



COG Operating, LLC

Lea County, NM

Sec 16, T23S, R34E

Gettysburg State Com #13H

Wellbore #1

Plan: Design #1

QES Well Planning Report

27 November, 2017

HCD 2017

NOV 30 2017

RECEIVED



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		

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

Site	Sec 16, T23S, R34E		
Site Position:		Northing:	478,042.00 usft
From:	Map	Easting:	765,915.40 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 18' 40.748 N
		Longitude:	103° 28' 21.433 W
		Grid Convergence:	0.46 °

Well	Gettysburg State Com #13H		
Well Position	+N/-S	-99.1 usft	Northing: 477,942.90 usft
	+E/-W	-1,668.1 usft	Easting: 764,247.30 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	Latitude: 32° 18' 39.899 N
			Longitude: 103° 28' 40.877 W
			Ground Level: 3,425.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/20/2017	6.87	60.15	47,955.70376228

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	173.82

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)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	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	0.00	
4,675.0	7.50	74.79	4,673.9	6.4	23.6	2.00	2.00	0.00	74.79	
10,160.8	7.50	74.79	10,112.8	194.2	714.5	0.00	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	180.00	
10,950.8	0.00	0.00	10,901.7	200.6	738.2	0.00	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	179.47	
18,896.4	88.49	179.47	11,569.0	-7,469.6	808.8	0.00	0.00	0.00	0.00	Gettysburg State Con



Well Planning Report



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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

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)
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
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

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Design: Design #1

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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)
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
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

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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)
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
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
11,275.0	38.91	179.47	11,201.6	94.7	739.2	-14.6	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)
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
11,525.0	68.91	179.47	11,347.2	-105.0	741.0	184.2	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
15,100.0	88.49	179.47	11,468.9	-3,674.7	773.9	3,736.7	0.00	0.00	0.00
15,200.0	88.49	179.47	11,471.6	-3,774.7	774.8	3,836.2	0.00	0.00	0.00
15,300.0	88.49	179.47	11,474.2	-3,874.6	775.7	3,935.6	0.00	0.00	0.00
15,400.0	88.49	179.47	11,476.8	-3,974.6	776.6	4,035.1	0.00	0.00	0.00
15,500.0	88.49	179.47	11,479.5	-4,074.6	777.5	4,134.6	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)
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
18,400.0	88.49	179.47	11,555.9	-6,973.4	804.2	7,019.5	0.00	0.00	0.00
18,500.0	88.49	179.47	11,558.6	-7,073.4	805.2	7,119.0	0.00	0.00	0.00
18,600.0	88.49	179.47	11,561.2	-7,173.4	806.1	7,218.4	0.00	0.00	0.00
18,700.0	88.49	179.47	11,563.8	-7,273.3	807.0	7,317.9	0.00	0.00	0.00
18,800.0	88.49	179.47	11,566.5	-7,373.3	807.9	7,417.4	0.00	0.00	0.00
TD @ 18896.4' MD/11569.0' TVD									
18,896.4	88.49	179.47	11,569.0	-7,469.6	808.8	7,513.3	0.00	0.00	0.00

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Gettysburg State Com #	0.00	0.00	0.0	-7,339.7	807.5	470,603.17	765,054.82	32° 17' 27.208 N	103° 28' 32.153 W
- hit/miss target									
- Shape									
- plan misses target center by 7384.0usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Point									
Gettysburg State Com #	0.00	0.00	0.0	-79.3	740.8	477,863.65	764,988.08	32° 18' 39.056 N	103° 28' 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 #	0.00	0.00	11,569.0	-7,469.6	808.8	470,473.30	765,056.10	32° 17' 25.922 N	103° 28' 32.150 W
- plan hits target center									
- Point									

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		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,229.0	1,229.0	Rustler		1.59	173.82
1,554.0	1,554.0	TOS		1.59	173.82
4,720.3	4,718.9	BOS (Castile)		1.59	173.82
4,992.5	4,988.7	Delaware (Lamar)		1.59	173.82
5,899.7	5,888.2	CYCN		1.59	173.82
7,290.8	7,267.4	BYCN		1.59	173.82
8,584.2	8,549.7	Bone Sprg (BSGL)		1.59	173.82
8,964.2	8,926.5	U Avalon Sh		1.59	173.82
9,150.7	9,111.3	L Avalon Sh		1.59	173.82
9,720.2	9,676.0	FBSG_sand		1.59	173.82
10,199.0	10,150.8	SBSG_sand		1.59	173.82
11,146.2	11,091.8	TBSG_sand		1.59	173.82

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