



HOBBS OCD

DEC 05 2017

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COG Operating, LLC

Lea County, NM

Sec 16, T23S, R34E

Gettysburg State Com #13H

Wellbore #1

Design #1

QES Anticollision Report

27 November, 2017



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

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: MD + Stations Interval 100.0usft **Error Model:**
Depth Range: Unlimited **Scan Method:**
Results Limited by: Maximum center-center distance of 1,000.0 usft **Error Surface:** ISCSWA
Warning Levels Evaluated at: 2.00 Sigma Closest Approach 3D
 Pedal Curve

Survey Tool Program	Date	From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
	11/27/2017	0.0	10,950.8	Design #1 (Wellbore #1)	GYRO-NS	OWSG Gyrocompass Gyro
		10,950.8	18,896.4	Design #1 (Wellbore #1)	MWD+IFR1+MS	OWSG MWD + IFR1 + Multi-Station Correction

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance			Warning
			Between Centres (usft)	Between Ellipses (usft)	Separation Factor	
Sec 16, T23S, R34E						
Gettysburg State Com #11H - Wellbore #1 - Design #1						Out of range
Gettysburg State Com #12H - Wellbore #1 - Design #1	18,896.4	18,819.0	875.4	663.7	4.134 CC, ES	
Gettysburg State Com #14H - Wellbore #1 - Design #1	4,300.0	4,300.0	30.0	0.4	1.015 Level 2, CC, ES, SF	
Gettysburg State Com #15H - Wellbore #1 - Design #1	4,300.0	4,300.0	60.0	30.4	2.029 CC, ES	
Gettysburg State Com #1H - OH - OH						Out of range
Gettysburg State Com #1H - ST01 - ST01						Out of range
Gettysburg State Com #2H - Pilot Hole - Pilot Hole	7,780.0	7,750.6	77.5	22.7	1.415 Level 1, CC	
Gettysburg State Com #2H - Pilot Hole - Pilot Hole	7,800.0	7,770.5	77.5	22.6	1.412 Level 1, ES, SF	
Gettysburg State Com #2H - Wellbore #1 - Wellbore #1	7,780.0	7,750.6	77.5	22.7	1.415 Level 1, CC	
Gettysburg State Com #2H - Wellbore #1 - Wellbore #1	7,800.0	7,770.5	77.5	22.6	1.412 Level 1, ES, SF	
Gettysburg State Com #3H - Wellbore #1 - Wellbore #1						Out of range
Gettysburg State Com #4H - Wellbore #1 - Wellbore #1						Out of range
Veto State Com #2H - Wellbore #1 - Wellbore #1	8,110.0	8,053.3	105.3	48.8	1.865 CC, ES	

Offset Design: Sec 16, T23S, R34E - Gettysburg State Com #12H - Wellbore #1 - Design #1

Measured Vertex	Depth (usft)	Offset	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

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
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Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

14,600.0	11,455.8	14,522.6	11,437.9	46.5	63.4	-89.68	-3,167.4	1,646.6	877.4	767.6	7.995
14,700.0	11,458.4	14,622.6	11,441.5	46.9	65.0	-89.75	-3,267.3	1,647.5	877.3	765.4	7.842
14,800.0	11,461.0	14,722.6	11,445.1	47.4	66.6	-89.81	-3,367.3	1,648.3	877.3	763.2	7.693
14,900.0	11,463.7	14,822.6	11,448.7	47.8	68.2	-89.87	-3,467.2	1,649.2	877.2	761.0	7.549
15,000.0	11,466.3	14,922.6	11,452.3	48.3	69.9	-89.93	-3,567.1	1,650.1	877.2	758.8	7.409
15,100.0	11,468.9	15,022.6	11,455.9	48.7	71.5	-89.99	-3,667.0	1,651.0	877.1	756.5	7.273
15,200.0	11,471.6	15,122.6	11,459.4	49.2	73.2	-90.06	-3,767.0	1,651.8	877.1	754.3	7.141
15,300.0	11,474.2	15,222.6	11,463.0	49.7	74.9	-90.12	-3,866.9	1,652.7	877.0	752.0	7.014
15,400.0	11,476.8	15,322.6	11,466.6	50.2	76.6	-90.18	-3,966.8	1,653.6	877.0	749.7	6.890
15,500.0	11,479.5	15,422.5	11,470.2	50.7	78.2	-90.24	-4,066.8	1,654.5	877.0	747.4	6.769
15,600.0	11,482.1	15,522.5	11,473.8	51.2	79.9	-90.30	-4,166.7	1,655.3	876.9	745.1	6.652
15,700.0	11,484.7	15,622.5	11,477.4	51.7	81.6	-90.37	-4,266.6	1,656.2	876.9	742.8	6.539
15,800.0	11,487.4	15,722.5	11,481.0	52.2	83.3	-90.43	-4,366.5	1,657.1	876.8	740.4	6.429
15,900.0	11,490.0	15,822.5	11,484.5	52.7	85.0	-90.49	-4,466.5	1,658.0	876.8	738.1	6.322
16,000.0	11,492.7	15,922.5	11,488.1	53.3	86.8	-90.55	-4,566.4	1,658.8	876.8	735.8	6.218
16,100.0	11,495.3	16,022.5	11,491.7	53.8	88.5	-90.62	-4,666.3	1,659.7	876.7	733.4	6.117
16,200.0	11,497.9	16,122.5	11,495.3	54.3	90.2	-90.68	-4,766.2	1,660.6	876.7	731.0	6.019
16,300.0	11,500.6	16,222.5	11,498.9	54.9	91.9	-90.74	-4,866.2	1,661.5	876.7	728.7	5.924
16,400.0	11,503.2	16,322.7	11,501.7	55.4	93.7	-90.75	-4,966.3	1,662.3	876.6	726.3	5.830
16,500.0	11,505.8	16,422.7	11,503.7	56.0	95.4	-90.71	-5,066.3	1,663.2	876.6	723.8	5.739
16,600.0	11,508.5	16,522.7	11,505.7	56.6	97.1	-90.67	-5,166.3	1,664.1	876.5	721.4	5.650
16,700.0	11,511.1	16,622.7	11,507.7	57.1	98.9	-90.62	-5,266.2	1,665.0	876.5	718.9	5.563
16,800.0	11,513.7	16,722.7	11,509.6	57.7	100.6	-90.58	-5,366.2	1,665.8	876.4	716.5	5.479
16,900.0	11,516.4	16,822.7	11,511.6	58.3	102.4	-90.54	-5,466.2	1,666.7	876.4	714.0	5.397
17,000.0	11,519.0	16,922.7	11,513.6	58.9	104.1	-90.49	-5,566.2	1,667.6	876.3	711.5	5.318
17,100.0	11,521.6	17,022.7	11,515.5	59.4	105.9	-90.45	-5,666.1	1,668.5	876.3	709.0	5.240
17,200.0	11,524.3	17,122.7	11,517.5	60.0	107.6	-90.41	-5,766.1	1,669.3	876.2	706.5	5.164
17,300.0	11,526.9	17,222.7	11,519.5	60.6	109.4	-90.36	-5,866.1	1,670.2	876.2	704.1	5.091
17,400.0	11,529.6	17,322.7	11,521.5	61.2	111.1	-90.32	-5,966.1	1,671.1	876.1	701.6	5.019
17,500.0	11,532.2	17,422.7	11,523.4	61.8	112.9	-90.28	-6,066.0	1,672.0	876.1	699.1	4.949
17,600.0	11,534.8	17,522.7	11,525.4	62.4	114.6	-90.23	-6,166.0	1,672.8	876.0	696.5	4.881

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Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design: Sec 16, T23S, R34E - Gettysburg State Com #14H - Wellbore #1 - Design #1 Offset Site Error: 0.0 usft
 Survey Program: 0- Well Error: 0.0 usft

Reference Measured Depth (usft)	Vertical Depth (usft)	Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Separation Factor	Warning
		Measured Depth (usft)	Vertical 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	-90.57	-0.3	-30.0	30.0			
100.0	100.0	100.0	100.0	0.1	0.1	-90.57	-0.3	-30.0	30.0	29.8	121.053	
200.0	200.0	200.0	200.0	0.5	0.5	-90.57	-0.3	-30.0	30.0	29.1	31.715	
300.0	300.0	300.0	300.0	0.8	0.8	-90.57	-0.3	-30.0	30.0	28.4	18.248	
400.0	400.0	400.0	400.0	1.2	1.2	-90.57	-0.3	-30.0	30.0	27.7	12.809	
500.0	500.0	500.0	500.0	1.5	1.5	-90.57	-0.3	-30.0	30.0	27.0	9.868	
600.0	600.0	600.0	600.0	1.9	1.9	-90.57	-0.3	-30.0	30.0	26.3	8.025	
700.0	700.0	700.0	700.0	2.2	2.2	-90.57	-0.3	-30.0	30.0	25.6	6.762	
800.0	800.0	800.0	800.0	2.6	2.6	-90.57	-0.3	-30.0	30.0	24.9	5.843	
900.0	900.0	900.0	900.0	2.9	2.9	-90.57	-0.3	-30.0	30.0	24.2	5.144	
1,000.0	1,000.0	1,000.0	1,000.0	3.3	3.3	-90.57	-0.3	-30.0	30.0	23.5	4.594	
1,100.0	1,100.0	1,100.0	1,100.0	3.6	3.6	-90.57	-0.3	-30.0	30.0	22.8	4.150	
1,200.0	1,200.0	1,200.0	1,200.0	4.0	4.0	-90.57	-0.3	-30.0	30.0	22.1	3.785	
1,300.0	1,300.0	1,300.0	1,300.0	4.3	4.3	-90.57	-0.3	-30.0	30.0	21.4	3.478	
1,400.0	1,400.0	1,400.0	1,400.0	4.7	4.7	-90.57	-0.3	-30.0	30.0	20.7	3.218	
1,500.0	1,500.0	1,500.0	1,500.0	5.0	5.0	-90.57	-0.3	-30.0	30.0	20.0	2.994	
1,600.0	1,600.0	1,600.0	1,600.0	5.4	5.4	-90.57	-0.3	-30.0	30.0	19.3	2.799	
1,700.0	1,700.0	1,700.0	1,700.0	5.7	5.7	-90.57	-0.3	-30.0	30.0	18.6	2.628	
1,800.0	1,800.0	1,800.0	1,800.0	6.1	6.1	-90.57	-0.3	-30.0	30.0	17.9	2.476	
1,900.0	1,900.0	1,900.0	1,900.0	6.4	6.4	-90.57	-0.3	-30.0	30.0	17.2	2.341	
2,000.0	2,000.0	2,000.0	2,000.0	6.8	6.8	-90.57	-0.3	-30.0	30.0	16.5	2.220	
2,100.0	2,100.0	2,100.0	2,100.0	7.1	7.1	-90.57	-0.3	-30.0	30.0	15.8	2.111	
2,200.0	2,200.0	2,200.0	2,200.0	7.5	7.5	-90.57	-0.3	-30.0	30.0	15.1	2.012	
2,300.0	2,300.0	2,300.0	2,300.0	7.8	7.8	-90.57	-0.3	-30.0	30.0	14.4	1.922	
2,400.0	2,400.0	2,400.0	2,400.0	8.2	8.2	-90.57	-0.3	-30.0	30.0	13.7	1.840	
2,500.0	2,500.0	2,500.0	2,500.0	8.5	8.5	-90.57	-0.3	-30.0	30.0	13.0	1.764	

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

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2,600.0	2,600.0	2,600.0	2,600.0	8.9	8.9	-90.57	-0.3	-30.0	30.0	12.3	1.695
2,700.0	2,700.0	2,700.0	2,700.0	9.2	9.2	-90.57	-0.3	-30.0	30.0	11.6	1.631
2,800.0	2,800.0	2,800.0	2,800.0	9.6	9.6	-90.57	-0.3	-30.0	30.0	10.9	1.571
2,900.0	2,900.0	2,900.0	2,900.0	9.9	9.9	-90.57	-0.3	-30.0	30.0	10.2	1.516
3,000.0	3,000.0	3,000.0	3,000.0	10.3	10.3	-90.57	-0.3	-30.0	30.0	9.5	1.464 Level 3
3,100.0	3,100.0	3,100.0	3,100.0	10.6	10.6	-90.57	-0.3	-30.0	30.0	8.8	1.416 Level 3
3,200.0	3,200.0	3,200.0	3,200.0	11.0	11.0	-90.57	-0.3	-30.0	30.0	8.1	1.371 Level 3
3,300.0	3,300.0	3,300.0	3,300.0	11.3	11.3	-90.57	-0.3	-30.0	30.0	7.4	1.328 Level 3
3,400.0	3,400.0	3,400.0	3,400.0	11.7	11.7	-90.57	-0.3	-30.0	30.0	6.7	1.288 Level 3
3,500.0	3,500.0	3,500.0	3,500.0	12.0	12.0	-90.57	-0.3	-30.0	30.0	6.0	1.251 Level 3
3,600.0	3,600.0	3,600.0	3,600.0	12.4	12.4	-90.57	-0.3	-30.0	30.0	5.3	1.215 Level 2
3,700.0	3,700.0	3,700.0	3,700.0	12.7	12.7	-90.57	-0.3	-30.0	30.0	4.6	1.182 Level 2
3,800.0	3,800.0	3,800.0	3,800.0	13.1	13.1	-90.57	-0.3	-30.0	30.0	3.9	1.150 Level 2
3,900.0	3,900.0	3,900.0	3,900.0	13.4	13.4	-90.57	-0.3	-30.0	30.0	3.2	1.120 Level 2
4,000.0	4,000.0	4,000.0	4,000.0	13.8	13.8	-90.57	-0.3	-30.0	30.0	2.5	1.092 Level 2
4,100.0	4,100.0	4,100.0	4,100.0	14.1	14.1	-90.57	-0.3	-30.0	30.0	1.8	1.065 Level 2
4,200.0	4,200.0	4,200.0	4,200.0	14.5	14.5	-90.57	-0.3	-30.0	30.0	1.1	1.039 Level 2
4,300.0	4,300.0	4,300.0	4,300.0	14.9	14.9	-90.57	-0.3	-30.0	30.0	0.4	1.015 Level 2, CC, ES, SF
4,400.0	4,400.0	4,400.0	4,400.0	15.2	15.2	-166.16	-0.3	-30.0	31.7	1.4	1.047 Level 2
4,500.0	4,499.8	4,499.8	4,499.8	15.6	15.6	-168.09	-0.3	-30.0	36.8	5.8	1.188 Level 2
4,600.0	4,599.5	4,599.5	4,599.5	15.9	15.9	-170.33	-0.3	-30.0	45.4	13.7	1.433 Level 3
4,675.0	4,673.9	4,673.9	4,673.9	16.2	16.2	-171.87	-0.3	-30.0	54.1	21.9	1.680
4,700.0	4,698.7	4,698.7	4,698.7	16.3	16.2	-172.33	-0.3	-30.0	57.3	24.9	1.771
4,800.0	4,797.9	4,797.9	4,797.9	16.6	16.6	-173.75	-0.3	-30.0	70.3	37.2	2.126
4,900.0	4,897.0	4,897.0	4,897.0	17.0	16.9	-174.73	-0.3	-30.0	83.2	49.5	2.467
5,000.0	4,996.2	4,996.2	4,996.2	17.4	17.3	-175.44	-0.3	-30.0	96.3	61.8	2.795

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design	Sec 16, T23S, R34E - Gettysburg State Com #14H - Wellbore #1 - Design #1										Offset Site Error: Offset	0.0 usft
Survey Program:	0-										Well Error:	0.0 usft
Reference	J-NS, 10902-MWD										Warning	
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)	Distance Between Ellipses (usft)	Separation Factor	

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

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5,100.0	5,095.3	5,095.3	5,095.3	17.8	17.6	-175.99	-0.3	-30.0	109.3	74.1	3.110
5,200.0	5,194.4	5,194.4	5,194.4	18.1	18.0	-176.42	-0.3	-30.0	122.3	86.5	3.413
5,300.0	5,293.6	5,293.6	5,293.6	18.5	18.3	-176.76	-0.3	-30.0	135.3	98.8	3.705
5,400.0	5,392.7	5,392.7	5,392.7	18.9	18.7	-177.05	-0.3	-30.0	148.4	111.1	3.986
5,500.0	5,491.9	5,491.9	5,491.9	19.2	19.0	-177.29	-0.3	-30.0	161.4	123.5	4.257
5,600.0	5,591.0	5,591.0	5,591.0	19.6	19.4	-177.49	-0.3	-30.0	174.4	135.8	4.518
5,700.0	5,690.2	5,690.2	5,690.2	20.0	19.7	-177.66	-0.3	-30.0	187.5	148.2	4.770
5,800.0	5,789.3	5,789.3	5,789.3	20.4	20.1	-177.82	-0.3	-30.0	200.5	160.5	5.013
5,900.0	5,888.5	5,888.5	5,888.5	20.7	20.4	-177.95	-0.3	-30.0	213.5	172.8	5.247
6,000.0	5,987.6	5,987.6	5,987.6	21.1	20.8	-178.07	-0.3	-30.0	226.6	185.2	5.474
6,100.0	6,086.7	6,086.7	6,086.7	21.5	21.1	-178.17	-0.3	-30.0	239.6	197.5	5.693
6,200.0	6,185.9	6,185.9	6,185.9	21.9	21.5	-178.27	-0.3	-30.0	252.7	209.9	5.905
6,300.0	6,285.0	6,285.0	6,285.0	22.3	21.8	-178.35	-0.3	-30.0	265.7	222.2	6.110
6,400.0	6,384.2	6,384.2	6,384.2	22.6	22.2	-178.43	-0.3	-30.0	278.8	234.6	6.309
6,500.0	6,483.3	6,483.3	6,483.3	23.0	22.5	-178.50	-0.3	-30.0	291.8	246.9	6.501
6,600.0	6,582.5	6,582.5	6,582.5	23.4	22.9	-178.56	-0.3	-30.0	304.9	259.3	6.688
6,700.0	6,681.6	6,681.6	6,681.6	23.8	23.2	-178.62	-0.3	-30.0	317.9	271.6	6.869
6,800.0	6,780.8	6,780.8	6,780.8	24.1	23.5	-178.68	-0.3	-30.0	331.0	284.0	7.044
6,900.0	6,879.9	6,879.9	6,879.9	24.5	23.9	-178.73	-0.3	-30.0	344.0	296.3	7.214
7,000.0	6,979.0	6,979.0	6,979.0	24.9	24.2	-178.77	-0.3	-30.0	357.1	308.7	7.380
7,100.0	7,078.2	7,078.2	7,078.2	25.3	24.6	-178.82	-0.3	-30.0	370.1	321.0	7.540
7,200.0	7,177.3	7,177.3	7,177.3	25.6	24.9	-178.86	-0.3	-30.0	383.1	333.4	7.696
7,300.0	7,276.5	7,276.5	7,276.5	26.0	25.3	-178.89	-0.3	-30.0	396.2	345.7	7.848
7,400.0	7,375.6	7,375.6	7,375.6	26.4	25.6	-178.93	-0.3	-30.0	409.2	358.1	7.996
7,500.0	7,474.8	7,474.8	7,474.8	26.8	26.0	-178.96	-0.3	-30.0	422.3	370.4	8.139
7,600.0	7,573.9	7,573.9	7,573.9	27.2	26.3	-178.99	-0.3	-30.0	435.3	382.8	8.279
7,700.0	7,673.1	7,673.1	7,673.1	27.5	26.7	-179.02	-0.3	-30.0	448.4	395.1	8.415
7,800.0	7,772.2	7,772.2	7,772.2	27.9	27.0	-179.05	-0.3	-30.0	461.4	407.5	8.547
7,900.0	7,871.3	7,871.3	7,871.3	28.3	27.4	-179.08	-0.3	-30.0	474.5	419.8	8.676
8,000.0	7,970.5	7,970.5	7,970.5	28.7	27.7	-179.10	-0.3	-30.0	487.5	432.1	8.802
8,100.0	8,069.6	8,069.6	8,069.6	29.1	28.1	-179.13	-0.3	-30.0	500.6	444.5	8.924



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

8,200.0	8,168.8	8,168.8	8,168.8	29.4	28.4	-179.15	-0.3	-30.0	513.6	456.8	9.044
8,300.0	8,267.9	8,267.9	8,267.9	29.8	28.8	-179.17	-0.3	-30.0	526.7	469.2	9.160
8,400.0	8,367.1	8,367.1	8,367.1	30.2	29.1	-179.19	-0.3	-30.0	539.7	481.5	9.274
8,500.0	8,466.2	8,466.2	8,466.2	30.6	29.5	-179.21	-0.3	-30.0	552.8	493.9	9.385
8,600.0	8,565.4	8,565.4	8,565.4	31.0	29.8	-179.23	-0.3	-30.0	565.8	506.2	9.493
8,700.0	8,664.5	8,664.5	8,664.5	31.3	30.2	-179.24	-0.3	-30.0	578.9	518.6	9.599
8,800.0	8,763.6	8,763.6	8,763.6	31.7	30.5	-179.26	-0.3	-30.0	591.9	530.9	9.702
8,900.0	8,862.8	8,862.8	8,862.8	32.1	30.9	-179.28	-0.3	-30.0	605.0	543.3	9.803
9,000.0	8,961.9	8,961.9	8,961.9	32.5	31.2	-179.29	-0.3	-30.0	618.0	555.6	9.902
9,100.0	9,061.1	9,061.1	9,061.1	32.9	31.5	-179.31	-0.3	-30.0	631.1	568.0	9.998
9,200.0	9,160.2	9,160.2	9,160.2	33.2	31.9	-179.32	-0.3	-30.0	644.1	580.3	10.093
9,300.0	9,259.4	9,259.4	9,259.4	33.6	32.2	-179.33	-0.3	-30.0	657.2	592.7	10.185
9,400.0	9,358.5	9,358.5	9,358.5	34.0	32.6	-179.35	-0.3	-30.0	670.2	605.0	10.275
9,500.0	9,457.7	9,457.7	9,457.7	34.4	32.9	-179.36	-0.3	-30.0	683.3	617.4	10.363
9,600.0	9,556.8	9,556.8	9,556.8	34.8	33.3	-179.37	-0.3	-30.0	696.3	629.7	10.450
9,700.0	9,656.0	9,656.0	9,656.0	35.1	33.6	-179.38	-0.3	-30.0	709.4	642.0	10.534
9,800.0	9,755.1	9,755.1	9,755.1	35.5	34.0	-179.39	-0.3	-30.0	722.4	654.4	10.617
9,900.0	9,854.2	9,854.2	9,854.2	35.9	34.3	-179.40	-0.3	-30.0	735.5	666.7	10.698
10,000.0	9,953.4	9,953.4	9,953.4	36.3	34.7	-179.41	-0.3	-30.0	748.5	679.1	10.778
10,100.0	10,052.5	10,052.5	10,052.5	36.7	35.0	-179.42	-0.3	-30.0	761.6	691.4	10.855
10,160.8	10,112.8	10,112.8	10,112.8	36.9	35.2	-179.43	-0.3	-30.0	769.5	698.9	10.902

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design											Sec 16, T23S, R34E - Gettysburg State Com #14H - Wellbore #1 - Design #1		Offset Site Error: Offset 0.0 usft	
Survey Program: 0-													Well Error: 0.0 usft	
Reference D-NS, 10902-MWD													Warning	
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)	Between Centres (usft)	Between Ellipses (usft)	Separation Factor			
10,200.0	10,151.7	10,151.7	10,151.7	37.0	35.4	-179.44	-0.3	-30.0	774.4	703.5	10.928			
10,300.0	10,251.2	10,251.2	10,251.2	37.4	35.7	-179.44	-0.3	-30.0	784.3	712.8	10.960			
10,400.0	10,351.0	10,351.0	10,351.0	37.7	36.1	-179.45	-0.3	-30.0	790.8	718.5	10.943			
10,500.0	10,450.9	10,450.9	10,450.9	38.1	36.4	-179.45	-0.3	-30.0	793.8	720.8	10.879			
10,535.8	10,486.7	10,486.7	10,486.7	38.2	36.5	-104.66	-0.3	-30.0	794.0	720.8	10.846			

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

10,600.0	10,550.9	10,550.9	10,550.9	38.4	36.8	-104.66	-0.3	-30.0	794.0	720.4	10.780
10,700.0	10,650.9	10,650.9	10,650.9	38.7	37.1	-104.66	-0.3	-30.0	794.0	719.7	10.680
10,800.0	10,750.9	10,750.9	10,750.9	39.1	37.5	-104.66	-0.3	-30.0	794.0	719.0	10.581
10,900.0	10,850.9	10,850.9	10,850.9	39.4	37.8	-104.66	-0.3	-30.0	794.0	718.3	10.484
10,950.8	10,901.7	10,901.7	10,901.7	39.6	38.0	-104.66	-0.3	-30.0	794.0	717.9	10.436
10,975.0	10,925.9	10,914.6	10,914.6	39.6	38.0	75.88	-0.5	-30.1	794.0	717.9	10.431
11,000.0	10,950.9	10,925.0	10,925.0	39.6	38.0	75.90	-0.8	-30.2	794.1	718.1	10.438
11,025.0	10,975.6	10,941.1	10,941.0	39.6	38.0	75.96	-1.8	-30.5	794.3	718.2	10.445
11,050.0	11,000.2	10,950.0	10,949.9	39.6	38.0	75.99	-2.6	-30.7	794.5	718.5	10.461
11,075.0	11,024.5	10,967.5	10,967.3	39.6	38.0	76.12	-4.6	-31.4	794.7	718.8	10.470
11,100.0	11,048.5	10,975.0	10,974.7	39.6	38.0	76.15	-5.7	-31.7	795.0	719.2	10.492
11,125.0	11,072.1	10,994.0	10,993.4	39.6	38.0	76.35	-8.8	-32.7	795.3	719.6	10.502
11,150.0	11,095.2	11,007.2	11,006.3	39.6	38.0	76.49	-11.4	-33.5	795.8	720.1	10.520
11,175.0	11,117.8	11,025.0	11,023.6	39.6	38.0	76.73	-15.4	-34.8	796.3	720.7	10.533
11,200.0	11,139.8	11,033.6	11,031.9	39.6	38.0	76.82	-17.5	-35.5	796.8	721.4	10.560
11,225.0	11,161.1	11,050.0	11,047.6	39.7	38.1	77.08	-22.1	-36.9	797.5	722.1	10.577
11,250.0	11,181.7	11,059.8	11,057.0	39.7	38.1	77.21	-25.0	-37.8	798.3	723.0	10.604
11,275.0	11,201.6	11,075.0	11,071.2	39.7	38.1	77.47	-30.0	-39.4	799.2	723.9	10.624
11,300.0	11,220.6	11,086.1	11,081.5	39.7	38.1	77.64	-33.8	-40.6	800.1	725.0	10.651
11,325.0	11,238.8	11,100.0	11,094.3	39.7	38.1	77.89	-39.0	-42.2	801.2	726.2	10.674
11,350.0	11,256.0	11,112.2	11,105.5	39.7	38.1	78.10	-43.8	-43.8	802.5	727.5	10.699
11,375.0	11,272.3	11,125.0	11,116.9	39.7	38.1	78.33	-49.2	-45.5	803.8	728.9	10.724
11,400.0	11,287.5	11,138.2	11,128.7	39.7	38.1	78.58	-55.0	-47.3	805.4	730.4	10.748
11,425.0	11,301.7	11,150.0	11,139.0	39.7	38.1	78.78	-60.5	-49.0	807.0	732.1	10.774
11,450.0	11,314.8	11,164.2	11,151.2	39.7	38.1	79.07	-67.4	-51.2	808.9	733.9	10.796
11,475.0	11,326.8	11,175.0	11,160.3	39.7	38.1	79.23	-72.9	-52.9	810.9	736.0	10.823
11,500.0	11,337.6	11,190.0	11,172.8	39.7	38.1	79.54	-80.8	-55.4	813.1	738.1	10.843
11,525.0	11,347.2	11,200.0	11,181.0	39.7	38.1	79.65	-86.3	-57.2	815.5	740.5	10.872
11,550.0	11,355.6	11,215.7	11,193.6	39.8	38.1	79.99	-95.3	-60.0	818.1	743.0	10.891
11,575.0	11,362.7	11,225.0	11,200.9	39.8	38.1	80.05	-100.7	-61.7	821.0	745.8	10.921
11,600.0	11,368.6	11,241.3	11,213.4	39.8	38.1	80.40	-110.7	-64.9	824.0	748.7	10.940



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

13,900.0	11,437.3	13,687.5	11,430.0	43.7	55.8	89.57	-2,484.4	-222.1	985.0	885.6	9.913
14,000.0	11,439.9	13,787.5	11,432.5	44.1	57.0	89.56	-2,584.4	-221.2	985.0	884.1	9.757
14,100.0	11,442.6	13,887.5	11,434.9	44.4	58.3	89.56	-2,684.4	-220.3	985.0	882.4	9.603
14,200.0	11,445.2	13,987.5	11,437.4	44.8	59.5	89.55	-2,784.3	-219.4	985.0	880.8	9.451
14,300.0	11,447.8	14,087.5	11,439.9	45.2	60.8	89.54	-2,884.3	-218.4	985.0	879.1	9.301
14,400.0	11,450.5	14,187.5	11,442.4	45.6	62.1	89.53	-2,984.3	-217.5	985.0	877.4	9.153
14,500.0	11,453.1	14,287.5	11,444.9	46.1	63.4	89.52	-3,084.2	-216.6	985.0	875.7	9.008
14,600.0	11,455.8	14,387.5	11,447.4	46.5	64.7	89.51	-3,184.2	-215.7	985.0	873.9	8.866
14,700.0	11,458.4	14,487.5	11,449.8	46.9	66.1	89.50	-3,284.1	-214.8	985.0	872.1	8.726
14,800.0	11,461.0	14,587.5	11,452.3	47.4	67.4	89.49	-3,384.1	-213.8	985.0	870.3	8.589
14,900.0	11,463.7	14,687.5	11,454.8	47.8	68.8	89.48	-3,484.1	-212.9	985.0	868.5	8.454
15,000.0	11,466.3	14,787.5	11,457.3	48.3	70.2	89.48	-3,584.0	-212.0	985.0	866.7	8.323
15,100.0	11,468.9	14,887.5	11,459.8	48.7	71.6	89.47	-3,684.0	-211.1	985.0	864.8	8.194
15,200.0	11,471.6	14,987.5	11,462.3	49.2	73.0	89.46	-3,784.0	-210.2	985.0	862.9	8.067
15,300.0	11,474.2	15,087.5	11,464.7	49.7	74.4	89.45	-3,883.9	-209.2	985.0	861.0	7.944
15,400.0	11,476.8	15,187.5	11,467.2	50.2	75.8	89.44	-3,983.9	-208.3	985.0	859.1	7.823
15,500.0	11,479.5	15,287.5	11,469.7	50.7	77.3	89.43	-4,083.9	-207.4	985.0	857.2	7.705
15,600.0	11,482.1	15,387.5	11,472.2	51.2	78.7	89.42	-4,183.8	-206.5	985.0	855.2	7.589
15,700.0	11,484.7	15,487.5	11,474.7	51.7	80.2	89.41	-4,283.8	-205.6	985.0	853.3	7.476
15,800.0	11,487.4	15,587.5	11,477.2	52.2	81.6	89.41	-4,383.8	-204.7	985.1	851.3	7.366
15,900.0	11,490.0	15,687.5	11,479.6	52.7	83.1	89.40	-4,483.7	-203.7	985.1	849.3	7.258
16,000.0	11,492.7	15,787.5	11,482.1	53.3	84.6	89.39	-4,583.7	-202.8	985.1	847.3	7.152
16,100.0	11,495.3	15,887.5	11,484.6	53.8	86.0	89.38	-4,683.7	-201.9	985.1	845.3	7.049
16,200.0	11,497.9	15,987.5	11,487.1	54.3	87.5	89.37	-4,783.6	-201.0	985.1	843.3	6.948
16,300.0	11,500.6	16,087.5	11,489.6	54.9	89.0	89.36	-4,883.6	-200.1	985.1	841.3	6.850
16,400.0	11,503.2	16,187.5	11,492.1	55.4	90.5	89.35	-4,983.6	-199.1	985.1	839.2	6.754
16,500.0	11,505.8	16,287.5	11,494.5	56.0	92.0	89.34	-5,083.5	-198.2	985.1	837.2	6.660
16,600.0	11,508.5	16,387.5	11,497.0	56.6	93.5	89.33	-5,183.5	-197.3	985.1	835.1	6.568
16,700.0	11,511.1	16,487.5	11,499.5	57.1	95.0	89.33	-5,283.4	-196.4	985.1	833.0	6.478
16,800.0	11,513.7	16,587.5	11,502.0	57.7	96.5	89.32	-5,383.4	-195.5	985.1	830.9	6.390
16,900.0	11,516.4	16,687.5	11,504.5	58.3	98.1	89.31	-5,483.4	-194.5	985.1	828.8	6.304

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design Sec 16, T23S, R34E - Gettysburg State Com #15H - Wellbore #1 - Design #1 **Offset Site Error: Offset** 0.0 usft
Survey Program: 0- **Well Error:** 0.0 usft

Reference Measured Depth (usft)	Vertical Depth (usft)	Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Separation Factor	Warning
		Measured Depth (usft)	Vertical 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	-90.57	-0.6	-60.0	60.0			
100.0	100.0	100.0	100.0	0.1	0.1	-90.57	-0.6	-60.0	60.0	59.8	242.106	
200.0	200.0	200.0	200.0	0.5	0.5	-90.57	-0.6	-60.0	60.0	59.1	63.430	
300.0	300.0	300.0	300.0	0.8	0.8	-90.57	-0.6	-60.0	60.0	58.4	36.496	
400.0	400.0	400.0	400.0	1.2	1.2	-90.57	-0.6	-60.0	60.0	57.7	25.618	
500.0	500.0	500.0	500.0	1.5	1.5	-90.57	-0.6	-60.0	60.0	57.0	19.735	
600.0	600.0	600.0	600.0	1.9	1.9	-90.57	-0.6	-60.0	60.0	56.3	16.050	
700.0	700.0	700.0	700.0	2.2	2.2	-90.57	-0.6	-60.0	60.0	55.6	13.524	
800.0	800.0	800.0	800.0	2.6	2.6	-90.57	-0.6	-60.0	60.0	54.9	11.686	
900.0	900.0	900.0	900.0	2.9	2.9	-90.57	-0.6	-60.0	60.0	54.2	10.287	
1,000.0	1,000.0	1,000.0	1,000.0	3.3	3.3	-90.57	-0.6	-60.0	60.0	53.5	9.187	
1,100.0	1,100.0	1,100.0	1,100.0	3.6	3.6	-90.57	-0.6	-60.0	60.0	52.8	8.300	
1,200.0	1,200.0	1,200.0	1,200.0	4.0	4.0	-90.57	-0.6	-60.0	60.0	52.1	7.569	
1,300.0	1,300.0	1,300.0	1,300.0	4.3	4.3	-90.57	-0.6	-60.0	60.0	51.4	6.957	
1,400.0	1,400.0	1,400.0	1,400.0	4.7	4.7	-90.57	-0.6	-60.0	60.0	50.7	6.436	
1,500.0	1,500.0	1,500.0	1,500.0	5.0	5.0	-90.57	-0.6	-60.0	60.0	50.0	5.987	
1,600.0	1,600.0	1,600.0	1,600.0	5.4	5.4	-90.57	-0.6	-60.0	60.0	49.3	5.597	
1,700.0	1,700.0	1,700.0	1,700.0	5.7	5.7	-90.57	-0.6	-60.0	60.0	48.6	5.255	
1,800.0	1,800.0	1,800.0	1,800.0	6.1	6.1	-90.57	-0.6	-60.0	60.0	47.9	4.952	
1,900.0	1,900.0	1,900.0	1,900.0	6.4	6.4	-90.57	-0.6	-60.0	60.0	47.2	4.683	
2,000.0	2,000.0	2,000.0	2,000.0	6.8	6.8	-90.57	-0.6	-60.0	60.0	46.5	4.441	
2,100.0	2,100.0	2,100.0	2,100.0	7.1	7.1	-90.57	-0.6	-60.0	60.0	45.8	4.222	
2,200.0	2,200.0	2,200.0	2,200.0	7.5	7.5	-90.57	-0.6	-60.0	60.0	45.1	4.025	
2,300.0	2,300.0	2,300.0	2,300.0	7.8	7.8	-90.57	-0.6	-60.0	60.0	44.4	3.845	
2,400.0	2,400.0	2,400.0	2,400.0	8.2	8.2	-90.57	-0.6	-60.0	60.0	43.7	3.680	
2,500.0	2,500.0	2,500.0	2,500.0	8.5	8.5	-90.57	-0.6	-60.0	60.0	43.0	3.529	

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

2,600.0	2,600.0	2,600.0	2,600.0	8.9	8.9	-90.57	-0.6	-60.0	60.0	42.3	3.390
2,700.0	2,700.0	2,700.0	2,700.0	9.2	9.2	-90.57	-0.6	-60.0	60.0	41.6	3.261
2,800.0	2,800.0	2,800.0	2,800.0	9.6	9.6	-90.57	-0.6	-60.0	60.0	40.9	3.142
2,900.0	2,900.0	2,900.0	2,900.0	9.9	9.9	-90.57	-0.6	-60.0	60.0	40.2	3.031
3,000.0	3,000.0	3,000.0	3,000.0	10.3	10.3	-90.57	-0.6	-60.0	60.0	39.5	2.928
3,100.0	3,100.0	3,100.0	3,100.0	10.6	10.6	-90.57	-0.6	-60.0	60.0	38.8	2.831
3,200.0	3,200.0	3,200.0	3,200.0	11.0	11.0	-90.57	-0.6	-60.0	60.0	38.1	2.741
3,300.0	3,300.0	3,300.0	3,300.0	11.3	11.3	-90.57	-0.6	-60.0	60.0	37.4	2.656
3,400.0	3,400.0	3,400.0	3,400.0	11.7	11.7	-90.57	-0.6	-60.0	60.0	36.7	2.577
3,500.0	3,500.0	3,500.0	3,500.0	12.0	12.0	-90.57	-0.6	-60.0	60.0	36.0	2.502
3,600.0	3,600.0	3,600.0	3,600.0	12.4	12.4	-90.57	-0.6	-60.0	60.0	35.3	2.431
3,700.0	3,700.0	3,700.0	3,700.0	12.7	12.7	-90.57	-0.6	-60.0	60.0	34.6	2.364
3,800.0	3,800.0	3,800.0	3,800.0	13.1	13.1	-90.57	-0.6	-60.0	60.0	33.9	2.301
3,900.0	3,900.0	3,900.0	3,900.0	13.4	13.4	-90.57	-0.6	-60.0	60.0	33.2	2.241
4,000.0	4,000.0	4,000.0	4,000.0	13.8	13.8	-90.57	-0.6	-60.0	60.0	32.5	2.184
4,100.0	4,100.0	4,100.0	4,100.0	14.1	14.1	-90.57	-0.6	-60.0	60.0	31.8	2.130
4,200.0	4,200.0	4,200.0	4,200.0	14.5	14.5	-90.57	-0.6	-60.0	60.0	31.1	2.078
4,300.0	4,300.0	4,300.0	4,300.0	14.9	14.9	-90.57	-0.6	-60.0	60.0	30.4	2.029 CC, ES, SF
4,400.0	4,400.0	4,397.9	4,397.8	15.2	15.2	-165.49	-0.3	-61.7	63.4	33.1	2.095
4,500.0	4,499.8	4,495.1	4,494.9	15.6	15.5	-165.80	0.4	-66.6	73.5	42.6	2.379
4,600.0	4,599.5	4,591.0	4,590.5	15.9	15.9	-166.14	1.7	-74.6	90.2	58.7	2.864
4,675.0	4,673.9	4,661.6	4,660.6	16.2	16.1	-166.37	2.9	-82.5	107.0	75.1	3.352
4,700.0	4,698.7	4,685.0	4,683.8	16.3	16.2	-166.45	3.4	-85.5	113.4	81.3	3.535
4,800.0	4,797.9	4,777.2	4,775.0	16.6	16.6	-166.56	5.5	-99.2	140.5	107.9	4.311
4,900.0	4,897.0	4,871.8	4,868.2	17.0	16.9	-166.49	8.0	-115.3	169.8	136.6	5.109
5,000.0	4,996.2	4,967.4	4,962.3	17.4	17.3	-166.44	10.5	-131.6	199.2	165.3	5.874

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design	Sec 16, T23S, R34E - Gettysburg State Com #15H - Wellbore #1 - Design #1										Offset Site Error: Offset	0.0 usft
Survey Program:	0-										Well Error:	0.0 usft
Reference	D-NS, 10991-MWD										Warning	
Measured Depth (usft)	Vertical Depth (usft)	Offset 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)	Distance Between Ellipses (usft)	Separation Factor	

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



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey Program: 100- RO-NS Offset Site Error: Offset 0.0 usft

Measured Depth (usft)	Reference 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	0.0	0.0	0.0	0.0	101.15	-81.3	412.4	420.4			
100.0	100.0	92.1	92.1	0.1	0.1	101.16	-81.4	412.4	420.3	420.1	1,730.369	
200.0	200.0	193.2	193.2	0.5	0.5	101.14	-81.2	412.3	420.2	419.3	452.828	
300.0	300.0	292.7	292.7	0.8	0.8	101.10	-80.9	412.1	420.0	418.3	258.481	
400.0	400.0	393.8	393.8	1.2	1.2	101.11	-80.9	411.8	419.7	417.4	180.307	
500.0	500.0	496.5	496.5	1.5	1.5	101.09	-80.6	411.1	418.9	415.9	137.954	
600.0	600.0	600.6	600.6	1.9	1.9	101.04	-79.9	409.6	417.4	413.6	111.276	
700.0	700.0	708.6	708.5	2.2	2.3	100.96	-78.7	406.5	414.4	409.9	92.519	
800.0	800.0	815.8	815.6	2.6	2.7	100.83	-76.8	401.5	409.5	404.3	78.702	
900.0	900.0	921.7	921.3	2.9	3.1	100.57	-73.7	394.9	402.8	396.9	68.000	
1,000.0	1,000.0	1,021.2	1,020.5	3.3	3.4	100.20	-69.9	388.4	395.6	389.0	59.705	
1,100.0	1,100.0	1,121.9	1,120.8	3.6	3.8	99.74	-65.5	381.6	388.2	380.9	52.945	
1,200.0	1,200.0	1,220.6	1,219.2	4.0	4.2	99.35	-61.7	374.9	380.9	372.9	47.420	
1,300.0	1,300.0	1,319.0	1,317.4	4.3	4.6	99.04	-58.6	368.5	374.0	365.3	42.835	
1,400.0	1,400.0	1,417.5	1,415.6	4.7	4.9	98.73	-55.6	362.3	367.3	357.9	38.952	
1,500.0	1,500.0	1,511.9	1,509.8	5.0	5.2	98.52	-53.5	357.3	361.7	351.6	35.759	
1,600.0	1,600.0	1,611.0	1,608.9	5.4	5.6	98.38	-51.9	352.7	356.9	346.1	33.007	
1,700.0	1,700.0	1,711.5	1,709.2	5.7	5.9	98.28	-50.6	348.0	352.1	340.5	30.580	
1,800.0	1,800.0	1,811.8	1,809.4	6.1	6.3	98.21	-49.5	343.1	347.1	334.9	28.418	
1,900.0	1,900.0	1,910.9	1,908.4	6.4	6.6	98.11	-48.2	338.3	342.2	329.3	26.501	
2,000.0	2,000.0	2,009.1	2,006.5	6.8	7.0	97.94	-46.6	334.1	337.6	324.0	24.811	
2,100.0	2,100.0	2,106.7	2,104.0	7.1	7.3	97.68	-44.6	330.4	333.6	319.3	23.331	
2,200.0	2,200.0	2,203.5	2,200.7	7.5	7.6	97.32	-42.1	327.7	330.5	315.5	22.049	
2,300.0	2,300.0	2,301.5	2,298.7	7.8	8.0	96.88	-39.3	325.8	328.2	312.5	20.926	
2,400.0	2,400.0	2,400.0	2,397.1	8.2	8.3	96.36	-36.2	324.5	326.6	310.2	19.939	
2,500.0	2,500.0	2,496.3	2,493.3	8.5	8.7	95.77	-32.8	324.1	325.8	308.7	19.091	
2,538.0	2,538.0	2,533.0	2,530.0	8.7	8.8	95.53	-31.4	324.2	325.7	308.4	18.799	
2,600.0	2,600.0	2,592.8	2,589.7	8.9	9.0	95.10	-29.0	324.6	325.9	308.1	18.363	

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

2,700.0	2,700.0	2,690.1	2,687.0	9.2	9.3	94.35	-24.8	326.0	327.0	308.6	17.741
2,800.0	2,800.0	2,785.8	2,782.5	9.6	9.6	93.58	-20.5	328.4	329.2	310.1	17.229
2,900.0	2,900.0	2,882.6	2,879.1	9.9	10.0	92.76	-16.0	332.0	332.6	312.8	16.811
3,000.0	3,000.0	2,979.7	2,976.1	10.3	10.3	91.99	-11.7	336.3	336.9	316.4	16.464
3,100.0	3,100.0	3,077.8	3,074.0	10.6	10.7	91.30	-7.8	341.4	341.9	320.8	16.171
3,200.0	3,200.0	3,177.3	3,173.3	11.0	11.0	90.76	-4.6	346.8	347.3	325.5	15.905
3,300.0	3,300.0	3,276.2	3,272.0	11.3	11.4	90.26	-1.6	352.2	352.8	330.3	15.665
3,400.0	3,400.0	3,377.0	3,372.6	11.7	11.7	89.80	1.2	357.9	358.4	335.2	15.435
3,500.0	3,500.0	3,478.9	3,474.3	12.0	12.1	89.44	3.6	363.1	363.6	339.7	15.195
3,600.0	3,600.0	3,578.3	3,573.6	12.4	12.4	89.05	6.1	367.9	368.4	343.8	14.965
3,700.0	3,700.0	3,681.0	3,676.1	12.7	12.8	88.53	9.6	372.7	373.2	347.9	14.732
3,800.0	3,800.0	3,785.6	3,780.6	13.1	13.1	88.01	13.1	376.5	376.9	350.8	14.463
3,900.0	3,900.0	3,891.7	3,886.6	13.4	13.5	87.64	15.6	378.7	379.1	352.3	14.154
4,000.0	4,000.0	3,993.7	3,988.6	13.8	13.9	87.42	17.1	379.8	380.2	352.7	13.831
4,100.0	4,100.0	4,096.1	4,091.0	14.1	14.2	87.29	18.0	380.4	380.8	352.6	13.506
4,200.0	4,200.0	4,187.8	4,182.7	14.5	14.5	87.27	18.2	381.5	382.1	353.2	13.243
4,300.0	4,300.0	4,289.0	4,283.8	14.9	14.9	87.12	19.3	384.0	384.5	355.0	13.011
4,400.0	4,400.0	4,384.1	4,378.9	15.2	15.2	12.16	20.9	386.4	385.5	355.3	12.754
4,500.0	4,499.8	4,480.1	4,474.8	15.6	15.6	12.13	22.4	390.1	384.3	353.4	12.439
4,600.0	4,599.5	4,578.9	4,573.5	15.9	15.9	12.15	24.4	394.6	380.4	348.9	12.045
4,675.0	4,673.9	4,652.9	4,647.4	16.2	16.2	12.31	25.5	398.1	375.4	343.3	11.695
4,700.0	4,698.7	4,677.6	4,672.1	16.3	16.2	12.37	25.9	399.3	373.5	341.2	11.572
4,800.0	4,797.9	4,780.0	4,774.4	16.6	16.6	12.68	27.0	404.1	365.4	332.4	11.078
4,900.0	4,897.0	4,886.3	4,880.6	17.0	17.0	13.13	27.4	407.7	356.1	322.3	10.560

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design	Sec 16, T23S, R34E - Gettysburg State Com #2H - Pilot Hole - Pilot Hole										Offset Site Error: Offset	0.0 usft
Survey Program:	100- RO-NS										Well Error:	0.0 usft
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)	Distance Between Ellipses (usft)	Separation Factor	Warning
5,000.0	4,996.2	4,984.0	4,978.3	17.4	17.3	13.60	27.6	410.1	345.8	311.4	10.051	
5,100.0	5,095.3	5,085.1	5,079.3	17.8	17.7	14.08	28.0	412.8	335.8	300.7	9.565	

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



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

5,200.0	5,194.4	5,186.5	5,180.6	18.1	18.0	14.52	28.8	414.9	325.2	289.4	9.081
5,300.0	5,293.6	5,284.5	5,278.6	18.5	18.4	15.01	29.3	416.8	314.5	278.0	8.616
5,400.0	5,392.7	5,383.3	5,377.4	18.9	18.7	15.64	29.3	419.1	304.3	267.1	8.179
5,500.0	5,491.9	5,484.4	5,478.5	19.2	19.1	16.33	29.4	421.3	293.9	256.0	7.752
5,600.0	5,591.0	5,583.2	5,577.3	19.6	19.4	16.99	29.7	423.2	283.2	244.6	7.336
5,700.0	5,690.2	5,683.0	5,677.1	20.0	19.7	17.59	30.6	425.2	272.7	233.4	6.938
5,800.0	5,789.3	5,783.5	5,777.6	20.4	20.1	18.27	31.4	426.9	261.9	221.9	6.546
5,900.0	5,888.5	5,883.8	5,877.8	20.7	20.4	19.07	32.0	428.1	250.8	210.0	6.159
6,000.0	5,987.6	5,983.6	5,977.7	21.1	20.8	19.92	32.7	429.1	239.4	197.9	5.779
6,100.0	6,086.7	6,083.9	6,078.0	21.5	21.1	20.88	33.3	429.8	227.7	185.6	5.405
6,200.0	6,185.9	6,183.4	6,177.4	21.9	21.5	21.93	34.0	430.1	215.8	173.0	5.038
6,300.0	6,285.0	6,280.8	6,274.8	22.3	21.8	23.12	34.4	430.7	204.3	160.8	4.693
6,400.0	6,384.2	6,380.0	6,374.0	22.6	22.2	24.44	34.9	432.0	193.5	149.3	4.374
6,500.0	6,483.3	6,479.4	6,473.5	23.0	22.5	26.03	35.1	433.1	182.8	137.8	4.065
6,600.0	6,582.5	6,579.1	6,573.1	23.4	22.9	27.71	35.6	434.1	172.0	126.3	3.766
6,700.0	6,681.6	6,678.4	6,672.4	23.8	23.2	29.59	36.2	435.0	161.3	114.9	3.476
6,800.0	6,780.8	6,779.1	6,773.1	24.1	23.6	31.85	36.7	435.5	150.4	103.2	3.191
6,900.0	6,879.9	6,877.6	6,871.6	24.5	23.9	34.43	37.3	435.5	139.2	91.4	2.909
7,000.0	6,979.0	6,977.4	6,971.4	24.9	24.2	37.54	37.6	435.8	128.7	80.2	2.649
7,100.0	7,078.2	7,076.6	7,070.6	25.3	24.6	41.34	37.8	435.5	118.2	68.9	2.396
7,200.0	7,177.3	7,175.6	7,169.6	25.6	24.9	45.89	38.0	435.2	108.4	58.3	2.164
7,300.0	7,276.5	7,274.9	7,268.9	26.0	25.3	51.62	37.6	434.6	99.5	48.6	1.955
7,400.0	7,375.6	7,373.6	7,367.6	26.4	25.6	58.15	37.5	434.2	91.7	40.0	1.773
7,500.0	7,474.8	7,472.9	7,466.9	26.8	26.0	65.70	37.3	434.0	85.5	33.0	1.627
7,600.0	7,573.9	7,572.0	7,566.0	27.2	26.3	74.31	37.4	433.7	80.7	27.4	1.513
7,700.0	7,673.1	7,671.2	7,665.2	27.5	26.7	83.80	37.2	433.2	78.2	24.0	1.443 Level 3
7,780.0	7,752.4	7,750.6	7,744.6	27.8	26.9	91.43	37.5	433.2	77.5	22.7	1.415 Level 3, CC
7,800.0	7,772.2	7,770.5	7,764.4	27.9	27.0	93.37	37.5	433.1	77.5	22.6	1.412 Level 3, ES, SF
7,900.0	7,871.3	7,869.6	7,863.6	28.3	27.3	102.87	37.8	432.9	79.1	23.5	1.423 Level 3
8,000.0	7,970.5	7,968.4	7,962.4	28.7	27.7	111.35	37.9	433.3	82.9	26.6	1.473 Level 3
8,100.0	8,069.6	8,067.8	8,061.8	29.1	28.0	119.14	37.7	433.3	88.6	31.7	1.558

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



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

8,200.0	8,168.8	8,166.8	8,160.8	29.4	28.4	126.24	38.1	432.9	95.5	38.0	1.661
8,300.0	8,267.9	8,266.0	8,260.0	29.8	28.7	132.21	38.1	432.6	103.9	45.8	1.787
8,400.0	8,367.1	8,365.9	8,359.9	30.2	29.1	137.13	38.4	432.8	112.8	54.0	1.919
8,500.0	8,466.2	8,465.3	8,459.3	30.6	29.4	141.43	39.4	433.1	121.8	62.4	2.050
8,600.0	8,565.4	8,563.9	8,557.9	31.0	29.8	145.47	40.7	432.5	131.6	71.6	2.193
8,700.0	8,664.5	8,663.4	8,657.3	31.3	30.1	148.90	41.7	431.9	142.3	81.6	2.345
8,800.0	8,763.8	8,763.0	8,756.9	31.7	30.5	151.84	43.0	431.7	152.9	91.5	2.492
8,900.0	8,862.8	8,861.9	8,855.8	32.1	30.8	154.68	45.0	430.9	163.8	101.8	2.642
9,000.0	8,961.9	8,961.8	8,955.7	32.5	31.2	157.19	47.0	430.2	175.0	112.4	2.793
9,100.0	9,061.1	9,061.7	9,055.6	32.9	31.5	159.35	49.3	430.0	185.9	122.6	2.935
9,200.0	9,160.2	9,161.5	9,155.4	33.2	31.9	161.31	51.9	430.0	196.8	132.8	3.074
9,300.0	9,259.4	9,261.9	9,255.7	33.6	32.2	162.97	54.4	430.5	207.4	142.7	3.206
9,400.0	9,358.5	9,361.1	9,354.8	34.0	32.5	164.71	57.9	430.9	217.9	152.5	3.331
9,500.0	9,457.7	9,460.4	9,454.0	34.4	32.9	166.36	61.6	430.9	228.6	162.6	3.460
9,600.0	9,556.8	9,559.9	9,553.5	34.8	33.2	167.86	65.3	431.2	239.4	172.6	3.586
9,700.0	9,656.0	9,659.6	9,653.1	35.1	33.6	169.32	69.4	431.3	250.2	182.8	3.709
9,800.0	9,755.1	9,759.0	9,752.4	35.5	33.9	170.80	74.3	431.4	261.0	192.9	3.830
9,900.0	9,854.2	9,857.4	9,850.7	35.9	34.3	172.22	79.3	431.2	272.1	203.2	3.952
10,000.0	9,953.4	9,956.3	9,949.4	36.3	34.6	173.62	84.6	430.6	283.6	214.0	4.079

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design Sec 16, T23S, R34E - Gettysburg State Com #2H - Pilot Hole - Pilot Hole												Offset Site Error: Offset	0.0 usft
Survey Program: 100-RO-NS												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)	+E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
10,100.0	10,052.5	10,053.8	10,046.8	36.7	35.0	174.92	89.9	429.8	295.3	225.1	4.206		
10,160.8	10,112.8	10,112.4	10,105.3	36.9	35.2	175.74	93.4	428.8	303.0	232.4	4.291		
10,200.0	10,151.7	10,151.0	10,143.8	37.0	35.3	176.28	95.8	428.0	307.8	236.9	4.342		
10,300.0	10,251.2	10,250.9	10,243.4	37.4	35.7	177.61	102.1	425.9	317.8	246.2	4.439		
10,400.0	10,351.0	10,352.1	10,344.5	37.7	36.0	178.72	107.9	424.4	324.0	251.7	4.481		
10,500.0	10,450.9	10,455.3	10,447.5	38.1	36.4	179.81	114.0	423.5	326.2	253.1	4.467		
10,535.8	10,486.7	10,492.9	10,485.1	38.2	36.5	-105.01	116.3	423.6	325.8	252.5	4.446		

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



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

10,600.0	10,550.9	10,556.0	10,548.0	38.4	36.7	-104.33	120.3	423.7	324.6	250.9	4.404
10,700.0	10,650.9	10,653.8	10,645.8	38.7	37.1	-103.15	127.1	423.2	323.5	249.1	4.348
10,800.0	10,750.9	10,753.1	10,744.6	39.1	37.4	-101.94	133.8	422.3	322.9	247.8	4.301
10,900.0	10,850.9	10,852.9	10,844.3	39.4	37.8	-100.92	139.6	421.6	322.4	246.6	4.255
10,950.8	10,901.7	10,903.7	10,895.0	39.6	38.0	-100.45	142.2	421.3	322.2	246.1	4.233
10,975.0	10,925.9	10,928.8	10,920.1	39.6	38.0	80.44	143.5	421.2	322.0	245.7	4.222
11,000.0	10,950.9	10,954.5	10,945.8	39.6	38.1	81.08	144.8	421.2	321.5	245.1	4.210
11,025.0	10,975.6	10,980.1	10,971.3	39.6	38.2	81.99	146.1	421.3	320.7	244.3	4.195
11,050.0	11,000.2	11,005.2	10,996.3	39.6	38.3	83.13	147.5	421.4	319.8	243.3	4.178
11,075.0	11,024.5	11,029.5	11,020.6	39.6	38.4	84.47	148.8	421.5	318.8	242.2	4.161
11,100.0	11,048.5	11,053.3	11,044.4	39.6	38.5	86.02	150.2	421.7	317.9	241.2	4.144
11,125.0	11,072.1	11,076.7	11,067.7	39.6	38.6	87.74	151.5	421.9	317.1	240.3	4.128
11,150.0	11,095.2	11,099.4	11,090.4	39.6	38.6	89.60	152.9	422.1	316.6	239.7	4.116
11,169.9	11,113.2	11,117.1	11,108.0	39.6	38.7	91.14	153.9	422.2	316.4	239.5	4.110
11,175.0	11,117.8	11,121.5	11,112.5	39.6	38.7	91.54	154.2	422.3	316.5	239.4	4.109
11,200.0	11,139.8	11,143.0	11,133.9	39.6	38.8	93.53	155.4	422.5	316.8	239.7	4.109
11,225.0	11,161.1	11,163.9	11,154.8	39.7	38.9	95.54	156.5	422.7	317.9	240.7	4.116
11,250.0	11,181.7	11,184.0	11,174.9	39.7	38.9	97.51	157.6	422.9	319.7	242.4	4.134
11,275.0	11,201.6	11,203.3	11,194.2	39.7	39.0	99.40	158.5	423.1	322.4	245.0	4.163
11,300.0	11,220.6	11,221.2	11,212.0	39.7	39.1	101.11	159.3	423.3	326.2	248.6	4.205
11,325.0	11,238.8	11,238.2	11,229.0	39.7	39.1	102.66	160.1	423.5	331.1	253.4	4.261
11,350.0	11,256.0	11,254.2	11,245.0	39.7	39.2	104.02	160.9	423.6	337.2	259.4	4.333
11,375.0	11,272.3	11,269.3	11,260.0	39.7	39.2	105.14	161.6	423.7	344.7	266.7	4.421
11,400.0	11,287.5	11,283.3	11,274.0	39.7	39.3	106.00	162.3	423.8	353.4	275.3	4.526
11,425.0	11,301.7	11,296.2	11,286.9	39.7	39.3	106.58	163.0	423.9	363.5	285.3	4.648
11,450.0	11,314.8	11,300.0	11,290.7	39.7	39.3	105.65	163.1	423.9	375.0	296.7	4.792
11,475.0	11,326.8	11,300.0	11,290.7	39.7	39.3	103.87	163.1	423.9	388.0	309.8	4.960
11,500.0	11,337.6	11,300.0	11,290.7	39.7	39.3	101.81	163.1	423.9	402.4	324.2	5.146
11,525.0	11,347.2	11,300.0	11,290.7	39.7	39.3	99.45	163.1	423.9	418.1	339.9	5.347
11,550.0	11,355.6	11,300.0	11,290.7	39.8	39.3	96.79	163.1	423.9	434.7	356.5	5.562
11,575.0	11,362.7	11,300.0	11,290.7	39.8	39.3	93.85	163.1	423.9	452.2	374.1	5.786

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

11,600.0	11,368.6	11,300.0	11,290.7	39.8	39.3	90.64	163.1	423.9	470.5	392.3	6.018
11,625.0	11,373.2	11,300.0	11,290.7	39.8	39.3	87.19	163.1	423.9	489.4	411.2	6.257
11,650.0	11,376.5	11,300.0	11,290.7	39.8	39.3	83.53	163.1	423.9	508.7	430.5	6.500
11,675.0	11,378.5	11,300.0	11,290.7	39.8	39.3	79.71	163.1	423.9	528.5	450.1	6.746
11,688.2	11,379.0	11,300.0	11,290.7	39.8	39.3	77.65	163.1	423.9	539.0	460.6	6.877
11,700.0	11,379.3	11,300.0	11,290.7	39.8	39.3	77.65	163.1	423.9	548.5	470.1	6.995
11,800.0	11,381.9	11,300.0	11,290.7	39.8	39.3	77.65	163.1	423.9	632.2	553.8	8.037
11,900.0	11,384.6	11,300.0	11,290.7	39.8	39.3	77.65	163.1	423.9	720.1	641.2	9.133
12,000.0	11,387.2	11,300.0	11,290.7	39.8	39.3	77.65	163.1	423.9	810.8	731.8	10.268
12,100.0	11,389.9	11,300.0	11,290.7	39.9	39.3	77.65	163.1	423.9	903.4	824.4	11.428
12,200.0	11,392.5	11,300.0	11,290.7	39.9	39.3	77.65	163.1	423.9	997.5	918.4	12.606

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design Sec 16, T23S, R34E - Gettysburg State Com #2H - Wellbore #1 - Wellbore #1 Offset Site Error: Offset 0.0 usft
 Survey Program: 100- RO-NS, 9757-MWD default 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)	Distance Between Ellipses (usft)	Separation Factor	Warning
	0.0	0.0	0.0	0.0	0.0	0.0	101.15	-81.3	412.4	420.4			
	100.0	100.0	92.1	92.1	0.1	0.1	101.16	-81.4	412.4	420.3	420.1	1,730.369	
	200.0	200.0	193.2	193.2	0.5	0.5	101.14	-81.2	412.3	420.2	419.3	452.828	
	300.0	300.0	292.7	292.7	0.8	0.8	101.10	-80.9	412.1	420.0	418.3	258.481	
	400.0	400.0	393.8	393.8	1.2	1.2	101.11	-80.9	411.8	419.7	417.4	180.307	
	500.0	500.0	496.5	496.5	1.5	1.5	101.09	-80.6	411.1	418.9	415.9	137.954	
	600.0	600.0	600.6	600.6	1.9	1.9	101.04	-79.9	409.6	417.4	413.6	111.276	
	700.0	700.0	708.6	708.5	2.2	2.3	100.96	-78.7	406.5	414.4	409.9	92.519	
	800.0	800.0	815.8	815.6	2.6	2.7	100.83	-76.8	401.5	409.5	404.3	78.702	
	900.0	900.0	921.7	921.3	2.9	3.1	100.57	-73.7	394.9	402.8	396.9	68.000	
	1,000.0	1,000.0	1,021.2	1,020.5	3.3	3.4	100.20	-69.9	388.4	395.6	389.0	59.705	
	1,100.0	1,100.0	1,121.9	1,120.8	3.6	3.8	99.74	-65.5	381.6	388.2	380.9	52.945	
	1,200.0	1,200.0	1,220.6	1,219.2	4.0	4.2	99.35	-61.7	374.9	380.9	372.9	47.420	
	1,300.0	1,300.0	1,319.0	1,317.4	4.3	4.6	99.04	-58.6	368.5	374.0	365.3	42.835	
	1,400.0	1,400.0	1,417.5	1,415.6	4.7	4.9	98.73	-55.6	362.3	367.3	357.9	38.952	

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



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

1,500.0	1,500.0	1,511.9	1,509.8	5.0	5.2	98.52	-53.5	357.3	361.7	351.6	35.759
1,600.0	1,600.0	1,611.0	1,608.9	5.4	5.6	98.36	-51.9	352.7	356.9	346.1	33.007
1,700.0	1,700.0	1,711.5	1,709.2	5.7	5.9	98.28	-50.6	348.0	352.1	340.5	30.580
1,800.0	1,800.0	1,811.8	1,809.4	6.1	6.3	98.21	-49.5	343.1	347.1	334.9	28.418
1,900.0	1,900.0	1,910.9	1,908.4	6.4	6.6	98.11	-48.2	338.3	342.2	329.3	26.501
2,000.0	2,000.0	2,009.1	2,006.5	6.8	7.0	97.94	-46.6	334.1	337.6	324.0	24.811
2,100.0	2,100.0	2,106.7	2,104.0	7.1	7.3	97.68	-44.6	330.4	333.6	319.3	23.331
2,200.0	2,200.0	2,203.5	2,200.7	7.5	7.6	97.32	-42.1	327.7	330.5	315.5	22.049
2,300.0	2,300.0	2,301.5	2,298.7	7.8	8.0	96.88	-39.3	325.8	328.2	312.5	20.926
2,400.0	2,400.0	2,400.0	2,397.1	8.2	8.3	96.36	-36.2	324.5	326.6	310.2	19.939
2,500.0	2,500.0	2,496.3	2,493.3	8.5	8.7	95.77	-32.8	324.1	325.8	308.7	19.091
2,538.0	2,538.0	2,533.0	2,530.0	8.7	8.8	95.53	-31.4	324.2	325.7	308.4	18.799
2,600.0	2,600.0	2,592.8	2,589.7	8.9	9.0	95.10	-29.0	324.6	325.9	308.1	18.363
2,700.0	2,700.0	2,690.1	2,687.0	9.2	9.3	94.35	-24.8	326.0	327.0	308.6	17.741
2,800.0	2,800.0	2,785.8	2,782.5	9.6	9.6	93.58	-20.5	328.4	329.2	310.1	17.229
2,900.0	2,900.0	2,882.6	2,879.1	9.9	10.0	92.76	-16.0	332.0	332.6	312.8	16.811
3,000.0	3,000.0	2,979.7	2,976.1	10.3	10.3	91.99	-11.7	336.3	336.9	316.4	16.464
3,100.0	3,100.0	3,077.8	3,074.0	10.6	10.7	91.30	-7.8	341.4	341.9	320.8	16.171
3,200.0	3,200.0	3,177.3	3,173.3	11.0	11.0	90.76	-4.6	346.8	347.3	325.5	15.905
3,300.0	3,300.0	3,276.2	3,272.0	11.3	11.4	90.26	-1.6	352.2	352.8	330.3	15.665
3,400.0	3,400.0	3,377.0	3,372.6	11.7	11.7	89.80	1.2	357.9	358.4	335.2	15.435
3,500.0	3,500.0	3,478.9	3,474.3	12.0	12.1	89.44	3.6	363.1	363.6	339.7	15.195
3,600.0	3,600.0	3,578.3	3,573.6	12.4	12.4	89.05	6.1	367.9	368.4	343.8	14.965
3,700.0	3,700.0	3,681.0	3,676.1	12.7	12.8	88.53	9.6	372.7	373.2	347.9	14.732
3,800.0	3,800.0	3,785.6	3,780.6	13.1	13.1	88.01	13.1	376.5	376.9	350.8	14.483
3,900.0	3,900.0	3,891.7	3,886.6	13.4	13.5	87.64	15.6	378.7	379.1	352.3	14.154
4,000.0	4,000.0	3,993.7	3,988.6	13.8	13.9	87.42	17.1	379.8	380.2	352.7	13.831
4,100.0	4,100.0	4,096.1	4,091.0	14.1	14.2	87.29	18.0	380.4	380.8	352.6	13.506
4,200.0	4,200.0	4,187.8	4,182.7	14.5	14.5	87.27	18.2	381.5	382.1	353.2	13.243
4,300.0	4,300.0	4,289.0	4,283.8	14.9	14.9	87.12	19.3	384.0	384.5	355.0	13.011
4,400.0	4,400.0	4,384.1	4,378.9	15.2	15.2	12.16	20.9	386.4	385.5	355.3	12.754

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

4,500.0	4,499.8	4,480.1	4,474.8	15.6	15.6	12.13	22.4	390.1	384.3	353.4	12.439
4,600.0	4,599.5	4,578.9	4,573.5	15.9	15.9	12.15	24.4	394.6	380.4	348.9	12.045
4,675.0	4,673.9	4,652.9	4,647.4	16.2	16.2	12.31	25.5	398.1	375.4	343.3	11.695
4,700.0	4,698.7	4,677.6	4,672.1	16.3	16.2	12.37	25.9	399.3	373.5	341.2	11.572
4,800.0	4,797.9	4,780.0	4,774.4	16.6	16.6	12.68	27.0	404.1	365.4	332.4	11.078
4,900.0	4,897.0	4,886.3	4,880.6	17.0	17.0	13.13	27.4	407.7	356.1	322.3	10.560

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design: Sec 16, T23S, R34E - Gettysburg State Com #2H - Wellbore #1 - Wellbore #1 Offset Site Error: Offset 0.0 usft
 Survey Program: 100- Well Error: 0.0 usft

Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Separation Factor	Warning
				Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)		
5,000.0	4,996.2	4,984.0	4,978.3	17.4	17.3	13.60	27.6	410.1	345.8	311.4	10.051	
5,100.0	5,095.3	5,085.1	5,079.3	17.8	17.7	14.08	28.0	412.8	335.8	300.7	9.565	
5,200.0	5,194.4	5,186.5	5,180.6	18.1	18.0	14.52	28.8	414.9	325.2	289.4	9.081	
5,300.0	5,293.6	5,284.5	5,278.6	18.5	18.4	15.01	29.3	416.8	314.5	278.0	8.616	
5,400.0	5,392.7	5,383.3	5,377.4	18.9	18.7	15.64	29.3	419.1	304.3	267.1	8.179	
5,500.0	5,491.9	5,484.4	5,478.5	19.2	19.1	16.33	29.4	421.3	293.9	256.0	7.752	
5,600.0	5,591.0	5,583.2	5,577.3	19.6	19.4	16.99	29.7	423.2	283.2	244.6	7.336	
5,700.0	5,690.2	5,683.0	5,677.1	20.0	19.7	17.59	30.6	425.2	272.7	233.4	6.938	
5,800.0	5,789.3	5,783.5	5,777.6	20.4	20.1	18.27	31.4	426.9	261.9	221.9	6.546	
5,900.0	5,888.5	5,883.8	5,877.8	20.7	20.4	19.07	32.0	428.1	250.8	210.0	6.159	
6,000.0	5,987.6	5,983.6	5,977.7	21.1	20.8	19.92	32.7	429.1	239.4	197.9	5.779	
6,100.0	6,086.7	6,083.9	6,078.0	21.5	21.1	20.88	33.3	429.8	227.7	185.6	5.405	
6,200.0	6,185.9	6,183.4	6,177.4	21.9	21.5	21.93	34.0	430.1	215.8	173.0	5.038	
6,300.0	6,285.0	6,280.8	6,274.8	22.3	21.8	23.12	34.4	430.7	204.3	160.8	4.693	
6,400.0	6,384.2	6,380.0	6,374.0	22.6	22.2	24.44	34.9	432.0	193.5	149.3	4.374	
6,500.0	6,483.3	6,479.4	6,473.5	23.0	22.5	26.03	35.1	433.1	182.8	137.8	4.065	
6,600.0	6,582.5	6,579.1	6,573.1	23.4	22.9	27.71	35.6	434.1	172.0	126.3	3.766	
6,700.0	6,681.6	6,678.4	6,672.4	23.8	23.2	29.59	36.2	435.0	161.3	114.9	3.476	
6,800.0	6,780.8	6,779.1	6,773.1	24.1	23.6	31.85	36.7	435.5	150.4	103.2	3.191	
6,900.0	6,879.9	6,877.6	6,871.6	24.5	23.9	34.43	37.3	435.5	139.2	91.4	2.909	

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

7,000.0	6,979.0	6,977.4	6,971.4	24.9	24.2	37.54	37.6	435.8	128.7	80.2	2.649
7,100.0	7,078.2	7,076.6	7,070.6	25.3	24.6	41.34	37.8	435.5	118.2	68.9	2.396
7,200.0	7,177.3	7,175.6	7,169.6	25.6	24.9	45.89	38.0	435.2	108.4	58.3	2.164
7,300.0	7,276.5	7,274.9	7,268.9	26.0	25.3	51.62	37.6	434.6	99.5	48.6	1.955
7,400.0	7,375.6	7,373.6	7,367.6	26.4	25.6	58.15	37.5	434.2	91.7	40.0	1.773
7,500.0	7,474.8	7,472.9	7,466.9	26.8	26.0	65.70	37.3	434.0	85.5	33.0	1.627
7,600.0	7,573.9	7,572.0	7,566.0	27.2	26.3	74.31	37.4	433.7	80.7	27.4	1.513
7,700.0	7,673.1	7,671.2	7,665.2	27.5	26.7	83.80	37.2	433.2	78.2	24.0	1.443 Level 3
7,780.0	7,752.4	7,750.6	7,744.6	27.8	26.9	91.43	37.5	433.2	77.5	22.7	1.415 Level 3, CC
7,800.0	7,772.2	7,770.5	7,764.4	27.9	27.0	93.37	37.5	433.1	77.5	22.6	1.412 Level 3, ES, SF
7,900.0	7,871.3	7,869.6	7,863.6	28.3	27.3	102.87	37.8	432.9	79.1	23.5	1.423 Level 3
8,000.0	7,970.5	7,968.4	7,962.4	28.7	27.7	111.35	37.9	433.3	82.9	26.6	1.473 Level 3
8,100.0	8,069.6	8,067.8	8,061.8	29.1	28.0	119.14	37.7	433.3	88.6	31.7	1.558
8,200.0	8,168.8	8,166.8	8,160.8	29.4	28.4	126.24	38.1	432.9	95.5	38.0	1.661
8,300.0	8,267.9	8,266.0	8,260.0	29.8	28.7	132.21	38.1	432.6	103.9	45.8	1.787
8,400.0	8,367.1	8,365.9	8,359.9	30.2	29.1	137.13	38.4	432.8	112.8	54.0	1.919
8,500.0	8,466.2	8,465.3	8,459.3	30.6	29.4	141.43	39.4	433.1	121.8	62.4	2.050
8,600.0	8,565.4	8,563.9	8,557.9	31.0	29.8	145.47	40.7	432.5	131.6	71.6	2.193
8,700.0	8,664.5	8,663.4	8,657.3	31.3	30.1	148.90	41.7	431.9	142.3	81.6	2.345
8,800.0	8,763.6	8,763.0	8,756.9	31.7	30.5	151.84	43.0	431.7	152.9	91.5	2.492
8,900.0	8,862.8	8,861.9	8,855.8	32.1	30.8	154.68	45.0	430.9	163.8	101.8	2.642
9,000.0	8,961.9	8,961.8	8,955.7	32.5	31.2	157.19	47.0	430.2	175.0	112.4	2.793
9,100.0	9,061.1	9,061.7	9,055.6	32.9	31.5	159.35	49.3	430.0	185.9	122.6	2.935
9,200.0	9,160.2	9,161.5	9,155.4	33.2	31.9	161.31	51.9	430.0	196.8	132.8	3.074
9,300.0	9,259.4	9,261.9	9,255.7	33.6	32.2	162.97	54.4	430.5	207.4	142.7	3.206
9,400.0	9,358.5	9,361.1	9,354.8	34.0	32.5	164.71	57.9	430.9	217.9	152.5	3.331
9,500.0	9,457.7	9,460.4	9,454.0	34.4	32.9	166.36	61.6	430.9	228.6	162.6	3.460
9,600.0	9,556.8	9,559.9	9,553.5	34.8	33.2	167.86	65.3	431.2	239.4	172.6	3.586
9,700.0	9,656.0	9,659.6	9,653.1	35.1	33.6	169.32	69.4	431.3	250.2	182.8	3.709
9,800.0	9,755.1	9,754.3	9,747.7	35.5	33.8	170.38	72.4	431.6	261.5	193.4	3.839
9,900.0	9,854.2	9,827.2	9,820.5	35.9	33.8	170.14	68.5	429.7	278.9	209.7	4.026

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



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

10,000.0	9,953.4	9,902.8	9,894.7	36.3	33.8	168.49	55.3	425.2	304.6	234.7	4.356
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Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design Sec 16, T23S, R34E - Gettysburg State Com #2H - Wellbore #1 - Wellbore #1												Offset Site Error: Offset
Survey Program: 100- RO-NS, 9757-MWD default												Well Error: 0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Separation Factor	Warning
		Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)		
10,100.0	10,052.5	9,969.4	9,958.5	36.7	33.8	166.32	37.2	419.3	337.8	267.5	4.809	
10,160.8	10,112.8	10,013.3	9,999.4	36.9	33.8	164.64	22.1	414.4	361.7	291.4	5.145	
10,200.0	10,151.7	10,040.0	10,023.8	37.0	33.8	163.61	11.6	411.5	378.0	307.7	5.379	
10,300.0	10,251.2	10,111.1	10,086.7	37.4	33.9	160.46	-20.8	404.9	421.1	351.0	6.001	
10,400.0	10,351.0	10,174.6	10,140.2	37.7	33.9	157.42	-54.7	400.4	466.8	397.0	6.692	
10,500.0	10,450.9	10,218.3	10,174.6	38.1	33.9	155.32	-81.5	398.2	516.8	448.2	7.540	
10,535.8	10,486.7	10,231.0	10,184.0	38.2	33.9	-130.48	-90.1	397.6	536.0	468.1	7.888	
10,600.0	10,550.9	10,258.0	10,203.1	38.4	33.9	-132.19	-109.1	396.5	572.9	505.8	8.546	
10,700.0	10,650.9	10,298.6	10,229.8	38.7	34.0	-134.84	-139.6	396.0	635.2	569.6	9.684	
10,800.0	10,750.9	10,336.5	10,252.8	39.1	34.1	-137.37	-169.7	397.3	702.5	638.3	10.943	
10,900.0	10,850.9	10,354.0	10,262.8	39.4	34.1	-138.52	-184.1	398.1	774.7	712.5	12.438	
10,950.8	10,901.7	10,369.8	10,271.3	39.6	34.1	-139.55	-197.4	398.8	813.0	751.4	13.186	
10,975.0	10,925.9	10,374.3	10,273.6	39.6	34.1	38.55	-201.2	399.0	831.4	770.3	13.617	
11,000.0	10,950.9	10,389.0	10,280.9	39.6	34.2	35.77	-214.0	399.8	850.1	789.2	13.955	
11,025.0	10,975.6	10,389.0	10,280.9	39.6	34.2	34.01	-214.0	399.8	868.0	807.7	14.400	
11,050.0	11,000.2	10,389.0	10,280.9	39.6	34.2	32.39	-214.0	399.8	885.5	825.9	14.850	
11,075.0	11,024.5	10,389.0	10,280.9	39.6	34.2	30.92	-214.0	399.8	902.6	843.6	15.303	
11,100.0	11,048.5	10,400.1	10,286.0	39.6	34.2	29.22	-223.9	400.3	919.1	860.4	15.663	
11,125.0	11,072.1	10,405.9	10,288.6	39.6	34.2	27.87	-229.0	400.6	935.0	876.8	16.066	
11,150.0	11,095.2	10,421.0	10,295.0	39.6	34.2	26.42	-242.7	401.4	950.4	892.4	16.389	
11,175.0	11,117.8	10,421.0	10,295.0	39.6	34.2	25.48	-242.7	401.4	964.9	907.6	16.833	
11,200.0	11,139.8	10,421.0	10,295.0	39.6	34.2	24.62	-242.7	401.4	978.9	922.3	17.277	
11,225.0	11,161.1	10,421.0	10,295.0	39.7	34.2	23.84	-242.7	401.4	992.4	936.4	17.719	

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design	Sec 16, T23S, R34E - Veto State Com #2H - Wellbore #1 - Wellbore #1	0.0 usft
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CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey Program: 197-MWC													Offset Site Error: Offset 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	0.0	0.0	0.0	0.0	79.13	88.2	459.1	467.9				
100.0	100.0	80.1	80.1	0.1	0.1	79.12	88.3	459.2	467.6	467.3	1,805.960		
200.0	200.0	179.1	179.1	0.5	0.3	79.10	88.5	459.4	467.9	467.1	604.070		
300.0	300.0	279.3	279.3	0.8	0.6	79.06	88.8	459.8	468.3	466.8	323.401		
400.0	400.0	379.7	379.7	1.2	1.0	79.01	89.3	460.0	468.6	466.4	217.310		
500.0	500.0	479.6	479.6	1.5	1.3	78.96	89.8	460.2	468.9	466.0	163.787		
600.0	600.0	579.4	579.4	1.9	1.7	78.91	90.2	460.5	469.2	465.7	131.459		
700.0	700.0	680.0	680.0	2.2	2.1	78.87	90.7	460.7	469.5	465.2	109.741		
800.0	800.0	780.3	780.3	2.6	2.4	78.82	91.0	460.7	469.6	464.7	94.197		
900.0	900.0	879.2	879.2	2.9	2.8	78.71	92.0	460.8	469.9	464.2	82.610		
1,000.0	1,000.0	978.4	978.4	3.3	3.1	78.50	93.8	461.0	470.4	464.0	73.592		
1,100.0	1,100.0	1,078.2	1,078.1	3.6	3.5	78.04	97.6	460.8	471.0	463.9	66.351		
1,200.0	1,200.0	1,177.6	1,177.4	4.0	3.8	77.55	101.7	460.6	471.7	463.9	60.439		
1,300.0	1,300.0	1,278.9	1,278.6	4.3	4.2	77.09	105.5	460.5	472.4	463.9	55.469		
1,400.0	1,400.0	1,384.7	1,384.4	4.7	4.6	76.72	108.5	459.7	472.3	463.1	51.102		
1,498.1	1,498.1	1,479.4	1,479.1	5.0	4.9	76.52	110.0	458.8	471.8	461.9	47.583		
1,500.0	1,500.0	1,481.2	1,480.9	5.0	4.9	76.52	110.0	458.8	471.8	461.8	47.523		
1,600.0	1,600.0	1,575.5	1,575.2	5.4	5.2	76.53	110.1	459.4	472.4	461.8	44.559		
1,700.0	1,700.0	1,673.1	1,672.7	5.7	5.6	76.70	109.0	461.2	474.0	462.7	42.011		
1,800.0	1,800.0	1,771.3	1,770.9	6.1	5.9	76.97	107.3	463.5	475.9	463.9	39.781		
1,900.0	1,900.0	1,871.7	1,871.3	6.4	6.2	77.30	105.1	466.2	478.0	465.3	37.773		
2,000.0	2,000.0	1,971.0	1,970.5	6.8	6.6	77.60	103.0	468.6	480.0	466.6	35.974		
2,100.0	2,100.0	2,068.8	2,068.2	7.1	6.9	77.88	101.2	471.3	482.2	468.2	34.374		
2,200.0	2,200.0	2,165.7	2,165.1	7.5	7.3	78.15	99.6	474.6	485.2	470.5	32.983		
2,300.0	2,300.0	2,271.3	2,270.6	7.8	7.6	78.42	97.9	477.9	488.0	472.5	31.619		
2,400.0	2,400.0	2,374.7	2,374.0	8.2	8.0	78.70	95.9	480.0	489.6	473.4	30.327		
2,500.0	2,500.0	2,471.4	2,470.6	8.5	8.3	78.96	94.1	482.1	491.3	474.5	29.197		
2,600.0	2,600.0	2,570.0	2,569.2	8.9	8.7	79.23	92.3	484.9	493.7	476.2	28.178		

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

2,700.0	2,700.0	2,673.3	2,672.4	9.2	9.0	79.45	90.7	487.4	495.8	477.6	27.187
2,800.0	2,800.0	2,772.6	2,771.7	9.6	9.4	79.61	89.7	489.2	497.4	478.5	26.267
2,900.0	2,900.0	2,867.2	2,866.3	9.9	9.7	79.75	88.9	491.6	499.8	480.2	25.477
3,000.0	3,000.0	2,964.0	2,963.0	10.3	10.1	79.87	88.5	495.0	503.2	482.9	24.778
3,100.0	3,100.0	3,063.3	3,062.2	10.6	10.4	80.00	87.9	498.8	506.8	485.8	24.123
3,200.0	3,200.0	3,164.7	3,163.6	11.0	10.8	80.15	87.3	502.6	510.5	488.7	23.500
3,300.0	3,300.0	3,267.9	3,266.7	11.3	11.2	80.20	87.4	505.9	513.6	491.1	22.884
3,400.0	3,400.0	3,372.6	3,371.4	11.7	11.5	80.23	87.5	508.3	515.9	492.7	22.272
3,500.0	3,500.0	3,477.9	3,476.6	12.0	11.9	80.41	86.1	510.0	517.3	493.4	21.655
3,600.0	3,600.0	3,583.6	3,582.3	12.4	12.3	80.70	83.6	510.8	517.6	493.0	21.038
3,700.0	3,700.0	3,687.7	3,686.4	12.7	12.6	81.02	80.7	510.4	516.8	491.5	20.419
3,800.0	3,800.0	3,782.8	3,781.4	13.1	13.0	81.22	78.8	510.2	516.2	490.2	19.860
3,808.8	3,808.8	3,791.2	3,789.8	13.1	13.0	81.23	78.7	510.2	516.2	490.2	19.814
3,900.0	3,900.0	3,878.8	3,877.4	13.4	13.3	81.27	78.4	510.6	516.6	489.9	19.363
4,000.0	4,000.0	3,978.9	3,977.6	13.8	13.7	81.28	78.4	511.3	517.3	489.9	18.888
4,100.0	4,100.0	4,080.1	4,078.8	14.1	14.0	81.32	78.2	511.9	517.9	489.8	18.434
4,200.0	4,200.0	4,183.7	4,182.3	14.5	14.4	81.46	76.9	512.2	518.0	489.2	17.982
4,277.1	4,277.1	4,259.4	4,258.1	14.8	14.7	81.65	75.1	512.2	517.7	488.3	17.644
4,300.0	4,300.0	4,279.5	4,278.1	14.9	14.7	81.70	74.7	512.3	517.7	488.2	17.556
4,400.0	4,400.0	4,366.7	4,365.3	15.2	15.0	7.08	73.6	514.1	517.8	487.7	17.180
4,500.0	4,499.8	4,460.9	4,459.4	15.6	15.4	7.22	73.6	517.9	516.6	485.8	16.767
4,600.0	4,599.5	4,569.4	4,567.9	15.9	15.8	7.39	73.8	521.5	511.3	479.7	16.201
4,675.0	4,673.9	4,647.2	4,645.6	16.2	16.0	7.54	74.1	523.0	504.0	471.9	15.701
4,700.0	4,698.7	4,671.8	4,670.2	16.3	16.1	7.59	74.1	523.5	501.3	469.0	15.531

Reference Design: Design #1 Offset TVD Reference: Offset Datum

Offset Design Sec 16, T23S, R34E - Veto State Com #2H - Wellbore #1 - Wellbore #1											Offset Site Error: Offset 0.0 usft	
Survey Program: 197-MWC											Well Error: 0.0 usft	
Reference											Warning	
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, +E-W) (usft)		Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	
4,800.0	4,797.9	4,769.8	4,768.2	16.6	16.5	7.78	74.4	525.5	490.3	457.4	14.872	
4,900.0	4,897.0	4,868.0	4,866.4	17.0	16.8	7.98	74.8	527.7	479.7	446.0	14.248	

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

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

5,000.0	4,996.2	4,966.6	4,964.9	17.4	17.2	8.18	75.3	530.1	469.3	434.9	13.656
5,100.0	5,095.3	5,066.1	5,064.4	17.8	17.5	8.38	75.8	532.7	459.0	423.9	13.087
5,200.0	5,194.4	5,165.4	5,163.7	18.1	17.9	8.58	76.5	535.2	448.6	412.9	12.541
5,300.0	5,293.6	5,264.6	5,262.8	18.5	18.2	8.76	77.3	537.8	438.4	401.9	12.018
5,400.0	5,392.7	5,367.7	5,365.9	18.9	18.6	8.96	78.2	540.2	427.9	390.7	11.504
5,500.0	5,491.9	5,472.7	5,470.9	19.2	19.0	9.27	78.3	541.4	416.1	378.2	10.976
5,600.0	5,591.0	5,572.8	5,571.0	19.6	19.3	9.64	77.8	541.7	403.5	364.9	10.450
5,700.0	5,690.2	5,671.8	5,670.0	20.0	19.7	10.04	77.2	542.0	390.9	351.6	9.944
5,800.0	5,789.3	5,770.7	5,768.9	20.4	20.0	10.47	76.7	542.4	378.4	338.4	9.457
5,900.0	5,888.5	5,869.6	5,867.8	20.7	20.4	10.89	76.4	542.9	366.0	325.3	8.989
6,000.0	5,987.6	5,969.4	5,967.6	21.1	20.7	11.33	76.2	543.2	353.6	312.1	8.535
6,100.0	6,086.7	6,069.2	6,067.4	21.5	21.1	11.79	76.1	543.4	340.9	298.8	8.093
6,200.0	6,185.9	6,168.5	6,166.7	21.9	21.4	12.27	76.0	543.5	328.3	285.4	7.665
6,300.0	6,285.0	6,267.8	6,266.0	22.3	21.8	12.78	76.0	543.5	315.5	272.0	7.250
6,400.0	6,384.2	6,366.7	6,364.9	22.6	22.1	13.31	76.1	543.6	302.9	258.6	6.849
6,500.0	6,483.3	6,466.0	6,464.2	23.0	22.5	13.88	76.2	543.7	290.3	245.4	6.463
6,600.0	6,582.5	6,565.7	6,563.9	23.4	22.8	14.50	76.3	543.6	277.6	232.0	6.085
6,700.0	6,681.6	6,665.3	6,663.5	23.8	23.1	15.16	76.5	543.4	264.7	218.4	5.716
6,800.0	6,780.8	6,764.7	6,762.9	24.1	23.5	15.92	76.6	543.0	251.7	204.7	5.356
6,900.0	6,879.9	6,864.0	6,862.2	24.5	23.8	16.80	76.5	542.5	238.7	191.0	5.005
7,000.0	6,979.0	6,963.2	6,961.4	24.9	24.1	17.83	76.3	541.9	225.7	177.3	4.664
7,100.0	7,078.2	7,062.0	7,060.1	25.3	24.5	19.04	75.8	541.4	212.8	163.7	4.335
7,200.0	7,177.3	7,161.0	7,159.2	25.6	24.8	20.48	75.0	540.9	200.1	150.3	4.018
7,300.0	7,276.5	7,259.6	7,257.8	26.0	25.2	22.15	74.2	540.5	187.6	137.1	3.714
7,400.0	7,375.6	7,358.1	7,356.3	26.4	25.5	23.99	73.4	540.4	175.6	124.3	3.428
7,500.0	7,474.8	7,457.3	7,455.5	26.8	25.8	26.08	72.7	540.5	163.9	112.0	3.156
7,600.0	7,573.9	7,556.6	7,554.7	27.2	26.2	28.49	72.0	540.5	152.4	99.8	2.894
7,700.0	7,673.1	7,655.7	7,653.8	27.5	26.5	31.29	71.4	540.5	141.2	87.8	2.644
7,800.0	7,772.2	7,754.7	7,752.9	27.9	26.9	34.55	70.7	540.4	130.4	76.3	2.408
7,900.0	7,871.3	7,853.7	7,851.9	28.3	27.2	38.36	70.0	540.5	120.2	65.3	2.189
8,000.0	7,970.5	7,952.4	7,950.5	28.7	27.6	42.78	69.3	540.7	110.7	55.0	1.988

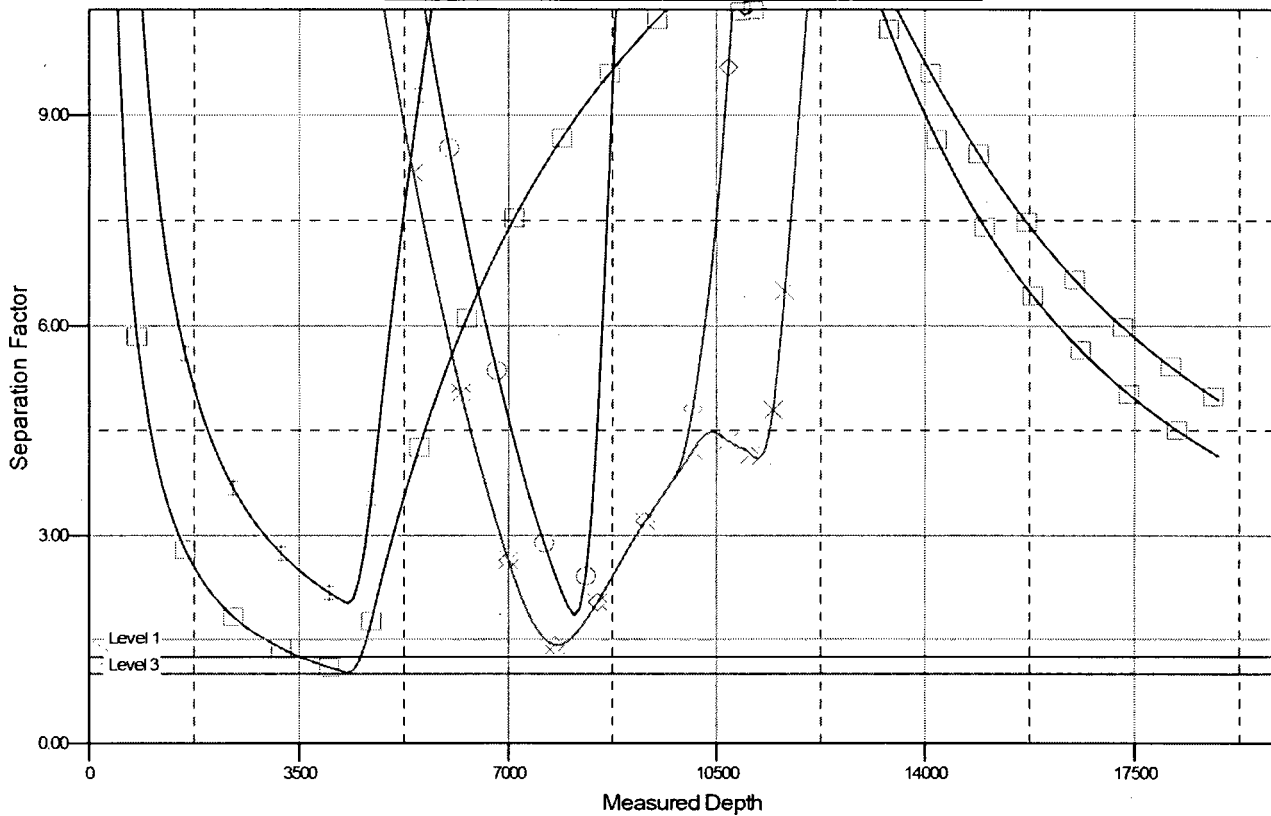
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

Reference Depths are relative to KB @ 3454.0usft (Noram 21)
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W





Coordinates are relative to: Gettysburg State Com #13H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.46°

Separation Factor Plot



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Project:	Lea County, NM	TVD Reference:	KB @ 3454.0usft (Noram 21)
Reference Site:	Sec 16, T23S, R34E	MD Reference:	KB @ 3454.0usft (Noram 21)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	EDM 5000.1 Single User Db

LEGEND

e Com #2H, Wellbore #1, Wellbore #1  V0Gettysburg State Com #15H, Wellbore #1, Design  #1 V0Gettysburg State Com #2
 llbore #1, W burg State Com #12H, Wellbore  #1, Design #1 V0Gettysburg State Com #14H,  Wellbore #1, Design #1 V0Gettysbu
 te Com #2H, Pilot Hole, Pilot



COG Operating, LLC
Lea County, NM
Sec 16, T23S, R34E
Gettysburg State Com #13H

HOBBS OCD

DEC 05 2017

RECEIVED

Wellbore #1

Plan: Design #1

QES Well Planning Report

27 November, 2017



Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Gettysburg State Com #13H
TVD Reference: KB @ 3454.0usft (Noram 21)
MD Reference: KB @ 3454.0usft (Noram 21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project: Lea County, NM
Map System: US State Plane 1927 (Exact solution) NAD 1927 (NADCON) **System Datum:** Mean Sea Level
Geo Datum: CONUS
Map Zone: New Mexico East 3001

Site: Sec 16, T23S, R34E
Site Position:
From: Northing: 478,042.00 usft
Position: Easting: 765,915.40 usft
Uncertainty: Map 0.0 usft Slot Radius: 13-3/16 " **Latitude:**
Grid Convergence:

Well: Gettysburg State Com #13H
Well Position: +N/-S -99.1 usft Northing: 477,942.90 usft **Latitude:**
Position: +E/-W -1,668.1 usft Easting: 764,247.30 usft **Longitude:**
Uncertainty: 0.0 usft **Wellhead Elevation:** **Ground Level:**

Wellbore: Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)
	IGRF2015	11/20/2017	6.87	60.15

Design: Design #1

Audit Notes:

Version:	Phase:	PLAN	Tie On Depth:	Dir
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	
	0.0	0.0	0.0	17

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)

Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1

Design: Design #1

Local Co-ordinate Reference: Well Gettysburg State Com #13H
TVD Reference: KB @ 3454.0usft (Noram 21)
MD Reference: KB @ 3454.0usft (Noram 21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.00	0.00	0.00
4,675.0	7.50	74.79	4,673.9	6.4	23.6	2.00	2.00	0.00
10,160.8	7.50	74.79	10,112.8	194.2	714.5	0.00	0.00	0.00
10,535.8	0.00	0.00	10,486.7	200.6	738.2	2.00	-2.00	0.00
10,950.8	0.00	0.00	10,901.7	200.6	738.2	0.00	0.00	0.00
11,688.2	88.49	179.47	11,379.0	-264.2	742.5	12.00	12.00	24.34
18,896.4	88.49	179.47	11,569.0	-	808.8	0.00	0.00	0.00
				7,469.6				

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
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Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Company:	COG Operating, LLC	TVD Reference:	KB @ 3454.0usft (Noram 21)
Project:	Lea County, NM	MD Reference:	KB @ 3454.0usft (Noram 21)
Site:	Sec 16, T23S, R34E	North Reference:	Grid
Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
Rustler									
1,229.0	0.00	0.00	1,229.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
TOS									
1,554.0	0.00	0.00	1,554.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
Build 2"/100'									
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00

Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Well Gettysburg State Com #13H
KB @ 3454.0usft (Noram 21)
KB @ 3454.0usft (Noram 21)
Grid
Minimum Curvature

4,400.0	2.00	74.79	4,400.0	0.5	1.7	-0.3	2.00	2.00	0.00
4,500.0	4.00	74.79	4,499.8	1.8	6.7	-1.1	2.00	2.00	0.00
4,600.0	6.00	74.79	4,599.5	4.1	15.1	-2.5	2.00	2.00	0.00
Hold 7.50° Inc., 74.79° Azm									
4,675.0	7.50	74.79	4,673.9	6.4	23.6	-3.8	2.00	2.00	0.00

Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Gettysburg State Com #13H
TVD Reference: KB @ 3454.0usft (Noram 21)
MD Reference: KB @ 3454.0usft (Noram 21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Company:	COG Operating, LLC	TVD Reference:	KB @ 3454.0usft (Noram 21)
Project:	Lea County, NM	MD Reference:	KB @ 3454.0usft (Noram 21)
Site:	Sec 16, T23S, R34E	North Reference:	Grid
Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

4,700.0	7.50	74.79	4,698.7	7.3	26.8	-4.4	0.00	0.00	0.00
BOS (Castile)									
4,720.3	7.50	74.79	4,718.9	8.0	29.4	-4.8	0.00	0.00	0.00
4,800.0	7.50	74.79	4,797.9	10.7	39.4	-6.4	0.00	0.00	0.00
4,900.0	7.50	74.79	4,897.0	14.1	52.0	-8.5	0.00	0.00	0.00
Delaware (Lamar)									
4,992.5	7.50	74.79	4,988.7	17.3	63.6	-10.3	0.00	0.00	0.00
5,000.0	7.50	74.79	4,996.2	17.6	64.6	-10.5	0.00	0.00	0.00
5,100.0	7.50	74.79	5,095.3	21.0	77.2	-12.5	0.00	0.00	0.00
5,200.0	7.50	74.79	5,194.4	24.4	89.8	-14.6	0.00	0.00	0.00
5,300.0	7.50	74.79	5,293.6	27.8	102.4	-16.6	0.00	0.00	0.00
5,400.0	7.50	74.79	5,392.7	31.2	115.0	-18.7	0.00	0.00	0.00
5,500.0	7.50	74.79	5,491.9	34.7	127.6	-20.7	0.00	0.00	0.00
5,600.0	7.50	74.79	5,591.0	38.1	140.1	-22.8	0.00	0.00	0.00
5,700.0	7.50	74.79	5,690.2	41.5	152.7	-24.8	0.00	0.00	0.00
5,800.0	7.50	74.79	5,789.3	44.9	165.3	-26.9	0.00	0.00	0.00
CYCN									
5,899.7	7.50	74.79	5,888.2	48.4	177.9	-28.9	0.00	0.00	0.00
5,900.0	7.50	74.79	5,888.5	48.4	177.9	-28.9	0.00	0.00	0.00
6,000.0	7.50	74.79	5,987.6	51.8	190.5	-31.0	0.00	0.00	0.00
6,100.0	7.50	74.79	6,086.7	55.2	203.1	-33.0	0.00	0.00	0.00
6,200.0	7.50	74.79	6,185.9	58.6	215.7	-35.1	0.00	0.00	0.00
6,300.0	7.50	74.79	6,285.0	62.1	228.3	-37.1	0.00	0.00	0.00
6,400.0	7.50	74.79	6,384.2	65.5	240.9	-39.2	0.00	0.00	0.00
6,500.0	7.50	74.79	6,483.3	68.9	253.5	-41.2	0.00	0.00	0.00
6,600.0	7.50	74.79	6,582.5	72.3	266.1	-43.3	0.00	0.00	0.00
6,700.0	7.50	74.79	6,681.6	75.7	278.7	-45.3	0.00	0.00	0.00
6,800.0	7.50	74.79	6,780.8	79.2	291.3	-47.4	0.00	0.00	0.00
6,900.0	7.50	74.79	6,879.9	82.6	303.9	-49.4	0.00	0.00	0.00
7,000.0	7.50	74.79	6,979.0	86.0	316.5	-51.4	0.00	0.00	0.00
7,100.0	7.50	74.79	7,078.2	89.4	329.1	-53.5	0.00	0.00	0.00
7,200.0	7.50	74.79	7,177.3	92.9	341.7	-55.5	0.00	0.00	0.00
BYCN									
7,290.8	7.50	74.79	7,267.4	96.0	353.1	-57.4	0.00	0.00	0.00
7,300.0	7.50	74.79	7,276.5	96.3	354.2	-57.6	0.00	0.00	0.00
7,400.0	7.50	74.79	7,375.6	99.7	366.8	-59.6	0.00	0.00	0.00
7,500.0	7.50	74.79	7,474.8	103.1	379.4	-61.7	0.00	0.00	0.00
7,600.0	7.50	74.79	7,573.9	106.6	392.0	-63.7	0.00	0.00	0.00
7,700.0	7.50	74.79	7,673.1	110.0	404.6	-65.8	0.00	0.00	0.00
7,800.0	7.50	74.79	7,772.2	113.4	417.2	-67.8	0.00	0.00	0.00
7,900.0	7.50	74.79	7,871.3	116.8	429.8	-69.9	0.00	0.00	0.00
8,000.0	7.50	74.79	7,970.5	120.2	442.4	-71.9	0.00	0.00	0.00
8,100.0	7.50	74.79	8,069.6	123.7	455.0	-74.0	0.00	0.00	0.00
8,200.0	7.50	74.79	8,168.8	127.1	467.6	-76.0	0.00	0.00	0.00
8,300.0	7.50	74.79	8,267.9	130.5	480.2	-78.1	0.00	0.00	0.00
8,400.0	7.50	74.79	8,367.1	133.9	492.8	-80.1	0.00	0.00	0.00
8,500.0	7.50	74.79	8,466.2	137.4	505.4	-82.2	0.00	0.00	0.00

Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1

Design: Design #1

Local Co-ordinate Reference: Well Gettysburg State Com #13H
TVD Reference: KB @ 3454.0usft (Noram 21)
MD Reference: KB @ 3454.0usft (Noram 21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Bone Sprg (BSGL)

8,584.2	7.50	74.79	8,549.7	140.2	516.0	-83.9	0.00	0.00	0.00
8,600.0	7.50	74.79	8,565.4	140.8	518.0	-84.2	0.00	0.00	0.00
8,700.0	7.50	74.79	8,664.5	144.2	530.6	-86.3	0.00	0.00	0.00
8,800.0	7.50	74.79	8,763.6	147.6	543.2	-88.3	0.00	0.00	0.00
8,900.0	7.50	74.79	8,862.8	151.1	555.7	-90.3	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Company:	COG Operating, LLC	TVD Reference:	KB @ 3454.0usft (Noram 21)
Project:	Lea County, NM	MD Reference:	KB @ 3454.0usft (Noram 21)
Site:	Sec 16, T23S, R34E	North Reference:	Grid
Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
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Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Well Gettysburg State Com #13H
KB @ 3454.0usft (Noram 21)
KB @ 3454.0usft (Noram 21)
Grid
Minimum Curvature

U Avalon Sh									
8,964.2	7.50	74.79	8,926.5	153.2	563.8	-91.7	0.00	0.00	0.00
9,000.0	7.50	74.79	8,961.9	154.5	568.3	-92.4	0.00	0.00	0.00
9,100.0	7.50	74.79	9,061.1	157.9	580.9	-94.4	0.00	0.00	0.00
L Avalon Sh									
9,150.7	7.50	74.79	9,111.3	159.6	587.3	-95.5	0.00	0.00	0.00
9,200.0	7.50	74.79	9,160.2	161.3	593.5	-96.5	0.00	0.00	0.00
9,300.0	7.50	74.79	9,259.4	164.7	606.1	-98.5	0.00	0.00	0.00
9,400.0	7.50	74.79	9,358.5	168.2	618.7	-100.6	0.00	0.00	0.00
9,500.0	7.50	74.79	9,457.7	171.6	631.3	-102.6	0.00	0.00	0.00
9,600.0	7.50	74.79	9,556.8	175.0	643.9	-104.7	0.00	0.00	0.00
9,700.0	7.50	74.79	9,656.0	178.4	656.5	-106.7	0.00	0.00	0.00
FBSG_sand									
9,720.2	7.50	74.79	9,676.0	179.1	659.1	-107.1	0.00	0.00	0.00
9,800.0	7.50	74.79	9,755.1	181.9	669.1	-108.8	0.00	0.00	0.00
9,900.0	7.50	74.79	9,854.2	185.3	681.7	-110.8	0.00	0.00	0.00
10,000.0	7.50	74.79	9,953.4	188.7	694.3	-112.9	0.00	0.00	0.00
10,100.0	7.50	74.79	10,052.5	192.1	706.9	-114.9	0.00	0.00	0.00
Drop 2°/100'									
10,160.8	7.50	74.79	10,112.8	194.2	714.5	-116.2	0.00	0.00	0.00
SBSG_sand									
10,199.0	6.73	74.79	10,150.8	195.5	719.1	-116.9	2.00	-2.00	0.00
10,200.0	6.72	74.79	10,151.7	195.5	719.2	-116.9	2.00	-2.00	0.00
10,300.0	4.72	74.79	10,251.2	198.1	728.8	-118.5	2.00	-2.00	0.00
10,400.0	2.72	74.79	10,351.0	199.8	735.1	-119.5	2.00	-2.00	0.00
10,500.0	0.72	74.79	10,450.9	200.6	738.0	-120.0	2.00	-2.00	0.00
Hold Vertical									
10,535.8	0.00	0.00	10,486.7	200.6	738.2	-120.0	2.00	-2.00	-209.16
10,600.0	0.00	0.00	10,550.9	200.6	738.2	-120.0	0.00	0.00	0.00
10,700.0	0.00	0.00	10,650.9	200.6	738.2	-120.0	0.00	0.00	0.00
10,800.0	0.00	0.00	10,750.9	200.6	738.2	-120.0	0.00	0.00	0.00
10,900.0	0.00	0.00	10,850.9	200.6	738.2	-120.0	0.00	0.00	0.00
KOP: Build 12°/100' @ 10950.8' MD									
10,950.8	0.00	0.00	10,901.7	200.6	738.2	-120.0	0.00	0.00	0.00
10,975.0	2.91	179.47	10,925.9	200.0	738.2	-119.4	12.00	12.00	0.00
11,000.0	5.91	179.47	10,950.9	198.1	738.2	-117.5	12.00	12.00	0.00
11,025.0	8.91	179.47	10,975.6	194.9	738.2	-114.3	12.00	12.00	0.00
11,050.0	11.91	179.47	11,000.2	190.4	738.3	-109.8	12.00	12.00	0.00



Well Planning Report



Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Gettysburg State Com #13H
TVD Reference: KB @ 3454.0usft (Noram 21)
MD Reference: KB @ 3454.0usft (Noram 21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

11,075.0	14.91	179.47	11,024.5	184.6	738.3	-104.0	12.00	12.00	0.00
11,100.0	17.91	179.47	11,048.5	177.5	738.4	-97.0	12.00	12.00	0.00
11,125.0	20.91	179.47	11,072.1	169.2	738.5	-88.7	12.00	12.00	0.00
TBSG_sand									
11,146.2	23.46	179.47	11,091.8	161.2	738.5	-80.7	12.00	12.00	0.00
11,150.0	23.91	179.47	11,095.2	159.7	738.6	-79.2	12.00	12.00	0.00
11,175.0	26.91	179.47	11,117.8	148.9	738.7	-68.6	12.00	12.00	0.00
11,200.0	29.91	179.47	11,139.8	137.0	738.8	-56.7	12.00	12.00	0.00
11,225.0	32.91	179.47	11,161.1	124.0	738.9	-43.8	12.00	12.00	0.00
11,250.0	35.91	179.47	11,181.7	109.9	739.0	-29.7	12.00	12.00	0.00
11,300.0	41.91	179.47	11,220.6	78.5	739.3	1.5	12.00	12.00	0.00
11,325.0	44.91	179.47	11,238.8	61.3	739.5	18.6	12.00	12.00	0.00
11,350.0	47.91	179.47	11,256.0	43.2	739.6	36.6	12.00	12.00	0.00
11,375.0	50.91	179.47	11,272.3	24.2	739.8	55.5	12.00	12.00	0.00

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Company:	COG Operating, LLC	TVD Reference:	KB @ 3454.0usft (Noram 21)
Project:	Lea County, NM	MD Reference:	KB @ 3454.0usft (Noram 21)
Site:	Sec 16, T23S, R34E	North Reference:	Grid
Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
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Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Company:	COG Operating, LLC	TVD Reference:	KB @ 3454.0usft (Noram 21)
Project:	Lea County, NM	MD Reference:	KB @ 3454.0usft (Noram 21)
Site:	Sec 16, T23S, R34E	North Reference:	Grid
Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

11,400.0	53.91	179.47	11,287.5	4.4	740.0	75.2	12.00	12.00	0.00
11,425.0	56.91	179.47	11,301.7	-16.1	740.2	95.7	12.00	12.00	0.00
11,450.0	59.91	179.47	11,314.8	-37.4	740.4	116.9	12.00	12.00	0.00
11,475.0	62.91	179.47	11,326.8	-59.4	740.6	138.8	12.00	12.00	0.00
11,500.0	65.91	179.47	11,337.6	-81.9	740.8	161.2	12.00	12.00	0.00
11,550.0	71.91	179.47	11,355.6	-128.5	741.2	207.6	12.00	12.00	0.00
11,575.0	74.91	179.47	11,362.7	-152.5	741.4	231.4	12.00	12.00	0.00
11,600.0	77.91	179.47	11,368.6	-176.8	741.7	255.6	12.00	12.00	0.00
11,625.0	80.91	179.47	11,373.2	-201.4	741.9	280.1	12.00	12.00	0.00
11,650.0	83.91	179.47	11,376.5	-226.1	742.1	304.7	12.00	12.00	0.00
11,675.0	86.91	179.47	11,378.5	-251.1	742.3	329.5	12.00	12.00	0.00

EOC: 11688.2' MD, 88.49° Inc, 179.47° Azm

11,688.2	88.49	179.47	11,379.0	-264.2	742.5	342.6	12.00	12.00	0.00	11,700.0	88.49	179.47	11,379.3	-276.0	742.6	354.4	0.00	0.00	0.00
11,800.0	88.49	179.47	11,381.9	-376.0	743.5	453.9	0.00	0.00	0.00										
11,900.0	88.49	179.47	11,384.6	-476.0	744.4	553.3	0.00	0.00	0.00										
12,000.0	88.49	179.47	11,387.2	-575.9	745.3	652.8	0.00	0.00	0.00										
12,100.0	88.49	179.47	11,389.9	-675.9	746.3	752.3	0.00	0.00	0.00										
12,200.0	88.49	179.47	11,392.5	-775.9	747.2	851.8	0.00	0.00	0.00										
12,300.0	88.49	179.47	11,395.1	-875.8	748.1	951.3	0.00	0.00	0.00	12,400.0	88.49	179.47	11,397.8	-975.8	749.0	1,050.7	0.00	0.00	0.00
12,500.0	88.49	179.47	11,400.4	-1,075.7	749.9	1,150.2	0.00	0.00	0.00										
12,600.0	88.49	179.47	11,403.0	-1,175.7	750.9	1,249.7	0.00	0.00	0.00										
12,700.0	88.49	179.47	11,405.7	-1,275.7	751.8	1,349.2	0.00	0.00	0.00										
12,800.0	88.49	179.47	11,408.3	-1,375.6	752.7	1,448.7	0.00	0.00	0.00										
12,900.0	88.49	179.47	11,410.9	-1,475.6	753.6	1,548.1	0.00	0.00	0.00										
13,000.0	88.49	179.47	11,413.6	-1,575.5	754.5	1,647.6	0.00	0.00	0.00										
13,100.0	88.49	179.47	11,416.2	-1,675.5	755.5	1,747.1	0.00	0.00	0.00										
13,200.0	88.49	179.47	11,418.8	-1,775.5	756.4	1,846.6	0.00	0.00	0.00										
13,300.0	88.49	179.47	11,421.5	-1,875.4	757.3	1,946.0	0.00	0.00	0.00										
13,400.0	88.49	179.47	11,424.1	-1,975.4	758.2	2,045.5	0.00	0.00	0.00										
13,500.0	88.49	179.47	11,426.8	-2,075.3	759.1	2,145.0	0.00	0.00	0.00										
13,600.0	88.49	179.47	11,429.4	-2,175.3	760.1	2,244.5	0.00	0.00	0.00										
13,700.0	88.49	179.47	11,432.0	-2,275.3	761.0	2,344.0	0.00	0.00	0.00										
13,800.0	88.49	179.47	11,434.7	-2,375.2	761.9	2,443.4	0.00	0.00	0.00										
13,900.0	88.49	179.47	11,437.3	-2,475.2	762.8	2,542.9	0.00	0.00	0.00										
14,000.0	88.49	179.47	11,439.9	-2,575.2	763.7	2,642.4	0.00	0.00	0.00										
14,100.0	88.49	179.47	11,442.6	-2,675.1	764.7	2,741.9	0.00	0.00	0.00										
14,200.0	88.49	179.47	11,445.2	-2,775.1	765.6	2,841.4	0.00	0.00	0.00										
14,300.0	88.49	179.47	11,447.8	-2,875.0	766.5	2,940.8	0.00	0.00	0.00										
14,400.0	88.49	179.47	11,450.5	-2,975.0	767.4	3,040.3	0.00	0.00	0.00										
14,500.0	88.49	179.47	11,453.1	-3,075.0	768.3	3,139.8	0.00	0.00	0.00										
14,600.0	88.49	179.47	11,455.8	-3,174.9	769.3	3,239.3	0.00	0.00	0.00										
14,700.0	88.49	179.47	11,458.4	-3,274.9	770.2	3,338.8	0.00	0.00	0.00										
14,800.0	88.49	179.47	11,461.0	-3,374.8	771.1	3,438.2	0.00	0.00	0.00										
14,900.0	88.49	179.47	11,463.7	-3,474.8	772.0	3,537.7	0.00	0.00	0.00										
15,000.0	88.49	179.47	11,466.3	-3,574.8	772.9	3,637.2	0.00	0.00	0.00										
5,100.0	88.49	179.47	11,468.9	-3,674.7	773.9	3,736.7	0.00	0.00	0.00										
5,200.0	88.49	179.47	11,471.6	-3,774.7	774.8	3,836.2	0.00	0.00	0.00										
5,300.0	88.49	179.47	11,474.2	-3,874.6	775.7	3,935.6	0.00	0.00	0.00										
5,400.0	88.49	179.47	11,476.8	-3,974.6	776.6	4,035.1	0.00	0.00	0.00										

Database: EDM 5000.1 Single User Db
Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 16, T23S, R34E
Well: Gettysburg State Com #13H
Wellbore: Wellbore #1

Design: Design #1

Local Co-ordinate Reference: Well Gettysburg State Com #13H
TVD Reference: KB @ 3454.0usft (Noram 21)
MD Reference: KB @ 3454.0usft (Noram 21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

15,500.0 88.49 179.47 11,479.5 -4,074.6 777.5 4,134.6 0.00 0.00 0.00



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Company:	COG Operating, LLC	TVD Reference:	KB @ 3454.0usft (Noram 21)
Project:	Lea County, NM	MD Reference:	KB @ 3454.0usft (Noram 21)
Site:	Sec 16, T23S, R34E	North Reference:	Grid
Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned Survey										
Measured			Vertical			Vertical	Dogleg	Build	Turn	
Depth	Inclination	Azimuth	Depth	+N/-S	+E/-W	Section	Rate	Rate	Rate	
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
15,600.0	88.49	179.47	11,482.1	-4,174.5	778.5	4,234.1	0.00	0.00	0.00	
15,700.0	88.49	179.47	11,484.7	-4,274.5	779.4	4,333.5	0.00	0.00	0.00	
15,800.0	88.49	179.47	11,487.4	-4,374.4	780.3	4,433.0	0.00	0.00	0.00	
15,900.0	88.49	179.47	11,490.0	-4,474.4	781.2	4,532.5	0.00	0.00	0.00	
16,000.0	88.49	179.47	11,492.7	-4,574.4	782.1	4,632.0	0.00	0.00	0.00	
16,100.0	88.49	179.47	11,495.3	-4,674.3	783.1	4,731.5	0.00	0.00	0.00	
16,200.0	88.49	179.47	11,497.9	-4,774.3	784.0	4,830.9	0.00	0.00	0.00	
16,300.0	88.49	179.47	11,500.6	-4,874.3	784.9	4,930.4	0.00	0.00	0.00	
16,400.0	88.49	179.47	11,503.2	-4,974.2	785.8	5,029.9	0.00	0.00	0.00	
16,500.0	88.49	179.47	11,505.8	-5,074.2	786.7	5,129.4	0.00	0.00	0.00	
16,600.0	88.49	179.47	11,508.5	-5,174.1	787.7	5,228.9	0.00	0.00	0.00	
16,700.0	88.49	179.47	11,511.1	-5,274.1	788.6	5,328.3	0.00	0.00	0.00	
16,800.0	88.49	179.47	11,513.7	-5,374.1	789.5	5,427.8	0.00	0.00	0.00	
16,900.0	88.49	179.47	11,516.4	-5,474.0	790.4	5,527.3	0.00	0.00	0.00	
17,000.0	88.49	179.47	11,519.0	-5,574.0	791.3	5,626.8	0.00	0.00	0.00	
17,100.0	88.49	179.47	11,521.6	-5,673.9	792.3	5,726.3	0.00	0.00	0.00	
17,200.0	88.49	179.47	11,524.3	-5,773.9	793.2	5,825.7	0.00	0.00	0.00	
17,300.0	88.49	179.47	11,526.9	-5,873.9	794.1	5,925.2	0.00	0.00	0.00	
17,400.0	88.49	179.47	11,529.6	-5,973.8	795.0	6,024.7	0.00	0.00	0.00	
17,500.0	88.49	179.47	11,532.2	-6,073.8	795.9	6,124.2	0.00	0.00	0.00	
17,600.0	88.49	179.47	11,534.8	-6,173.7	796.9	6,223.7	0.00	0.00	0.00	
17,700.0	88.49	179.47	11,537.5	-6,273.7	797.8	6,323.1	0.00	0.00	0.00	
17,800.0	88.49	179.47	11,540.1	-6,373.7	798.7	6,422.6	0.00	0.00	0.00	
17,900.0	88.49	179.47	11,542.7	-6,473.6	799.6	6,522.1	0.00	0.00	0.00	
18,000.0	88.49	179.47	11,545.4	-6,573.6	800.6	6,621.6	0.00	0.00	0.00	
18,100.0	88.49	179.47	11,548.0	-6,673.6	801.5	6,721.0	0.00	0.00	0.00	
18,200.0	88.49	179.47	11,550.6	-6,773.5	802.4	6,820.5	0.00	0.00	0.00	
18,300.0	88.49	179.47	11,553.3	-6,873.5	803.3	6,920.0	0.00	0.00	0.00	
8,400.0	88.49	179.47	11,555.9	-6,973.4	804.2	7,019.5	0.00	0.00	0.00	
8,500.0	88.49	179.47	11,558.6	-7,073.4	805.2	7,119.0	0.00	0.00	0.00	
600.0	88.49	179.47	11,561.2	-7,173.4	806.1	7,218.4	0.00	0.00	0.00	
700.0	88.49	179.47	11,563.8	-7,273.3	807.0	7,317.9	0.00	0.00	0.00	
800.0	88.49	179.47	11,566.5	-7,373.3	807.9	7,417.4	0.00	0.00	0.00	
18896.4' MD/11569.0' TVD										
96.4	88.49	179.47	11,569.0	-7,469.6	808.8	7,513.3	0.00	0.00	0.00	

Dip								
TVD	+N/-S	+E/-W	Northing	Easting		Latitude	Longitude	
(°)	(usft)	(usft)	(usft)	(usft)	(usft)			



Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Gettysburg State Com #13H
Company:	COG Operating, LLC	TVD Reference:	KB @ 3454.0usft (Noram 21)
Project:	Lea County, NM	MD Reference:	KB @ 3454.0usft (Noram 21)
Site:	Sec 16, T23S, R34E	North Reference:	Grid
Well:	Gettysburg State Com #13H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Gettysburg State Com #1	0.00								
	0.00	0.0	-7,339.7	807.5	470,603.17	765,054.82	32° 17'	103° 28'	27.208 N 32.153 W
- plan misses target center by 7384.0usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E) - Point									
Gettysburg State Com #1	0.00								
79.3	0.00	0.0	-		477,863.65	764,988.08	32° 18'	103° 28'	39.056 N 32.254 W
- plan misses target center by 745.0usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E) - Point									
Gettysburg State Com #1	0.00								
7,469.6	0.00	0.00	11,569.0	-	470,473.30	765,056.10	32° 17'	103° 28'	25.922 N 32.150 W
- plan hits target center									
- Point									

Formations				
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology (°)	Dip (°)
1,229.0	1,229.0	Rustler		1.5°
1,554.0	1,554.0	TOS		1.5°
4,720.3	4,718.9	BOS (Castile)		1°
4,992.5	4,988.7	Delaware (Lamar)		
5,899.7	5,888.2	CYCN		
7,290.8	7,267.4	BYCN		
8,584.2	8,549.7	Bone Sprg (BSGL)		
8,964.2	8,926.5	U Avalon Sh		
9,150.7	9,111.3	L Avalon Sh		
9,720.2	9,676.0	FBSG_sand		
10,199.0	10,150.8	SBSG_sand		
11,146.2	11,091.8	TBSG_sand		



Well Planning Report



Database: EDM 5000.1 Single User Db
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Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Gettysburg State Com #13H
TVD Reference: KB @ 3454.0usft (Noram 21)
MD Reference: KB @ 3454.0usft (Noram 21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
4,300.0	4,300.0	0.0	0.0	Build 2"/100'
4,675.0	4,673.9	6.4	23.6	Hold 7.50° Inc., 74.79° Azm
10,160.8	10,112.8	194.2	714.5	Drop 2"/100'
10,535.8	10,486.7	200.6	738.2	Hold Vertical
10,950.8	10,901.7	200.6	738.2	KOP: Build 12"/100' @ 10950.8' MD
11,688.2	11,379.0	-264.2	742.5	EOC: 11688.2' MD, 88.49° Inc, 179.47° Azm
18,896.4	11,569.0	-7,469.6	808.8	TD @ 18896.4' MD/11569.0' TVD

