1	8,632.5	8,632.4	21.0	4.5	-88.22	39.0	1,479.1	979.9	955.7	40.474		
8,700.0	8,683.0	8,683.2	8,683.1	21.1	4.5	-88.40	38.8	1,479.2	979.9	955.6	40.300		
8,750.0	8,732.4	8,732.2	8,732.1	21.2	4.6	-88.83	38.8	1,479.2	979.8	955.3	40.125		
8,800.0	8,781.0	8,779.8	8,779.7	21.2	4.6	-89.49	38.6	1,479.3	979.7	955.1	39.942		
8,802.2	8,783.1	8,781.9	8,781.8	21.2	4.6	-89.52	38.6	1,479.3	979.7	955.1	39.939 CC		
8,850.0	8,828.4	8,828.0	8,827.9	21.3	4.6	-90.36	38.3	1,479.4	979.8	955.1	39.743 ES		
8,900.0	8,874.2	8,875.8	8,875.7	21.4	4.6	-91.43	38.1	1,479.4	980.1	955.3	39.521		
8,950.0	8,918.0	8,921.3	8,921.2	21.5	4.7	-92.60	37.9	1,479.4	981.0	956.1	39.286		
9,000.0	8,959.7	8,964.4	8,964.3	21.6	4.7	-93.81	37.6	1,479.3	982.7	957.6	39.052		
9,050.0	8,998.7	9,004.8	9,004.7	21.6	4.7	-94.98	37.3	1,479.1	985.5	960.1	38.838		
9,100.0	9,034.9	9,041.4	9,041.3	21.7	4.7	-96.01	37.0	1,479.0	989.7	964.1	38.670		
9,150.0	9,068.0	9,074.6	9,074.5	21.9	4.7	-96.85	36.9	1,478.8	995.7	969.8	38.564		
9,200.0	9,097.6	9,104.3	9,104.2	22.0	4.8	-97.43	36.8	1,478.7	1,003.6	977.5	38.537		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 9900-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore +N/-S (usft)	Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
9,250.0	9,123.7	9,129.9	9,129.7	22.2	4.8	-97.66	36.7	1,478.5	1,013.7	987.4	38.600		
9,300.0	9,145.9	9,151.9	9,151.8	22.4	4.8	-97.52	36.5	1,478.5	1,026.1	999.6	38.755		
9,350.0	9,164.1	9,170.2	9,170.1	22.6	4.8	-96.96	36.4	1,478.4	1,040.9	1,014.2	39.006		
9,400.0	9,178.2	9,184.6	9,184.5	22.9	4.8	-95.93	36.3	1,478.4	1,058.1	1,031.2	39.353		
9,450.0	9,188.1	9,194.8	9,194.7	23.2	4.8	-94.40	36.2	1,478.4	1,077.6	1,050.6	39.804		
9,500.0	9,193.6	9,201.1	9,201.0	23.5	4.8	-92.36	36.1	1,478.4	1,099.3	1,072.1	40.366		
9,538.9	9,195.0	9,203.2	9,203.1	23.8	4.8	-90.42	36.1	1,478.4	1,117.6	1,090.2	40.889		
9,600.0	9,195.0	9,204.0	9,203.9	24.2	4.8	-90.46	36.1	1,478.4	1,148.3	1,120.5	41.334		
9,700.0	9,195.0	9,205.4	9,205.2	25.1	4.8	-90.54	36.1	1,478.4	1,203.6	1,175.0	42.073		
9,800.0	9,195.0	9,206.8	9,206.7	26.0	4.8	-90.63	36.0	1,478.4	1,264.4	1,234.9	42.791		
9,900.0	9,195.0	9,208.2	9,208.1	27.1	4.8	-90.71	36.0	1,478.4	1,330.0	1,299.4	43.421		
10,000.0	9,195.0	9,209.7	9,209.6	28.2	4.8	-90.80	36.0	1,478.4	1,399.7	1,367.9	44.025		
10,100.0	9,195.0	9,211.2	9,211.1	29.4	4.8	-90.88	36.0	1,478.4	1,472.8	1,439.8	44.599		
10,200.0	9,195.0	9,212.7	9,212.6	30.6	4.8	-90.98	36.0	1,478.4	1,548.9	1,514.6	45.139		
10,300.0	9,195.0	9,214.3	9,214.2	31.9	4.8	-91.07	35.9	1,478.4	1,627.7	1,592.0	45.644		
10,400.0	9,195.0	9,215.9	9,215.8	33.3	4.8	-91.16	35.9	1,478.4	1,708.6	1,671.6	46.115		
10,500.0	9,195.0	11,809.0	10,628.2	34.7	26.9	-145.07	-1,458.0	1,509.1	1,747.0	1,708.9	45.967		
10,600.0	9,195.0	11,873.3	10,627.1	36.1	28.0	-144.97	-1,522.2	1,512.5	1,748.3	1,708.5	43.930		
10,700.0	9,195.0	11,963.0	10,626.6	37.6	29.5	-144.81	-1,611.7	1,518.7	1,751.4	1,709.4	41.776		
10,800.0	9,195.0	12,053.9	10,626.3	39.1	31.0	-144.66	-1,702.4	1,524.4	1,754.4	1,710.4	39.817		
10,900.0	9,195.0	12,163.4	10,626.7	40.6	32.8	-144.51	-1,811.7	1,531.3	1,758.1	1,711.6	37.845		
11,000.0	9,195.0	12,280.0	10,625.4	42.2	34.8	-144.33	-1,928.1	1,537.6	1,759.8	1,710.8	35.899		
11,100.0	9,195.0	12,346.1	10,624.6	43.7	36.0	-144.22	-1,994.0	1,541.7	1,762.4	1,711.4	34.580		
11,200.0	9,195.0	12,432.0	10,625.4	45.3	37.4	-144.07	-2,079.8	1,548.4	1,767.3	1,714.1	33.229		
11,300.0	9,195.0	12,594.5	10,622.1	46.9	40.3	-143.70	-2,241.7	1,561.1	1,769.7	1,713.2	31.297		
11,400.0	9,195.0	12,656.0	10,620.3	48.5	41.3	-143.55	-2,302.9	1,566.0	1,771.8	1,713.2	30.270		
11,500.0	9,195.0	12,694.1	10,620.4	50.2	41.9	-143.48	-2,340.9	1,569.1	1,776.8	1,716.6	29.529		
11,600.0	9,195.0	12,750.0	10,623.9	51.8	42.8	-143.42	-2,396.5	1,574.2	1,786.0	1,724.0	28.808		
11,700.0	9,195.0	12,774.2	10,626.3	53.5	43.2	-143.41	-2,420.4	1,576.5	1,798.0	1,734.6	28.343		
11,800.0	9,195.0	12,978.9	10,645.8	55.1	46.7	-143.45	-2,623.6	1,590.9	1,810.3	1,743.4	27.057		
11,900.0	9,195.0	13,112.5	10,654.4	56.8	49.0	-143.52	-2,756.9	1,595.2	1,817.0	1,747.4	26.117		
12,000.0	9,195.0	13,350.0	10,663.0	58.5	53.2	-143.80	-2,994.1	1,592.0	1,818.3	1,745.0	24.831		
12,100.0	9,195.0	13,488.7	10,663.9	60.2	55.6	-144.00	-3,132.6	1,585.7	1,815.9	1,740.1	23.958		
12,200.0	9,195.0	13,596.0	10,661.4	61.9	57.5	-144.11	-3,239.8	1,580.3	1,810.6	1,732.5	23.184		
12,300.0	9,195.0	13,691.0	10,658.3	63.6	59.1	-144.11	-3,334.7	1,578.4	1,806.4	1,726.0	22.480		
12,400.0	9,195.0	13,738.9	10,657.4	65.3	59.9	-144.09	-3,382.6	1,578.9	1,804.5	1,722.4	21.978		
12,478.7	9,195.0	13,785.0	10,656.5	66.7	60.7	-144.05	-3,428.7	1,579.8	1,804.1	1,720.5	21.580		
12,500.0	9,195.0	13,812.0	10,656.1	67.1	61.1	-144.03	-3,455.6	1,580.5	1,804.0	1,719.9	21.430		
12,600.0	9,195.0	13,879.0	10,656.4	68.8	62.2	-144.00	-3,522.6	1,582.4	1,805.6	1,719.4	20.954		
12,700.0	9,195.0	13,955.4	10,658.1	70.5	63.5	-143.99	-3,599.0	1,584.6	1,808.7	1,720.5	20.500		
12,800.0	9,195.0	14,036.1	10,660.3	72.2	64.8	-143.96	-3,679.6	1,587.8	1,812.8	1,722.4	20.059		
12,900.0	9,195.0	14,256.0	10,650.5	74.0	68.7	-143.42	-3,898.6	1,603.1	1,811.6	1,716.7	19.077		
12,978.4	9,195.0	14,299.9	10,647.4	75.4	69.4	-143.28	-3,942.2	1,606.6	1,810.7	1,714.1	18.738		
13,000.0	9,195.0	14,310.0	10,646.8	75.7	69.6	-143.25	-3,952.3	1,607.4	1,810.8	1,713.7	18.657		
13,100.0	9,195.0	14,367.2	10,644.7	77.5	70.6	-143.08	-4,009.1	1,612.8	1,812.8	1,713.6	18.275		
13,200.0	9,195.0	14,486.8	10,639.9	79.2	72.7	-142.70	-4,128.0	1,624.9	1,815.4	1,713.0	17.724		
13,300.0	9,195.0	14,594.1	10,634.4	81.0	74.6	-142.35	-4,234.7	1,635.5	1,816.9	1,711.4	17.221		
13,400.0	9,195.0	14,696.0	10,631.0	82.7	76.3	-142.11	-4,336.2	1,643.1	1,818.6	1,710.2	16.784		
13,500.0	9,195.0	14,806.7	10,627.0	84.5	78.3	-141.85	-4,446.6	1,651.2	1,819.8	1,708.4	16.339		
13,600.0	9,195.0	14,900.3	10,622.9	86.3	80.0	-141.60	-4,539.8	1,658.5	1,820.9	1,706.7	15.947		
13,700.0	9,195.0	15,000.9	10,618.3	88.0	81.7	-141.32	-4,639.9	1,667.1	1,822.2	1,705.1	15.552		
13,800.0	9,195.0	15,091.7	10,615.4	89.8	83.3	-141.12	-4,730.4	1,673.5	1,823.8	1,703.9	15.213		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 100-Good_gyro, 9900-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
13,900.0	9,195.0	15,196.0	10,613.9	91.6	85.1	-140.98	-4,834.6	1,678.6	1,825.3	1,702.7	14.881		
14,000.0	9,195.0	15,274.4	10,613.3	93.3	86.5	-140.89	-4,912.9	1,682.2	1,827.3	1,702.3	14.615		
14,100.0	9,195.0	15,368.7	10,614.3	95.1	88.1	-140.83	-5,007.1	1,686.1	1,830.4	1,702.8	14.350		
14,200.0	9,195.0	15,482.5	10,614.7	96.9	90.1	-140.73	-5,120.9	1,691.3	1,833.1	1,702.7	14.054		
14,300.0	9,195.0	15,579.3	10,614.3	98.7	91.8	-140.62	-5,217.5	1,696.0	1,835.6	1,702.5	13.793		
14,400.0	9,195.0	15,691.1	10,613.6	100.4	93.7	-140.50	-5,329.2	1,701.0	1,837.4	1,701.5	13.515		
14,500.0	9,195.0	15,772.0	10,613.2	102.2	95.1	-140.41	-5,410.0	1,705.1	1,839.9	1,701.5	13.293		
14,600.0	9,195.0	15,878.1	10,612.7	104.0	96.9	-140.28	-5,516.0	1,710.8	1,842.6	1,701.3	13.043		
14,700.0	9,195.0	15,985.5	10,611.7	105.8	98.9	-140.16	-5,623.1	1,716.6	1,845.0	1,700.8	12.794		
14,800.0	9,195.0	16,088.4	10,610.4	107.6	100.7	-139.99	-5,725.9	1,722.2	1,847.0	1,699.9	12.556		
14,900.0	9,195.0	16,218.5	10,607.6	109.3	103.0	-139.79	-5,855.8	1,729.2	1,848.6	1,698.1	12.285		
15,000.0	9,195.0	16,278.4	10,605.9	111.1	104.1	-139.68	-5,915.5	1,732.7	1,849.9	1,697.1	12.110		
15,100.0	9,195.0	16,338.3	10,605.5	112.9	105.1	-139.57	-5,975.3	1,737.2	1,853.7	1,698.7	11.958		
15,200.0	9,195.0	16,439.9	10,605.2	114.7	106.9	-139.39	-6,076.6	1,745.2	1,858.2	1,700.2	11.762		
15,300.0	9,195.0	16,512.0	10,605.8	116.5	108.1	-139.28	-6,148.4	1,750.8	1,863.6	1,703.2	11.617		
15,400.0	9,195.0	16,581.2	10,607.7	118.3	109.3	-139.20	-6,217.4	1,756.4	1,870.6	1,707.8	11.494		
15,500.0	9,195.0	16,673.6	10,611.4	120.1	110.9	-139.11	-6,309.4	1,764.3	1,878.8	1,713.3	11.358		
15,600.0	9,195.0	16,759.5	10,615.0	121.9	112.4	-139.02	-6,394.9	1,771.7	1,887.2	1,719.2	11.233		
15,700.0	9,195.0	16,876.0	10,620.1	123.7	114.4	-138.89	-6,510.8	1,782.2	1,896.1	1,725.0	11.083		
15,800.0	9,195.0	17,044.1	10,622.9	125.5	117.4	-138.68	-6,678.3	1,795.3	1,901.9	1,726.8	10.863		
15,900.0	9,195.0	17,223.2	10,621.4	127.3	120.6	-138.47	-6,857.2	1,804.3	1,904.1	1,724.9	10.625		
15,974.2	9,195.0	17,301.6	10,619.1	128.6	121.9	-138.37	-6,935.5	1,807.3	1,904.1	1,722.6	10.493		
16,000.0	9,195.0	17,323.0	10,618.5	129.1	122.3	-138.34	-6,956.9	1,808.1	1,904.1	1,722.0	10.455		
16,100.0	9,195.0	17,401.5	10,616.8	130.9	123.6	-138.24	-7,035.3	1,811.4	1,904.9	1,720.3	10.315		
16,200.0	9,195.0	17,520.4	10,615.2	132.7	125.7	-138.10	-7,154.1	1,816.9	1,906.7	1,718.8	10.150		
16,300.0	9,195.0	17,641.0	10,611.0	134.5	127.8	-137.93	-7,274.5	1,821.6	1,906.2	1,715.0	9.971		
16,400.0	9,195.0	17,735.0	10,607.2	136.3	129.4	-137.77	-7,368.3	1,825.8	1,905.9	1,711.8	9.818		
16,415.0	9,195.0	17,742.8	10,606.9	136.5	129.6	-137.76	-7,376.1	1,826.2	1,905.9	1,711.4	9.801		
16,500.0	9,195.0	17,819.6	10,604.3	138.1	130.8	-137.63	-7,452.8	1,830.0	1,906.1	1,709.2	9.681		
16,600.0	9,195.0	17,927.9	10,600.5	139.9	132.7	-137.45	-7,560.9	1,835.2	1,906.4	1,706.4	9.528		
16,700.0	9,195.0	18,020.1	10,597.6	141.7	134.3	-137.31	-7,653.0	1,839.4	1,906.7	1,703.8	9.394		
16,800.0	9,195.0	18,111.0	10,595.3	143.5	135.8	-137.20	-7,743.7	1,843.0	1,907.2	1,701.5	9.270		
16,900.0	9,195.0	18,184.5	10,595.0	145.3	137.0	-137.15	-7,817.2	1,845.3	1,908.7	1,700.5	9.170		
17,000.0	9,195.0	18,284.5	10,596.9	147.1	138.7	-137.15	-7,917.1	1,847.8	1,911.3	1,700.5	9.068		
17,100.0	9,195.0	18,371.6	10,598.3	148.9	140.2	-137.14	-8,004.2	1,850.0	1,913.9	1,700.7	8.975		
17,200.0	9,195.0	18,471.3	10,600.4	150.7	142.0	-137.13	-8,103.8	1,853.0	1,917.1	1,701.2	8.879		
17,300.0	9,195.0	18,580.1	10,602.0	152.5	143.9	-137.10	-8,212.5	1,856.5	1,919.9	1,701.2	8.776		
17,400.0	9,195.0	18,697.4	10,601.9	154.3	146.0	-137.02	-8,329.8	1,860.8	1,922.0	1,700.1	8.662		
17,500.0	9,195.0	18,802.0	10,600.9	156.1	147.8	-136.92	-8,434.3	1,865.1	1,923.6	1,698.7	8.553		
17,600.0	9,195.0	18,895.4	10,599.4	157.9	149.4	-136.82	-8,527.6	1,869.0	1,925.0	1,697.2	8.451		
17,700.0	9,195.0	18,958.0	10,599.3	159.7	150.5	-136.76	-8,590.1	1,871.9	1,927.6	1,697.5	8.376		
17,800.0	9,195.0	19,039.7	10,599.9	161.5	151.9	-136.68	-8,671.7	1,876.6	1,931.6	1,698.9	8.299		
17,900.0	9,195.0	19,131.8	10,600.7	163.3	153.5	-136.58	-8,763.6	1,882.9	1,936.6	1,701.0	8.219		
18,000.0	9,195.0	19,260.8	10,600.8	165.1	155.8	-136.40	-8,892.2	1,891.9	1,941.0	1,701.8	8.113		
18,100.0	9,195.0	19,367.2	10,598.9	166.9	157.7	-136.21	-8,998.4	1,899.5	1,944.2	1,701.6	8.014		
18,200.0	9,195.0	19,457.0	10,597.2	168.7	159.2	-136.04	-9,087.9	1,906.5	1,947.8	1,702.2	7.928		
18,300.0	9,195.0	19,547.3	10,595.3	170.5	160.8	-135.86	-9,177.8	1,914.0	1,951.8	1,703.0	7.844		
18,400.0	9,195.0	19,627.1	10,595.0	172.3	162.2	-135.73	-9,257.4	1,920.4	1,956.7	1,705.0	7.775		
18,500.0	9,195.0	19,733.1	10,594.9	174.2	164.0	-135.57	-9,363.1	1,928.7	1,961.7	1,706.7	7.694		
18,600.0	9,195.0	19,835.3	10,596.0	176.0	165.8	-135.44	-9,464.9	1,936.3	1,967.2	1,709.2	7.623		
18,700.0	9,195.0	19,984.9	10,594.4	177.8	168.4	-135.24	-9,614.3	1,945.4	1,970.0	1,707.9	7.516		
18,800.0	9,195.0	20,106.9	10,592.9	179.6	170.5	-135.11	-9,736.2	1,951.0	1,971.9	1,706.4	7.426		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Sec 30 T24-S R32-E - Windward Federal #3H - Wellbore #1 - Wellbore #1												Offset Well Error:	0.0 usft
Survey Program: 100-Good_gyro, 9900-MWD default													
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
18,900.0	9,195.0	20,240.8	10,587.6	181.4	172.9	-134.88	-9,869.8	1,957.6	1,972.2	1,702.7	7.318		
18,979.0	9,195.0	20,312.0	10,583.6	182.8	174.2	-134.73	-9,940.7	1,961.4	1,971.7	1,699.7	7.247		
19,000.0	9,195.0	20,312.0	10,583.6	183.2	174.2	-134.73	-9,940.7	1,961.4	1,971.9	1,699.5	7.240		
19,100.0	9,195.0	20,312.0	10,583.6	185.0	174.2	-134.73	-9,940.7	1,961.4	1,975.4	1,701.7	7.216		
19,200.0	9,195.0	20,312.0	10,583.6	186.8	174.2	-134.73	-9,940.7	1,961.4	1,984.1	1,708.9	7.211 SF		
19,300.0	9,195.0	20,312.0	10,583.6	188.6	174.2	-134.73	-9,940.7	1,961.4	1,997.7	1,721.2	7.224		
19,329.1	9,195.0	20,312.0	10,583.6	189.2	174.2	-134.73	-9,940.7	1,961.4	2,002.6	1,725.6	7.231		



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.0 usft
Survey Program: 0-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	-90.46	-0.4	-50.0	50.5				
100.0	100.0	93.0	93.0	0.1	0.1	-90.46	-0.4	-50.0	50.0	49.9	337.521		
200.0	200.0	193.0	193.0	0.3	0.3	-90.46	-0.4	-50.0	50.0	49.4	85.071		
300.0	300.0	293.0	293.0	0.5	0.5	-90.46	-0.4	-50.0	50.0	49.0	48.204		
400.0	400.0	393.0	393.0	0.7	0.7	-90.46	-0.4	-50.0	50.0	48.5	33.630		
500.0	500.0	493.0	493.0	1.0	1.0	-90.46	-0.4	-50.0	50.0	48.1	25.822		
600.0	600.0	593.0	593.0	1.2	1.2	-90.46	-0.4	-50.0	50.0	47.6	20.957		
700.0	700.0	693.0	693.0	1.4	1.4	-90.46	-0.4	-50.0	50.0	47.2	17.635		
800.0	800.0	793.0	793.0	1.6	1.6	-90.46	-0.4	-50.0	50.0	46.7	15.221		
900.0	900.0	893.0	893.0	1.9	1.9	-90.46	-0.4	-50.0	50.0	46.3	13.389		
1,000.0	1,000.0	993.0	993.0	2.1	2.1	-90.46	-0.4	-50.0	50.0	45.8	11.951	CC, ES	
1,100.0	1,100.0	1,093.0	1,093.0	2.3	2.3	-173.43	-0.4	-50.0	51.7	47.1	11.199		
1,193.9	1,193.8	1,186.8	1,186.8	2.5	2.5	-173.98	-0.4	-50.0	56.5	51.5	11.269		
1,200.0	1,199.8	1,192.8	1,192.8	2.5	2.5	-174.02	-0.4	-50.0	56.9	51.9	11.292		
1,300.0	1,299.6	1,292.6	1,292.6	2.7	2.8	-174.66	-0.4	-50.0	63.7	58.2	11.631		
1,400.0	1,399.4	1,392.4	1,392.4	3.0	3.0	-175.17	-0.4	-50.0	70.4	64.5	11.915		
1,500.0	1,499.2	1,492.2	1,492.2	3.2	3.2	-175.59	-0.4	-50.0	77.1	70.8	12.156		
1,600.0	1,598.9	1,591.9	1,591.9	3.4	3.4	-175.95	-0.4	-50.0	83.9	77.1	12.363		
1,700.0	1,698.7	1,691.7	1,691.7	3.6	3.7	-176.25	-0.4	-50.0	90.6	83.4	12.542		
1,800.0	1,798.5	1,791.5	1,791.5	3.9	3.9	-176.51	-0.4	-50.0	97.4	89.7	12.698		
1,900.0	1,898.2	1,891.2	1,891.2	4.1	4.1	-176.74	-0.4	-50.0	104.1	96.0	12.836		
2,000.0	1,998.0	1,991.0	1,991.0	4.4	4.3	-176.93	-0.4	-50.0	110.9	102.3	12.959		
2,100.0	2,097.8	2,090.8	2,090.8	4.6	4.6	-177.11	-0.4	-50.0	117.6	108.6	13.068		
2,200.0	2,197.5	2,190.5	2,190.5	4.9	4.8	-177.27	-0.4	-50.0	124.4	114.9	13.167		
2,300.0	2,297.3	2,290.3	2,290.3	5.1	5.0	-177.41	-0.4	-50.0	131.2	121.3	13.256		
2,400.0	2,397.1	2,390.1	2,390.1	5.3	5.2	-177.54	-0.4	-50.0	137.9	127.6	13.336		
2,500.0	2,496.9	2,489.9	2,489.9	5.6	5.5	-177.65	-0.4	-50.0	144.7	133.9	13.409		
2,600.0	2,596.6	2,589.6	2,589.6	5.8	5.7	-177.76	-0.4	-50.0	151.4	140.2	13.475		
2,700.0	2,696.4	2,689.4	2,689.4	6.1	5.9	-177.85	-0.4	-50.0	158.2	146.5	13.535		
2,800.0	2,796.2	2,789.2	2,789.2	6.3	6.1	-177.94	-0.4	-50.0	164.9	152.8	13.591		
2,900.0	2,895.9	2,888.9	2,888.9	6.6	6.4	-178.02	-0.4	-50.0	171.7	159.1	13.643		
3,000.0	2,995.7	2,988.7	2,988.7	6.8	6.6	-178.10	-0.4	-50.0	178.5	165.4	13.690		
3,100.0	3,095.5	3,088.5	3,088.5	7.1	6.8	-178.17	-0.4	-50.0	185.2	171.7	13.735		
3,200.0	3,195.3	3,188.3	3,188.3	7.3	7.0	-178.23	-0.4	-50.0	192.0	178.0	13.776		
3,300.0	3,295.0	3,288.0	3,288.0	7.6	7.2	-178.29	-0.4	-50.0	198.7	184.4	13.814		
3,400.0	3,394.8	3,387.8	3,387.8	7.8	7.5	-178.35	-0.4	-50.0	205.5	190.7	13.850		
3,500.0	3,494.6	3,487.6	3,487.6	8.1	7.7	-178.40	-0.4	-50.0	212.3	197.0	13.884		
3,600.0	3,594.3	3,587.3	3,587.3	8.3	7.9	-178.45	-0.4	-50.0	219.0	203.3	13.915		
3,700.0	3,694.1	3,687.1	3,687.1	8.6	8.1	-178.49	-0.4	-50.0	225.8	209.6	13.945		
3,800.0	3,793.9	3,786.9	3,786.9	8.8	8.4	-178.54	-0.4	-50.0	232.5	215.9	13.973		
3,900.0	3,893.7	3,886.7	3,886.7	9.1	8.6	-178.58	-0.4	-50.0	239.3	222.2	13.999		
4,000.0	3,993.4	3,986.4	3,986.4	9.3	8.8	-178.62	-0.4	-50.0	246.1	228.5	14.024		
4,100.0	4,093.2	4,086.2	4,086.2	9.6	9.0	-178.66	-0.4	-50.0	252.8	234.8	14.048		
4,200.0	4,193.0	4,186.0	4,186.0	9.8	9.3	-178.69	-0.4	-50.0	259.6	241.1	14.071		
4,300.0	4,292.7	4,285.7	4,285.7	10.1	9.5	-178.72	-0.4	-50.0	266.3	247.4	14.092		
4,400.0	4,392.5	4,385.5	4,385.5	10.4	9.7	-178.76	-0.4	-50.0	273.1	253.8	14.112		
4,500.0	4,492.3	4,485.3	4,485.3	10.6	9.9	-178.79	-0.4	-50.0	279.9	260.1	14.131		
4,600.0	4,592.1	4,585.1	4,585.1	10.9	10.2	-178.81	-0.4	-50.0	286.6	266.4	14.150		
4,700.0	4,691.8	4,684.8	4,684.8	11.1	10.4	-178.84	-0.4	-50.0	293.4	272.7	14.167		
4,800.0	4,791.6	4,784.6	4,784.6	11.4	10.6	-178.87	-0.4	-50.0	300.2	279.0	14.184		
4,900.0	4,891.4	4,884.4	4,884.4	11.6	10.8	-178.89	-0.4	-50.0	306.9	285.3	14.200		
5,000.0	4,991.1	4,984.1	4,984.1	11.9	11.1	-178.92	-0.4	-50.0	313.7	291.6	14.215		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #7H - Wellbore #1 - Design #1												Offset Site Error:	0.0 usft
Survey Program: 0-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference Offset		Highside Toolface (°)	Offset Wellbore +N-S (usft)	Offset Wellbore +E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
5,100.0	5,090.9	5,083.9	5,083.9	12.1	11.3	-178.94	-0.4	-50.0	320.4	297.9	14.230		
5,200.0	5,190.7	5,183.7	5,183.7	12.4	11.5	-178.96	-0.4	-50.0	327.2	304.2	14.244		
5,300.0	5,290.5	5,283.5	5,283.5	12.6	11.7	-178.98	-0.4	-50.0	334.0	310.5	14.258		
5,400.0	5,390.2	5,383.2	5,383.2	12.9	12.0	-179.00	-0.4	-50.0	340.7	316.9	14.271		
5,500.0	5,490.0	5,483.0	5,483.0	13.1	12.2	-179.02	-0.4	-50.0	347.5	323.2	14.283		
5,600.0	5,589.8	5,582.8	5,582.8	13.4	12.4	-179.04	-0.4	-50.0	354.3	329.5	14.295		
5,700.0	5,689.5	5,682.5	5,682.5	13.6	12.6	-179.06	-0.4	-50.0	361.0	335.8	14.307		
5,800.0	5,789.3	5,782.3	5,782.3	13.9	12.9	-179.08	-0.4	-50.0	367.8	342.1	14.318		
5,900.0	5,889.1	5,882.1	5,882.1	14.2	13.1	-179.09	-0.4	-50.0	374.5	348.4	14.328		
6,000.0	5,988.8	5,981.8	5,981.8	14.4	13.3	-179.11	-0.4	-50.0	381.3	354.7	14.339		
6,100.0	6,088.6	6,081.6	6,081.6	14.7	13.5	-179.12	-0.4	-50.0	388.1	361.0	14.349		
6,200.0	6,188.4	6,181.4	6,181.4	14.9	13.8	-179.14	-0.4	-50.0	394.8	367.3	14.358		
6,300.0	6,288.2	6,281.2	6,281.2	15.2	14.0	-179.15	-0.4	-50.0	401.6	373.6	14.368		
6,400.0	6,387.9	6,380.9	6,380.9	15.4	14.2	-179.17	-0.4	-50.0	408.4	379.9	14.377		
6,500.0	6,487.7	6,480.7	6,480.7	15.7	14.4	-179.18	-0.4	-50.0	415.1	386.3	14.385		
6,600.0	6,587.5	6,580.5	6,580.5	15.9	14.6	-179.19	-0.4	-50.0	421.9	392.6	14.394		
6,700.0	6,687.2	6,680.2	6,680.2	16.2	14.9	-179.21	-0.4	-50.0	428.6	398.9	14.402		
6,800.0	6,787.0	6,780.0	6,780.0	16.4	15.1	-179.22	-0.4	-50.0	435.4	405.2	14.410		
6,900.0	6,886.8	6,879.8	6,879.8	16.7	15.3	-179.23	-0.4	-50.0	442.2	411.5	14.418		
7,000.0	6,986.6	6,979.6	6,979.6	16.9	15.5	-179.24	-0.4	-50.0	448.9	417.8	14.425		
7,100.0	7,086.3	7,079.3	7,079.3	17.2	15.8	-179.25	-0.4	-50.0	455.7	424.1	14.432		
7,200.0	7,186.1	7,179.1	7,179.1	17.5	16.0	-179.27	-0.4	-50.0	462.5	430.4	14.439		
7,300.0	7,285.9	7,278.9	7,278.9	17.7	16.2	-179.28	-0.4	-50.0	469.2	436.7	14.446		
7,400.0	7,385.6	7,378.6	7,378.6	18.0	16.4	-179.29	-0.4	-50.0	476.0	443.0	14.453		
7,500.0	7,485.4	7,478.4	7,478.4	18.2	16.7	-179.30	-0.4	-50.0	482.7	449.4	14.459		
7,600.0	7,585.2	7,578.2	7,578.2	18.5	16.9	-179.31	-0.4	-50.0	489.5	455.7	14.465		
7,700.0	7,685.0	7,678.0	7,678.0	18.7	17.1	-179.32	-0.4	-50.0	496.3	462.0	14.471		
7,800.0	7,784.7	7,777.7	7,777.7	19.0	17.3	-179.32	-0.4	-50.0	503.0	468.3	14.477		
7,900.0	7,884.5	7,877.5	7,877.5	19.2	17.6	-179.33	-0.4	-50.0	509.8	474.6	14.483		
8,000.0	7,984.3	7,977.3	7,977.3	19.5	17.8	-179.34	-0.4	-50.0	516.6	480.9	14.489		
8,100.0	8,084.0	8,077.0	8,077.0	19.7	18.0	-179.35	-0.4	-50.0	523.3	487.2	14.494		
8,200.0	8,183.8	8,176.8	8,176.8	20.0	18.2	-179.36	-0.4	-50.0	530.1	493.5	14.499		
8,300.0	8,283.6	8,276.6	8,276.6	20.3	18.5	-179.37	-0.4	-50.0	536.8	499.8	14.505		
8,400.0	8,383.4	8,376.4	8,376.4	20.5	18.7	-179.37	-0.4	-50.0	543.6	506.1	14.510		
8,445.0	8,428.2	8,421.2	8,421.2	20.6	18.8	-179.38	-0.4	-50.0	546.6	509.0	14.512		
8,500.0	8,483.2	8,476.2	8,476.2	20.7	18.9	-179.38	-0.4	-50.0	549.8	511.9	14.499		
8,600.0	8,583.1	8,576.1	8,576.1	20.9	19.1	-179.39	-0.4	-50.0	552.9	514.6	14.429		
8,638.9	8,622.0	8,615.0	8,615.0	21.0	19.2	-96.64	-0.4	-50.0	553.2	514.3	14.230		
8,650.0	8,633.1	8,625.1	8,625.1	21.0	19.2	83.71	-0.5	-50.0	553.2	514.7	14.367		
8,700.0	8,683.0	8,669.8	8,669.8	21.1	19.3	83.76	-2.8	-50.0	553.2	514.5	14.307		
8,750.0	8,732.4	8,714.6	8,714.1	21.2	19.4	83.85	-8.7	-50.1	553.2	514.4	14.252		
8,800.0	8,781.0	8,759.4	8,757.9	21.2	19.5	83.98	-18.0	-50.1	553.2	514.2	14.199		
8,824.4	8,804.3	8,781.4	8,779.1	21.3	19.5	84.06	-23.8	-50.2	553.2	514.1	14.172		
8,850.0	8,828.4	8,804.3	8,801.0	21.3	19.5	84.16	-30.8	-50.2	553.2	514.1	14.147		
8,900.0	8,874.2	8,850.0	8,843.6	21.4	19.6	84.37	-47.1	-50.4	553.2	513.9	14.093		
8,903.6	8,877.4	8,852.7	8,846.1	21.4	19.6	84.39	-48.2	-50.4	553.2	513.9	14.089		
8,950.0	8,918.0	8,894.6	8,883.9	21.5	19.7	84.62	-66.3	-50.5	553.2	513.8	14.037		
9,000.0	8,959.7	8,940.0	8,923.2	21.6	19.8	84.91	-89.1	-50.7	553.3	513.7	13.975		
9,050.0	8,998.7	8,985.6	8,960.7	21.6	19.9	85.24	-114.9	-50.9	553.3	513.6	13.906		
9,100.0	9,034.9	9,031.5	8,996.3	21.7	20.0	85.60	-143.9	-51.1	553.5	513.4	13.827		
9,150.0	9,068.0	9,077.6	9,029.6	21.9	20.1	85.99	-175.8	-51.3	553.6	513.3	13.737		
9,200.0	9,097.6	9,124.0	9,060.4	22.0	20.2	86.41	-210.5	-51.6	553.8	513.2	13.633		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #7H - Wellbore #1 - Design #1											Offset Site Error:	0.0 usft
Survey Program: 0-MWD default											Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
9,250.0	9,123.7	9,170.8	9,088.5	22.2	20.4	86.86	-247.8	-51.9	554.1	513.1	13.515	
9,300.0	9,145.9	9,217.9	9,113.7	22.4	20.6	87.33	-287.7	-52.2	554.4	513.0	13.382	
9,350.0	9,164.1	9,265.5	9,135.6	22.6	20.8	87.82	-329.8	-52.5	554.8	512.9	13.234	
9,400.0	9,178.2	9,313.4	9,154.2	22.9	21.1	88.32	-374.0	-52.8	555.2	512.7	13.071	
9,450.0	9,188.1	9,361.8	9,169.1	23.2	21.4	88.84	-420.0	-53.1	555.7	512.6	12.895	
9,500.0	9,193.6	9,410.6	9,180.1	23.5	21.7	89.37	-467.6	-53.5	556.3	512.5	12.707	
9,538.9	9,195.0	9,448.9	9,185.9	23.8	22.0	89.79	-505.4	-53.8	556.8	512.4	12.555	
9,600.0	9,195.0	9,509.9	9,189.9	24.2	22.4	90.20	-566.3	-54.2	557.6	512.3	12.306	
9,700.0	9,195.0	9,609.9	9,190.0	25.1	23.3	90.20	-666.3	-55.0	559.0	511.9	11.878	
9,800.0	9,195.0	9,709.9	9,190.0	26.0	24.2	90.20	-766.3	-55.7	560.3	511.3	11.433	
9,900.0	9,195.0	9,809.9	9,190.0	27.1	25.3	90.20	-866.3	-56.5	561.7	510.6	10.982	
10,000.0	9,195.0	9,909.9	9,190.0	28.2	26.4	90.20	-966.2	-57.2	563.1	509.6	10.535	
10,100.0	9,195.0	10,009.9	9,190.0	29.4	27.6	90.20	-1,066.2	-58.0	564.4	508.5	10.099	
10,200.0	9,195.0	10,109.9	9,190.0	30.6	28.9	90.20	-1,166.2	-58.7	565.8	507.3	9.679	
10,300.0	9,195.0	10,209.9	9,190.0	31.9	30.2	90.20	-1,266.2	-59.5	567.1	506.0	9.277	
10,400.0	9,195.0	10,309.9	9,190.0	33.3	31.6	90.20	-1,366.2	-60.2	568.5	504.6	8.896	
10,500.0	9,195.0	10,409.9	9,190.0	34.7	33.0	90.20	-1,466.2	-61.0	569.9	503.1	8.536	
10,600.0	9,195.0	10,509.9	9,190.0	36.1	34.5	90.20	-1,566.2	-61.7	571.2	501.5	8.197	
10,700.0	9,195.0	10,609.8	9,190.0	37.6	36.0	90.20	-1,666.2	-62.5	572.6	499.9	7.878	
10,800.0	9,195.0	10,709.8	9,190.0	39.1	37.5	90.20	-1,766.1	-63.2	573.9	498.2	7.578	
10,900.0	9,195.0	10,809.8	9,190.0	40.6	39.1	90.20	-1,866.1	-64.0	575.3	496.5	7.297	
11,000.0	9,195.0	10,909.8	9,190.0	42.2	40.6	90.20	-1,966.1	-64.7	576.7	494.7	7.034	
11,100.0	9,195.0	11,009.8	9,190.0	43.7	42.2	90.20	-2,066.1	-65.5	578.0	492.9	6.787	
11,200.0	9,195.0	11,109.8	9,190.0	45.3	43.8	90.20	-2,166.1	-66.2	579.4	491.0	6.555	
11,300.0	9,195.0	11,209.8	9,190.0	46.9	45.4	90.20	-2,266.1	-67.0	580.8	489.1	6.337	
11,400.0	9,195.0	11,309.8	9,190.0	48.5	47.1	90.20	-2,366.1	-67.7	582.1	487.2	6.132	
11,500.0	9,195.0	11,409.8	9,190.0	50.2	48.7	90.20	-2,466.1	-68.5	583.5	485.2	5.940	
11,600.0	9,195.0	11,509.8	9,190.0	51.8	50.4	90.20	-2,566.0	-69.2	584.8	483.3	5.758	
11,700.0	9,195.0	11,609.8	9,190.0	53.5	52.1	90.20	-2,666.0	-70.0	586.2	481.3	5.587	
11,800.0	9,195.0	11,709.7	9,190.0	55.1	53.7	90.20	-2,766.0	-70.7	587.6	479.3	5.426	
11,900.0	9,195.0	11,809.7	9,190.0	56.8	55.4	90.19	-2,866.0	-71.5	588.9	477.2	5.274	
12,000.0	9,195.0	11,909.7	9,190.0	58.5	57.1	90.19	-2,966.0	-72.2	590.3	475.2	5.129	
12,100.0	9,195.0	12,009.7	9,190.0	60.2	58.8	90.19	-3,066.0	-73.0	591.6	473.1	4.993	
12,200.0	9,195.0	12,109.7	9,190.0	61.9	60.6	90.19	-3,166.0	-73.7	593.0	471.1	4.864	
12,300.0	9,195.0	12,209.7	9,190.0	63.6	62.3	90.19	-3,266.0	-74.5	594.4	469.0	4.741	
12,400.0	9,195.0	12,309.7	9,190.0	65.3	64.0	90.19	-3,366.0	-75.2	595.7	466.9	4.625	
12,500.0	9,195.0	12,409.7	9,190.0	67.1	65.7	90.19	-3,465.9	-76.0	597.1	464.8	4.514	
12,600.0	9,195.0	12,509.7	9,190.0	68.8	67.5	90.19	-3,565.9	-76.7	598.4	462.7	4.408	
12,700.0	9,195.0	12,609.7	9,190.0	70.5	69.2	90.19	-3,665.9	-77.5	599.8	460.6	4.308	
12,800.0	9,195.0	12,709.7	9,190.0	72.2	70.9	90.19	-3,765.9	-78.2	601.2	458.4	4.212	
12,900.0	9,195.0	12,809.6	9,190.0	74.0	72.7	90.19	-3,865.9	-79.0	602.5	456.3	4.121	
13,000.0	9,195.0	12,909.6	9,190.0	75.7	74.4	90.19	-3,965.9	-79.7	603.9	454.1	4.033	
13,100.0	9,195.0	13,009.6	9,190.0	77.5	76.2	90.19	-4,065.9	-80.5	605.2	452.0	3.950	
13,200.0	9,195.0	13,109.6	9,190.0	79.2	78.0	90.19	-4,165.9	-81.2	606.6	449.8	3.870	
13,300.0	9,195.0	13,209.6	9,190.0	81.0	79.7	90.19	-4,265.8	-82.0	608.0	447.7	3.793	
13,400.0	9,195.0	13,309.6	9,190.0	82.7	81.5	90.19	-4,365.8	-82.7	609.3	445.5	3.720	
13,500.0	9,195.0	13,409.6	9,190.0	84.5	83.2	90.19	-4,465.8	-83.5	610.7	443.3	3.649	
13,600.0	9,195.0	13,509.6	9,190.0	86.3	85.0	90.19	-4,565.8	-84.2	612.0	441.2	3.582	
13,700.0	9,195.0	13,609.6	9,190.0	88.0	86.8	90.19	-4,665.8	-85.0	613.4	439.0	3.517	
13,800.0	9,195.0	13,709.6	9,190.0	89.8	88.6	90.19	-4,765.8	-85.7	614.8	436.8	3.454	
13,900.0	9,195.0	13,809.5	9,190.0	91.6	90.3	90.19	-4,865.8	-86.5	616.1	434.6	3.394	
14,000.0	9,195.0	13,909.5	9,190.0	93.3	92.1	90.19	-4,965.8	-87.2	617.5	432.4	3.337	

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 30 T24-S R32-E - Windward Federal #7H - Wellbore #1 - Design #1												Offset Site Error:	0.0 usft
Survey Program: O-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
14,100.0	9,195.0	14,009.5	9,190.0	95.1	93.9	90.19	-5,065.7	-88.0	618.8	430.2	3.281		
14,200.0	9,195.0	14,109.5	9,190.0	96.9	95.7	90.18	-5,165.7	-88.7	620.2	428.0	3.227		
14,300.0	9,195.0	14,209.5	9,190.0	98.7	97.4	90.18	-5,265.7	-89.5	621.6	425.8	3.175		
14,400.0	9,195.0	14,309.5	9,190.0	100.4	99.2	90.18	-5,365.7	-90.2	622.9	423.6	3.125		
14,500.0	9,195.0	14,409.5	9,190.0	102.2	101.0	90.18	-5,465.7	-91.0	624.3	421.4	3.077		
14,600.0	9,195.0	14,509.5	9,190.0	104.0	102.8	90.18	-5,565.7	-91.7	625.6	419.2	3.030		
14,700.0	9,195.0	14,609.5	9,190.0	105.8	104.6	90.18	-5,665.7	-92.5	627.0	417.0	2.985		
14,800.0	9,195.0	14,709.5	9,190.0	107.6	106.4	90.18	-5,765.7	-93.2	628.4	414.8	2.942		
14,900.0	9,195.0	14,809.5	9,190.0	109.3	108.1	90.18	-5,865.6	-94.0	629.7	412.5	2.900		
15,000.0	9,195.0	14,909.4	9,190.0	111.1	109.9	90.18	-5,965.6	-94.7	631.1	410.3	2.859		
15,100.0	9,195.0	15,009.4	9,190.0	112.9	111.7	90.18	-6,065.6	-95.5	632.4	408.1	2.819		
15,200.0	9,195.0	15,109.4	9,190.0	114.7	113.5	90.18	-6,165.6	-96.2	633.8	405.9	2.781		
15,300.0	9,195.0	15,209.4	9,190.0	116.5	115.3	90.18	-6,265.6	-96.9	635.2	403.6	2.743		
15,400.0	9,195.0	15,309.4	9,190.0	118.3	117.1	90.18	-6,365.6	-97.7	636.5	401.4	2.707		
15,500.0	9,195.0	15,409.4	9,190.0	120.1	118.9	90.18	-6,465.6	-98.4	637.9	399.2	2.672		
15,600.0	9,195.0	15,509.4	9,190.0	121.9	120.7	90.18	-6,565.6	-99.2	639.2	396.9	2.638		
15,700.0	9,195.0	15,609.4	9,190.0	123.7	122.5	90.18	-6,665.6	-99.9	640.6	394.7	2.605		
15,800.0	9,195.0	15,709.4	9,190.0	125.5	124.3	90.18	-6,765.5	-100.7	642.0	392.4	2.573		
15,900.0	9,195.0	15,809.4	9,190.0	127.3	126.1	90.18	-6,865.5	-101.4	643.3	390.2	2.542		
16,000.0	9,195.0	15,909.4	9,190.0	129.1	127.9	90.18	-6,965.5	-102.2	644.7	388.0	2.511		
16,100.0	9,195.0	16,009.3	9,190.0	130.9	129.7	90.18	-7,065.5	-102.9	646.0	385.7	2.482		
16,200.0	9,195.0	16,109.3	9,190.0	132.7	131.5	90.18	-7,165.5	-103.7	647.4	383.5	2.453		
16,300.0	9,195.0	16,209.3	9,190.0	134.5	133.3	90.18	-7,265.5	-104.4	648.8	381.2	2.425		
16,400.0	9,195.0	16,309.3	9,190.0	136.3	135.1	90.18	-7,365.5	-105.2	650.1	379.0	2.398		
16,500.0	9,195.0	16,409.3	9,190.0	138.1	136.9	90.18	-7,465.5	-105.9	651.5	376.7	2.371		
16,600.0	9,195.0	16,509.3	9,190.0	139.9	138.7	90.18	-7,565.4	-106.7	652.8	374.5	2.345		
16,700.0	9,195.0	16,609.3	9,190.0	141.7	140.5	90.18	-7,665.4	-107.4	654.2	372.2	2.320		
16,800.0	9,195.0	16,709.3	9,190.0	143.5	142.3	90.17	-7,765.4	-108.2	655.6	370.0	2.295		
16,900.0	9,195.0	16,809.3	9,190.0	145.3	144.1	90.17	-7,865.4	-108.9	656.9	367.7	2.271		
17,000.0	9,195.0	16,909.3	9,190.0	147.1	145.9	90.17	-7,965.4	-109.7	658.3	365.5	2.248		
17,100.0	9,195.0	17,009.3	9,190.0	148.9	147.7	90.17	-8,065.4	-110.4	659.6	363.2	2.225		
17,200.0	9,195.0	17,109.2	9,190.0	150.7	149.5	90.17	-8,165.4	-111.2	661.0	361.0	2.203		
17,300.0	9,195.0	17,209.2	9,190.0	152.5	151.3	90.17	-8,265.4	-111.9	662.4	358.7	2.181		
17,400.0	9,195.0	17,309.2	9,190.0	154.3	153.1	90.17	-8,365.3	-112.7	663.7	356.4	2.160		
17,500.0	9,195.0	17,409.2	9,190.0	156.1	154.9	90.17	-8,465.3	-113.4	665.1	354.2	2.139		
17,600.0	9,195.0	17,509.2	9,190.0	157.9	156.7	90.17	-8,565.3	-114.2	666.4	351.9	2.119		
17,700.0	9,195.0	17,609.2	9,190.0	159.7	158.5	90.17	-8,665.3	-114.9	667.8	349.7	2.099		
17,800.0	9,195.0	17,709.2	9,190.0	161.5	160.3	90.17	-8,765.3	-115.7	669.2	347.4	2.080		
17,900.0	9,195.0	17,809.2	9,190.0	163.3	162.1	90.17	-8,865.3	-116.4	670.5	345.1	2.061		
18,000.0	9,195.0	17,909.2	9,190.0	165.1	163.9	90.17	-8,965.3	-117.2	671.9	342.9	2.042		
18,100.0	9,195.0	18,009.2	9,190.0	166.9	165.7	90.17	-9,065.3	-117.9	673.2	340.6	2.024		
18,200.0	9,195.0	18,109.2	9,190.0	168.7	167.5	90.17	-9,165.3	-118.7	674.6	338.4	2.006		
18,300.0	9,195.0	18,209.1	9,190.0	170.5	169.3	90.17	-9,265.2	-119.4	676.0	336.1	1.989		
18,400.0	9,195.0	18,309.1	9,190.0	172.3	171.2	90.17	-9,365.2	-120.2	677.3	333.8	1.972		
18,500.0	9,195.0	18,409.1	9,190.0	174.2	173.0	90.17	-9,465.2	-120.9	678.7	331.6	1.955		
18,600.0	9,195.0	18,509.1	9,190.0	176.0	174.8	90.17	-9,565.2	-121.7	680.0	329.3	1.939		
18,700.0	9,195.0	18,609.1	9,190.0	177.8	176.6	90.17	-9,665.2	-122.4	681.4	327.0	1.923		
18,800.0	9,195.0	18,709.1	9,190.0	179.6	178.4	90.17	-9,765.2	-123.2	682.8	324.8	1.907		
18,900.0	9,195.0	18,809.1	9,190.0	181.4	180.2	90.17	-9,865.2	-123.9	684.1	322.5	1.892		
19,000.0	9,195.0	18,909.1	9,190.0	183.2	182.0	90.17	-9,965.2	-124.7	685.5	320.2	1.877		
19,100.0	9,195.0	19,009.1	9,190.0	185.0	183.8	90.17	-10,065.1	-125.4	686.8	318.0	1.862		
19,200.0	9,195.0	19,109.1	9,190.0	186.8	185.6	90.17	-10,165.1	-126.2	688.2	315.7	1.847		

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



QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design	Sec 30 T24-S R32-E - Windward Federal #7H - Wellbore #1 - Design #1											Offset Site Error:	0.0 usft
Survey Program:	0-MWD default											Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Centre +E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
19,300.0	9,195.0	19,209.0	9,190.0	188.6	187.4	90.17	-10,265.1	-126.9	689.6	313.4	1.833		
19,329.1	9,195.0	19,238.2	9,190.0	189.2	188.0	90.17	-10,294.2	-127.1	690.0	312.8	1.829 SF		



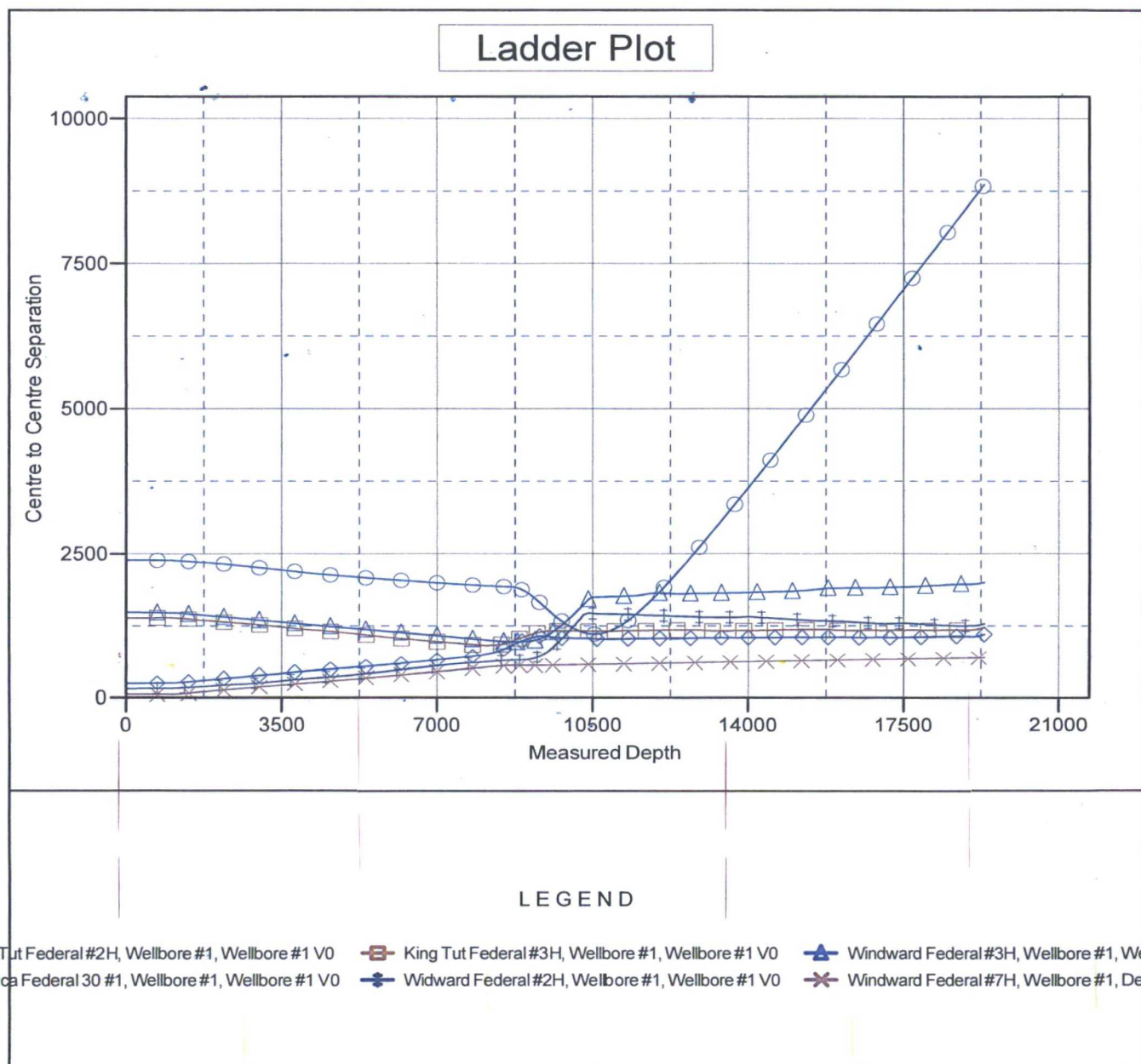
QES Directional Drilling, LLC
Anticollision Report



Company:	COG Production LLC	Local Co-ordinate Reference:	Well Windward Federal #8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Reference Site:	Sec 30 T24-S R32-E	MD Reference:	WELL @ 3576.0usft (Scandril Freedom)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Windward Federal #8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM5002
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 3576.0usft (Scandril Freedom)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Windward Federal #8H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 3001
Grid Convergence at Surface is: 0.33°





QES Directional Drilling, LLC
Anticollision Report



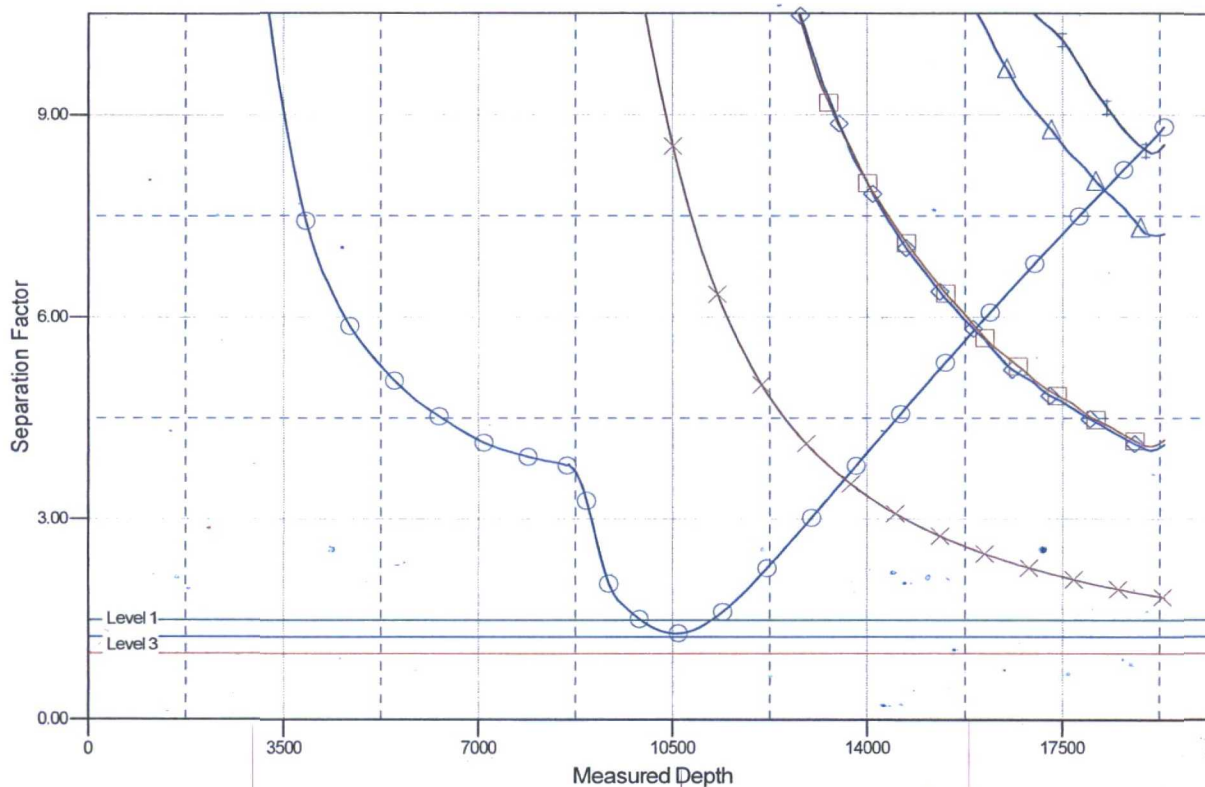
Company: COG Production LLC
Project: Lea County, New Mexico
Reference Site: Sec 30 T24-S R32-E
Site Error: 0.0 usft
Reference Well: Windward Federal #8H
Well Error: 0.0 usft
Reference Wellbore: Wellbore #1
Reference Design: Design #1

Local Co-ordinate Reference: Well Windward Federal #8H
TVD Reference: WELL @ 3576.0usft (Scandrill Freedom)
MD Reference: WELL @ 3576.0usft (Scandrill Freedom)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM5002
Offset TVD Reference: Offset Datum

Reference Depths are relative to WELL @ 3576.0usft (Scandrill Freedom)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Windward Federal #8H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 3001
Grid Convergence at Surface is: 0.33°

Separation Factor Plot



LEGEND

Tut Federal #2H, Wellbore #1, Wellbore #1 V0 King Tut Federal #3H, Wellbore #1, Wellbore #1 V0 Windward Federal #3H, Wellbore #1, Wellbore #1 V0
uca Federal 30 #1, Wellbore #1, Wellbore #1 V0 Windward Federal #2H, Wellbore #1, Wellbore #1 V0 Windward Federal #7H, Wellbore #1, Design