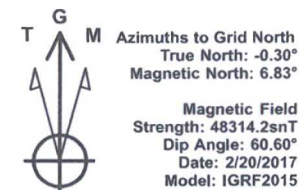
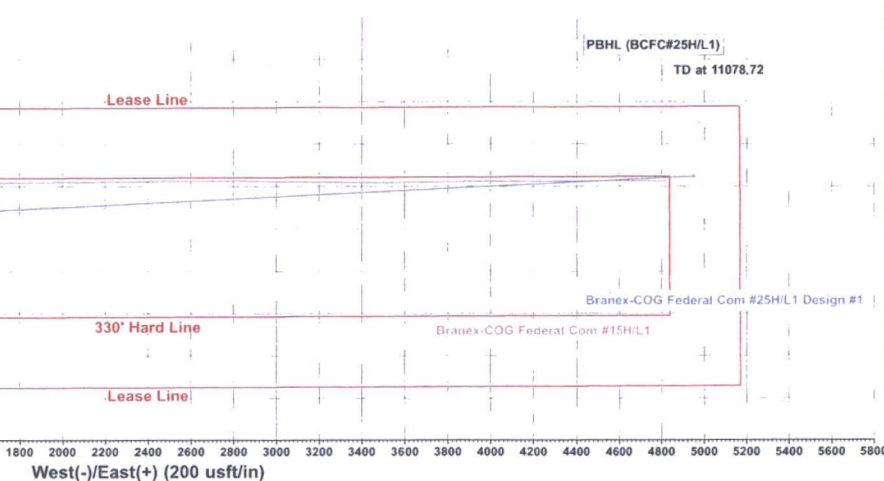
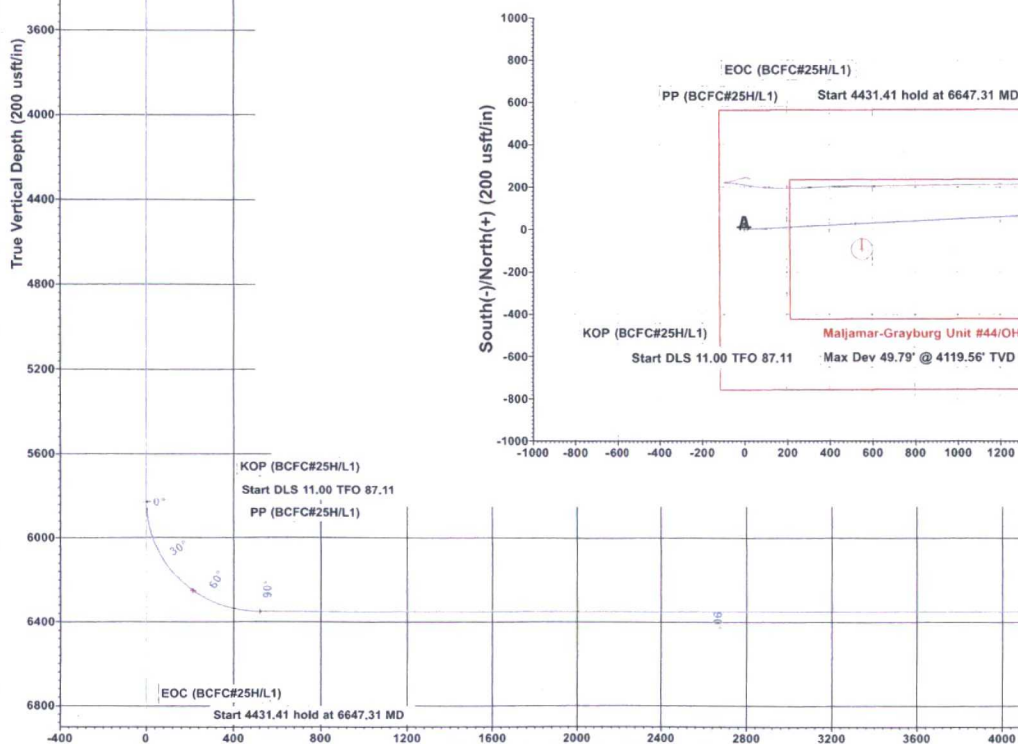
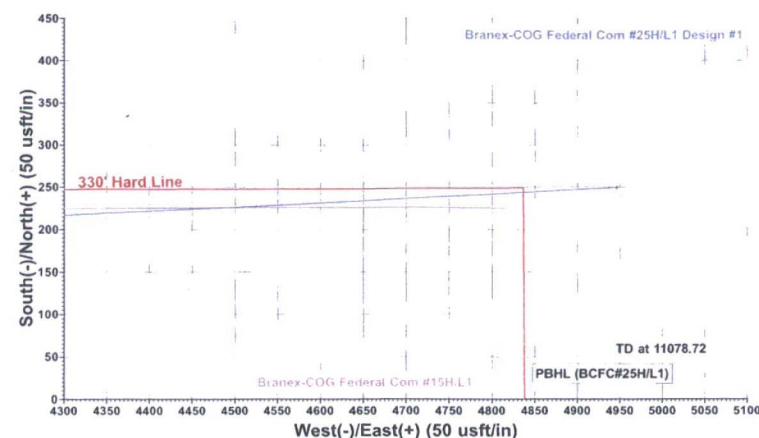
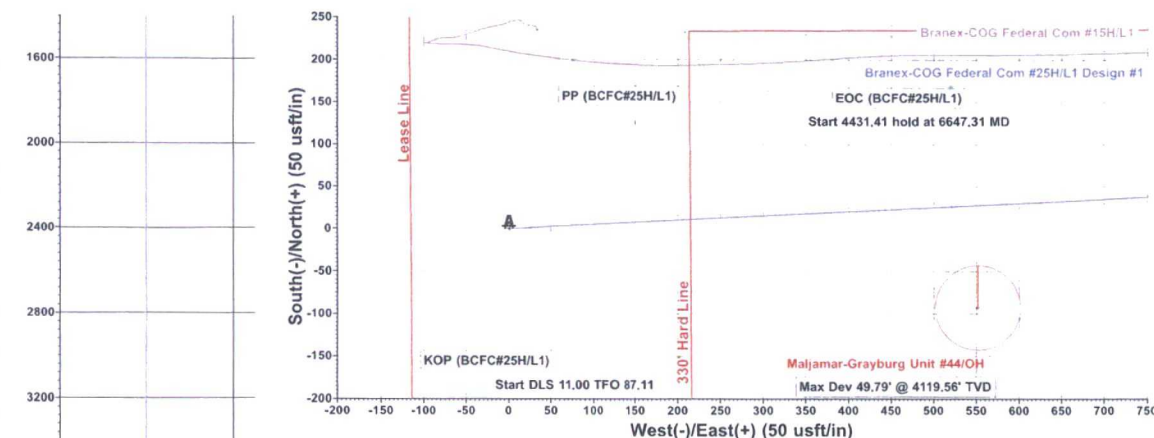




COG Operating LLC
 Project: Lea County, NM (NAD-27 2015)
 Site: Branex-COG Federal Com #25H
 Well: SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L
 Wellbore: BHL: 2310' FSL, 220' FEL, Sec 9, T17S, R32E, Unit I
 Plan: Design #1 (SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L/BHL: 2310' FSL, 220' FEL, Sec 9, T17S, R32E, Unit I)

Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	5829.13	0.00	0.00	5829.13	0.00	0.00	0.00	0.00	0.00	
3	6647.31	90.00	87.11	6350.00	26.22	520.21	11.00	87.11	520.87	
4	11078.72	90.00	87.11	6350.00	249.30	4946.00	0.00	0.00	4952.28	PBHL (BCFC#25H/L1)

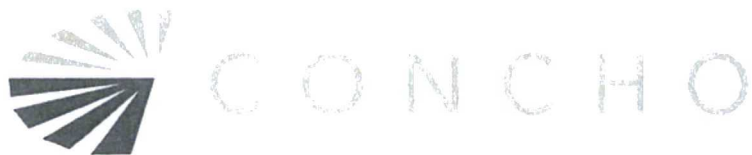


Terra Directional Services LLC
 3705 South County Road 1210, Midland, TX 79706
 Phone: 432-618-1210

Ground Elevation:: 4068.00
 RKB Elevation: KB @ 4086.00usft (Silver Oak 3)

Northing 672474.90 Easting 670187.30 Latitude 32° 50' 50.968 N Longitude 103° 46' 45.043 W

PROJECT DETAILS: Lea County, NM (NAD-27 2015)
 Geodetic System: US State Plane 1927 (Exact solution)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: New Mexico East 3001
 System Datum: Mean Sea Level
 Local North: Grid



COG Operating LLC

Lea County, NM (NAD-27 2015)

Branex-COG Federal Com #25H

SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L

PP: 2085' FSL, 330' FWL, Sec 9, T17S, R32E, Unit L

BHL: 2310' FSL, 220' FEL, Sec 9, T17S, R32E, Unit I

HOBBS OCD
SEP 11 2017
RECEIVED

Plan: Design #1

Standard Planning Report

20 February, 2017





TDS
Planning Report



Database: EDM 5000.1 Single User Db
Local Co-ordinate Reference: Well SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L
Company: COG Operating LLC
TVD Reference: KB @ 4086.00usft (Silver Oak 3)
Project: Lea County, NM (NAD-27 2015)
MD Reference: KB @ 4086.00usft (Silver Oak 3)
Site: Branex-COG Federal Com #25H
North Reference: Grid
Well: SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L
Survey Calculation Method: Minimum Curvature
Wellbore: BHL: 2310' FSL, 220' FEL, Sec 9, T17S, R32E, Unit I
Design: Design #1

Project	Lea County, NM (NAD-27 2015)		
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 Branex-COG Federal Com #25H

Site Position:	Northing:	672,474.90 usft	Latitude:	32° 50' 50.968 N	
From: Map	Easting:	670,187.30 usft	Longitude:	103° 46' 45.043 W	
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.30 °

Well SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L

Well Position	+N/-S	0.00 usft	Northing:	672,474.90 usft	Latitude:	32° 50' 50.968 N
	+E/-W	0.00 usft	Easting:	670,187.30 usft	Longitude:	103° 46' 45.043 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,068.00 usft	

Wellbore BHL: 2310' FSL, 220' FEL, Sec 9, T17S, R32E, Unit I

Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2015	2/20/2017	(°)	(°)	(nT)
			7.13	60.60	48,314

Design Design #1

Audit Notes:

Version: **Phase:** PLAN **Tie On Depth:** 0.00

Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	87.11

Plan Sections

Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,829.13	0.00	0.00	5,829.13	0.00	0.00	0.00	0.00	0.00	0.00	
6,647.31	90.00	87.11	6,350.00	26.22	520.21	11.00	11.00	10.65	87.11	
11,078.72	90.00	87.11	6,350.00	249.30	4,946.00	0.00	0.00	0.00	0.00	PBHL (BCFC#25H/L1



TDS
Planning Report



Database: EDM 5000.1 Single User Db

Local Co-ordinate Reference:

Well SHL: 2075' FSL, 115' FWL, Sec 9,
T17S, R32E, Unit L

Company: COG Operating LLC

TVD Reference:

KB @ 4086.00usft (Silver Oak 3)

Project: Lea County, NM (NAD-27 2015)

MD Reference:

KB @ 4086.00usft (Silver Oak 3)

Site: Branex-COG Federal Com #25H

North Reference:

Grid

Well: SHL: 2075' FSL, 115' FWL, Sec 9, T17S,
R32E, Unit L

Survey Calculation Method:

Minimum Curvature

Wellbore: BHL: 2310' FSL, 220' FEL, Sec 9, T17S,
R32E, Unit I

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00



TDS
Planning Report



Database: EDM 5000.1 Single User Db

Local Co-ordinate Reference:

Well SHL: 2075' FSL, 115' FWL, Sec 9,
T17S, R32E, Unit L

Company: COG Operating LLC

TVD Reference:

KB @ 4086.00usft (Silver Oak 3)

Project: Lea County, NM (NAD-27 2015)

MD Reference:

KB @ 4086.00usft (Silver Oak 3)

Site: Branex-COG Federal Com #25H

North Reference:

Grid

Well: SHL: 2075' FSL, 115' FWL, Sec 9, T17S,
R32E, Unit L

Survey Calculation Method:

Minimum Curvature

Wellbore: BHL: 2310' FSL, 220' FEL, Sec 9, T17S,
R32E, Unit I

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)
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,829.13	0.00	0.00	5,829.13	0.00	0.00	0.00	0.00	0.00	0.00
Start DLS 11.00 TFO 87.11									
5,850.00	2.30	87.11	5,849.99	0.02	0.42	0.42	11.00	11.00	0.00
5,900.00	7.80	87.11	5,899.78	0.24	4.81	4.81	11.00	11.00	0.00
5,950.00	13.30	87.11	5,948.92	0.70	13.94	13.96	11.00	11.00	0.00
6,000.00	18.80	87.11	5,996.95	1.40	27.74	27.78	11.00	11.00	0.00
6,050.00	24.30	87.11	6,043.44	2.32	46.07	46.13	11.00	11.00	0.00
6,100.00	29.80	87.11	6,087.96	3.47	68.77	68.86	11.00	11.00	0.00
6,150.00	35.30	87.11	6,130.09	4.82	95.62	95.75	11.00	11.00	0.00
6,200.00	40.80	87.11	6,169.45	6.37	126.39	126.55	11.00	11.00	0.00
6,250.00	46.30	87.11	6,205.68	8.10	160.78	160.98	11.00	11.00	0.00
6,300.00	51.80	87.11	6,238.44	10.00	198.48	198.73	11.00	11.00	0.00
6,350.00	57.30	87.11	6,267.43	12.05	239.14	239.44	11.00	11.00	0.00
6,400.00	62.80	87.11	6,292.38	14.23	282.39	282.75	11.00	11.00	0.00
6,450.00	68.30	87.11	6,313.07	16.52	327.83	328.24	11.00	11.00	0.00
6,500.00	73.80	87.11	6,329.31	18.90	375.04	375.51	11.00	11.00	0.00
6,550.00	79.30	87.11	6,340.94	21.35	423.59	424.12	11.00	11.00	0.00
6,600.00	84.80	87.11	6,347.85	23.84	473.02	473.62	11.00	11.00	0.00
6,647.31	90.00	87.11	6,350.00	26.22	520.21	520.87	11.00	11.00	0.00
Start 4431.41 hold at 6647.31 MD									
6,700.00	90.00	87.11	6,350.00	28.87	572.83	573.56	0.00	0.00	0.00
6,800.00	90.00	87.11	6,350.00	33.91	672.70	673.56	0.00	0.00	0.00
6,900.00	90.00	87.11	6,350.00	38.94	772.58	773.56	0.00	0.00	0.00
7,000.00	90.00	87.11	6,350.00	43.98	872.45	873.56	0.00	0.00	0.00
7,100.00	90.00	87.11	6,350.00	49.01	972.32	973.56	0.00	0.00	0.00
7,200.00	90.00	87.11	6,350.00	54.04	1,072.20	1,073.56	0.00	0.00	0.00
7,300.00	90.00	87.11	6,350.00	59.08	1,172.07	1,173.56	0.00	0.00	0.00
7,400.00	90.00	87.11	6,350.00	64.11	1,271.94	1,273.56	0.00	0.00	0.00
7,500.00	90.00	87.11	6,350.00	69.15	1,371.82	1,373.56	0.00	0.00	0.00
7,600.00	90.00	87.11	6,350.00	74.18	1,471.69	1,473.56	0.00	0.00	0.00
7,700.00	90.00	87.11	6,350.00	79.21	1,571.56	1,573.56	0.00	0.00	0.00
7,800.00	90.00	87.11	6,350.00	84.25	1,671.44	1,673.56	0.00	0.00	0.00
7,900.00	90.00	87.11	6,350.00	89.28	1,771.31	1,773.56	0.00	0.00	0.00
8,000.00	90.00	87.11	6,350.00	94.32	1,871.18	1,873.56	0.00	0.00	0.00
8,100.00	90.00	87.11	6,350.00	99.35	1,971.06	1,973.56	0.00	0.00	0.00
8,200.00	90.00	87.11	6,350.00	104.38	2,070.93	2,073.56	0.00	0.00	0.00
8,300.00	90.00	87.11	6,350.00	109.42	2,170.80	2,173.56	0.00	0.00	0.00
8,400.00	90.00	87.11	6,350.00	114.45	2,270.68	2,273.56	0.00	0.00	0.00
8,500.00	90.00	87.11	6,350.00	119.49	2,370.55	2,373.56	0.00	0.00	0.00
8,600.00	90.00	87.11	6,350.00	124.52	2,470.42	2,473.56	0.00	0.00	0.00
8,700.00	90.00	87.11	6,350.00	129.55	2,570.30	2,573.56	0.00	0.00	0.00
8,800.00	90.00	87.11	6,350.00	134.59	2,670.17	2,673.56	0.00	0.00	0.00
8,900.00	90.00	87.11	6,350.00	139.62	2,770.04	2,773.56	0.00	0.00	0.00

Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Branex-COG Federal Com #25H
Well: SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L
Wellbore: BHL: 2310' FSL, 220' FEL, Sec 9, T17S, R32E, Unit I
Design: Design #1

Local Co-ordinate Reference: Well SHL: 2075' FSL, 115' FWL, Sec 9, T17S, R32E, Unit L
TVD Reference: KB @ 4086.00usft (Silver Oak 3)
MD Reference: KB @ 4086.00usft (Silver Oak 3)
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)
9,000.00	90.00	87.11	6,350.00	144.66	2,869.92	2,873.56	0.00	0.00	0.00
9,100.00	90.00	87.11	6,350.00	149.69	2,969.79	2,973.56	0.00	0.00	0.00
9,200.00	90.00	87.11	6,350.00	154.72	3,069.66	3,073.56	0.00	0.00	0.00
9,300.00	90.00	87.11	6,350.00	159.76	3,169.54	3,173.56	0.00	0.00	0.00
9,400.00	90.00	87.11	6,350.00	164.79	3,269.41	3,273.56	0.00	0.00	0.00
9,500.00	90.00	87.11	6,350.00	169.83	3,369.28	3,373.56	0.00	0.00	0.00
9,600.00	90.00	87.11	6,350.00	174.86	3,469.15	3,473.56	0.00	0.00	0.00
9,700.00	90.00	87.11	6,350.00	179.89	3,569.03	3,573.56	0.00	0.00	0.00
9,800.00	90.00	87.11	6,350.00	184.93	3,668.90	3,673.56	0.00	0.00	0.00
9,900.00	90.00	87.11	6,350.00	189.96	3,768.77	3,773.56	0.00	0.00	0.00
10,000.00	90.00	87.11	6,350.00	195.00	3,868.65	3,873.56	0.00	0.00	0.00
10,100.00	90.00	87.11	6,350.00	200.03	3,968.52	3,973.56	0.00	0.00	0.00
10,200.00	90.00	87.11	6,350.00	205.06	4,068.39	4,073.56	0.00	0.00	0.00
10,300.00	90.00	87.11	6,350.00	210.10	4,168.27	4,173.56	0.00	0.00	0.00
10,400.00	90.00	87.11	6,350.00	215.13	4,268.14	4,273.56	0.00	0.00	0.00
10,500.00	90.00	87.11	6,350.00	220.17	4,368.01	4,373.56	0.00	0.00	0.00
10,600.00	90.00	87.11	6,350.00	225.20	4,467.89	4,473.56	0.00	0.00	0.00
10,700.00	90.00	87.11	6,350.00	230.24	4,567.76	4,573.56	0.00	0.00	0.00
10,800.00	90.00	87.11	6,350.00	235.27	4,667.63	4,673.56	0.00	0.00	0.00
10,900.00	90.00	87.11	6,350.00	240.30	4,767.51	4,773.56	0.00	0.00	0.00
11,000.00	90.00	87.11	6,350.00	245.34	4,867.38	4,873.56	0.00	0.00	0.00
11,078.72	90.00	87.11	6,350.00	249.30	4,946.00	4,952.28	0.00	0.00	0.00

TD at 11078.72

Design Targets
Target Name

- hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Max Dev 49.79' @ 4119. - plan misses target center by 558.99usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Circle (radius 49.79)	0.00	0.00	0.00	-92.81	551.23	672,382.09	670,738.53	32° 50' 50.021 N	103° 46' 38.588 W
KOP (BCFC#25H/L1) - plan hits target center - Point	0.00	0.00	5,829.13	0.00	0.00	672,474.90	670,187.30	32° 50' 50.968 N	103° 46' 45.043 W
PP (BCFC#25H/L1) - plan hits target center - Point	0.00	0.00	6,250.79	10.83	214.80	672,485.72	670,402.11	32° 50' 51.064 N	103° 46' 42.525 W
PBHL (BCFC#25H/L1) - plan hits target center - Point	0.00	0.00	6,350.00	249.30	4,946.00	672,724.20	675,133.30	32° 50' 53.174 N	103° 45' 47.053 W
EOC (BCFC#25H/L1) - plan hits target center - Point	0.00	0.00	6,350.00	26.22	520.21	672,501.12	670,707.51	32° 50' 51.200 N	103° 46' 38.944 W



Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Branex-COG Federal Com #25H
Well: SHL: 2075' FSL, 115' FWL, Sec 9, T17S,
R32E, Unit L
Wellbore: BHL: 2310' FSL, 220' FEL, Sec 9, T17S,
R32E, Unit I
Design: Design #1

Local Co-ordinate Reference: Well SHL: 2075' FSL, 115' FWL, Sec 9,
T17S, R32E, Unit L
TVD Reference: KB @ 4086.00usft (Silver Oak 3)
MD Reference: KB @ 4086.00usft (Silver Oak 3)
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)	
5,829.13	5,829.13	0.00	0.00	Start DLS 11.00 TFO 87.11
6,647.31	6,350.00	26.22	520.21	Start 4431.41 hold at 6647.31 MD
11,078.72	6,350.00	249.30	4,946.00	TD at 11078.72