



COG Operating L L C
 Project: Lea County, NM (NAD27 NME)
 Site: Sec. 34, T 25 S., R 33 E
 Well: Columbus Fee 24H
 Wellbore: Wellbore #1
 Plan: Plan #2 (Columbus Fee 24H/Wellbore #1)
 Scandrill Freedom



WELL DETAILS: Columbus Fee 24H

Ground Elevation:: 3327.00
 RKB Elevation: KB=26' @ 3353.00ft (Scandrill Freedom)
 Rig Name: Scandrill Freedom

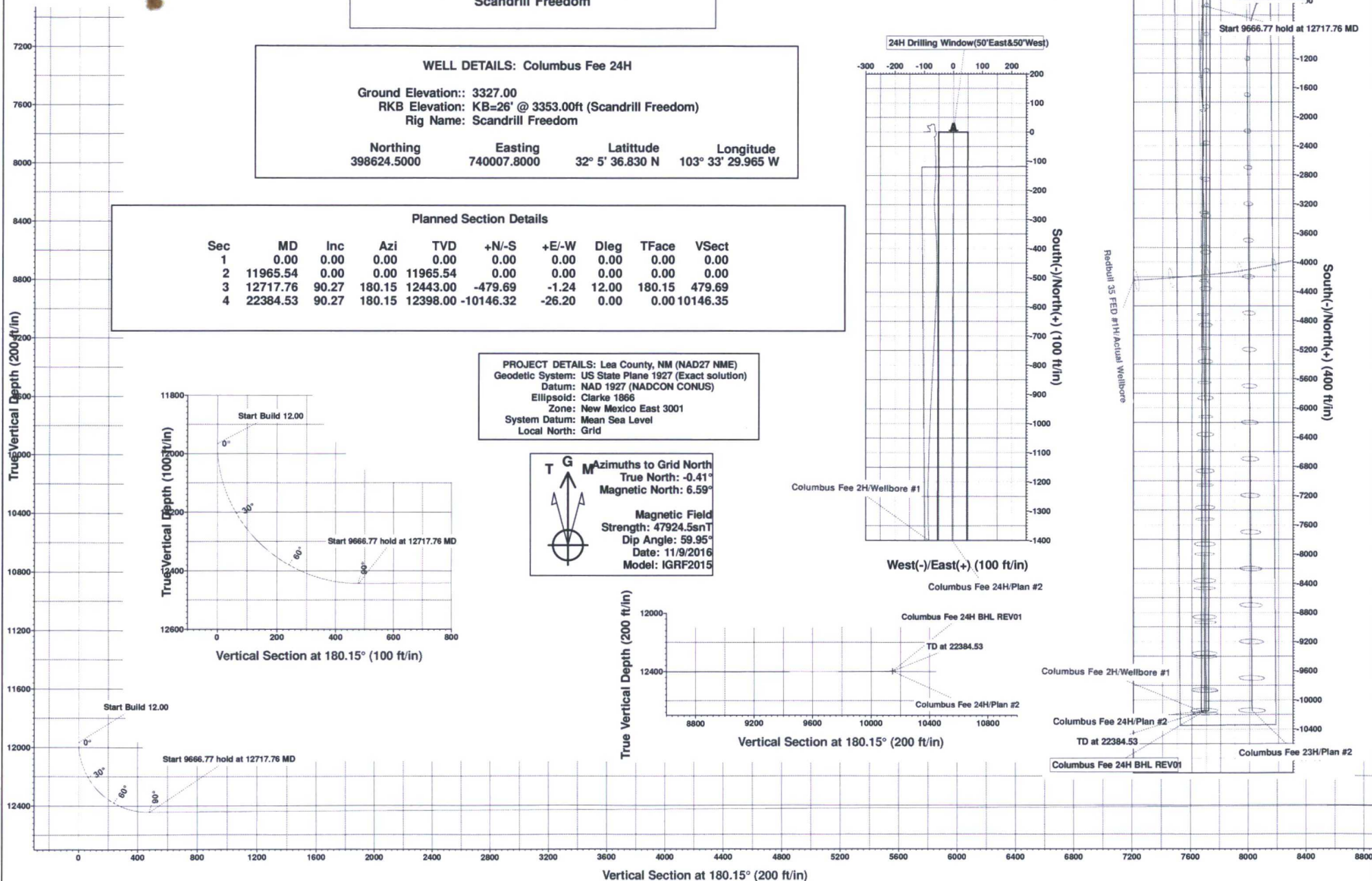
Northing Easting Latitude Longitude
 398624.5000 740007.8000 32° 5' 36.830 N 103° 33' 29.965 W

Planned Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	11965.54	0.00	0.00	11965.54	0.00	0.00	0.00	0.00	0.00
3	12717.76	90.27	180.15	12443.00	-479.69	-1.24	12.00	180.15	479.69
4	22384.53	90.27	180.15	12398.00	-10146.32	-26.20	0.00	0.00	10146.35

PROJECT DETAILS: Lea County, NM (NAD27 NME)
 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

Azimuths to Grid North
 True North: -0.41°
 Magnetic North: 6.59°
Magnetic Field
 Strength: 47924.5nT
 Dip Angle: 59.95°
 Date: 11/9/2016
 Model: IGRF2015





COG Operating L L C

Lea County, NM (NAD27 NME)

Sec. 34, T 25 S. , R 33 E

Columbus Fee 24H

Wellbore #1

Plan: Plan #2

Standard Survey Report

11 November, 2016





Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Well:	Columbus Fee 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #2	Database:	EDM 5000.1 Multi User Db

Project	Lea County, NM (NAD27 NME)		
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. 34, T 25 S. , R 33 E		
Site Position:		Northing:	398,623.8000 usft
From:	Map	Easting:	739,904.9000 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 5' 36.830 N
		Longitude:	103° 33' 31.161 W
		Grid Convergence:	0.41 °

Well	Columbus Fee 24H		
Well Position	+N/-S	0.00 ft	Northing: 398,624.5000 usft
	+E/-W	0.00 ft	Easting: 740,007.8000 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 5' 36.830 N
		Longitude:	103° 33' 29.965 W
		Ground Level:	3,327.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/9/2016	7.00	59.95	47,925

Design	Plan #2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	180.15

Survey Tool Program	Date 11/11/2016			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	22,384.50	Plan #2 (Wellbore #1)	MWD	MWD - Standard

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	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



Integrity Directional Services, LLC

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #2	Database:	EDM 5000.1 Multi User Db

Planned Survey

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



Integrity Directional Services, LLC

Survey Report



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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
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00
8,400.00	0.00	0.00	8,400.00	0.00	0.00	0.00	0.00	0.00	0.00
8,500.00	0.00	0.00	8,500.00	0.00	0.00	0.00	0.00	0.00	0.00
8,600.00	0.00	0.00	8,600.00	0.00	0.00	0.00	0.00	0.00	0.00
8,700.00	0.00	0.00	8,700.00	0.00	0.00	0.00	0.00	0.00	0.00
8,800.00	0.00	0.00	8,800.00	0.00	0.00	0.00	0.00	0.00	0.00
8,900.00	0.00	0.00	8,900.00	0.00	0.00	0.00	0.00	0.00	0.00
9,000.00	0.00	0.00	9,000.00	0.00	0.00	0.00	0.00	0.00	0.00
9,100.00	0.00	0.00	9,100.00	0.00	0.00	0.00	0.00	0.00	0.00
9,200.00	0.00	0.00	9,200.00	0.00	0.00	0.00	0.00	0.00	0.00
9,300.00	0.00	0.00	9,300.00	0.00	0.00	0.00	0.00	0.00	0.00
9,400.00	0.00	0.00	9,400.00	0.00	0.00	0.00	0.00	0.00	0.00
9,500.00	0.00	0.00	9,500.00	0.00	0.00	0.00	0.00	0.00	0.00
9,600.00	0.00	0.00	9,600.00	0.00	0.00	0.00	0.00	0.00	0.00



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9,700.00	0.00	0.00	9,700.00	0.00	0.00	0.00	0.00	0.00	0.00
9,800.00	0.00	0.00	9,800.00	0.00	0.00	0.00	0.00	0.00	0.00
9,900.00	0.00	0.00	9,900.00	0.00	0.00	0.00	0.00	0.00	0.00
10,000.00	0.00	0.00	10,000.00	0.00	0.00	0.00	0.00	0.00	0.00
10,100.00	0.00	0.00	10,100.00	0.00	0.00	0.00	0.00	0.00	0.00
10,200.00	0.00	0.00	10,200.00	0.00	0.00	0.00	0.00	0.00	0.00
10,300.00	0.00	0.00	10,300.00	0.00	0.00	0.00	0.00	0.00	0.00
10,400.00	0.00	0.00	10,400.00	0.00	0.00	0.00	0.00	0.00	0.00
10,500.00	0.00	0.00	10,500.00	0.00	0.00	0.00	0.00	0.00	0.00
10,600.00	0.00	0.00	10,600.00	0.00	0.00	0.00	0.00	0.00	0.00
10,700.00	0.00	0.00	10,700.00	0.00	0.00	0.00	0.00	0.00	0.00
10,800.00	0.00	0.00	10,800.00	0.00	0.00	0.00	0.00	0.00	0.00
10,900.00	0.00	0.00	10,900.00	0.00	0.00	0.00	0.00	0.00	0.00
11,000.00	0.00	0.00	11,000.00	0.00	0.00	0.00	0.00	0.00	0.00
11,100.00	0.00	0.00	11,100.00	0.00	0.00	0.00	0.00	0.00	0.00
11,200.00	0.00	0.00	11,200.00	0.00	0.00	0.00	0.00	0.00	0.00
11,300.00	0.00	0.00	11,300.00	0.00	0.00	0.00	0.00	0.00	0.00
11,400.00	0.00	0.00	11,400.00	0.00	0.00	0.00	0.00	0.00	0.00
11,500.00	0.00	0.00	11,500.00	0.00	0.00	0.00	0.00	0.00	0.00
11,600.00	0.00	0.00	11,600.00	0.00	0.00	0.00	0.00	0.00	0.00
11,700.00	0.00	0.00	11,700.00	0.00	0.00	0.00	0.00	0.00	0.00
11,800.00	0.00	0.00	11,800.00	0.00	0.00	0.00	0.00	0.00	0.00
11,900.00	0.00	0.00	11,900.00	0.00	0.00	0.00	0.00	0.00	0.00
11,965.54	0.00	0.00	11,965.54	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 12.00									
12,000.00	4.14	180.15	11,999.97	-1.24	0.00	1.24	12.00	12.00	0.00
12,100.00	16.14	180.15	12,098.23	-18.81	-0.05	18.81	12.00	12.00	0.00
12,200.00	28.14	180.15	12,190.69	-56.42	-0.15	56.42	12.00	12.00	0.00
12,300.00	40.14	180.15	12,273.31	-112.43	-0.29	112.43	12.00	12.00	0.00
12,400.00	52.14	180.15	12,342.48	-184.40	-0.48	184.40	12.00	12.00	0.00
12,500.00	64.14	180.15	12,395.17	-269.17	-0.70	269.17	12.00	12.00	0.00
12,600.00	76.14	180.15	12,429.09	-363.05	-0.94	363.05	12.00	12.00	0.00
12,700.00	88.14	180.15	12,442.75	-461.93	-1.19	461.93	12.00	12.00	0.00
12,717.76	90.27	180.15	12,443.00	-479.69	-1.24	479.69	12.00	12.00	0.00
Start 9666.77 hold at 12717.76 MD									
12,800.00	90.27	180.15	12,442.61	-561.93	-1.45	561.93	0.00	0.00	0.00
12,900.00	90.27	180.15	12,442.15	-661.92	-1.71	661.93	0.00	0.00	0.00
13,000.00	90.27	180.15	12,441.68	-761.92	-1.97	761.93	0.00	0.00	0.00
13,100.00	90.27	180.15	12,441.22	-861.92	-2.23	861.92	0.00	0.00	0.00
13,200.00	90.27	180.15	12,440.75	-961.92	-2.48	961.92	0.00	0.00	0.00
13,300.00	90.27	180.15	12,440.29	-1,061.92	-2.74	1,061.92	0.00	0.00	0.00
13,400.00	90.27	180.15	12,439.82	-1,161.92	-3.00	1,161.92	0.00	0.00	0.00
13,500.00	90.27	180.15	12,439.36	-1,261.92	-3.26	1,261.92	0.00	0.00	0.00
13,600.00	90.27	180.15	12,438.89	-1,361.91	-3.52	1,361.92	0.00	0.00	0.00



Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Well:	Columbus Fee 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #2	Database:	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,700.00	90.27	180.15	12,438.42	-1,461.91	-3.77	1,461.92	0.00	0.00	0.00
13,800.00	90.27	180.15	12,437.96	-1,561.91	-4.03	1,561.92	0.00	0.00	0.00
13,900.00	90.27	180.15	12,437.49	-1,661.91	-4.29	1,661.92	0.00	0.00	0.00
14,000.00	90.27	180.15	12,437.03	-1,761.91	-4.55	1,761.91	0.00	0.00	0.00
14,100.00	90.27	180.15	12,436.56	-1,861.91	-4.81	1,861.91	0.00	0.00	0.00
14,200.00	90.27	180.15	12,436.10	-1,961.91	-5.07	1,961.91	0.00	0.00	0.00
14,300.00	90.27	180.15	12,435.63	-2,061.90	-5.32	2,061.91	0.00	0.00	0.00
14,400.00	90.27	180.15	12,435.17	-2,161.90	-5.58	2,161.91	0.00	0.00	0.00
14,500.00	90.27	180.15	12,434.70	-2,261.90	-5.84	2,261.91	0.00	0.00	0.00
14,600.00	90.27	180.15	12,434.24	-2,361.90	-6.10	2,361.91	0.00	0.00	0.00
14,700.00	90.27	180.15	12,433.77	-2,461.90	-6.36	2,461.91	0.00	0.00	0.00
14,800.00	90.27	180.15	12,433.30	-2,561.90	-6.62	2,561.91	0.00	0.00	0.00
14,900.00	90.27	180.15	12,432.84	-2,661.90	-6.87	2,661.90	0.00	0.00	0.00
15,000.00	90.27	180.15	12,432.37	-2,761.89	-7.13	2,761.90	0.00	0.00	0.00
15,100.00	90.27	180.15	12,431.91	-2,861.89	-7.39	2,861.90	0.00	0.00	0.00
15,200.00	90.27	180.15	12,431.44	-2,961.89	-7.65	2,961.90	0.00	0.00	0.00
15,300.00	90.27	180.15	12,430.98	-3,061.89	-7.91	3,061.90	0.00	0.00	0.00
15,400.00	90.27	180.15	12,430.51	-3,161.89	-8.16	3,161.90	0.00	0.00	0.00
15,500.00	90.27	180.15	12,430.05	-3,261.89	-8.42	3,261.90	0.00	0.00	0.00
15,600.00	90.27	180.15	12,429.58	-3,361.89	-8.68	3,361.90	0.00	0.00	0.00
15,700.00	90.27	180.15	12,429.12	-3,461.88	-8.94	3,461.90	0.00	0.00	0.00
15,800.00	90.27	180.15	12,428.65	-3,561.88	-9.20	3,561.89	0.00	0.00	0.00
15,900.00	90.27	180.15	12,428.18	-3,661.88	-9.46	3,661.89	0.00	0.00	0.00
16,000.00	90.27	180.15	12,427.72	-3,761.88	-9.71	3,761.89	0.00	0.00	0.00
16,100.00	90.27	180.15	12,427.25	-3,861.88	-9.97	3,861.89	0.00	0.00	0.00
16,200.00	90.27	180.15	12,426.79	-3,961.88	-10.23	3,961.89	0.00	0.00	0.00
16,300.00	90.27	180.15	12,426.32	-4,061.88	-10.49	4,061.89	0.00	0.00	0.00
16,400.00	90.27	180.15	12,425.86	-4,161.87	-10.75	4,161.89	0.00	0.00	0.00
16,500.00	90.27	180.15	12,425.39	-4,261.87	-11.01	4,261.89	0.00	0.00	0.00
16,600.00	90.27	180.15	12,424.93	-4,361.87	-11.26	4,361.89	0.00	0.00	0.00
16,700.00	90.27	180.15	12,424.46	-4,461.87	-11.52	4,461.89	0.00	0.00	0.00
16,800.00	90.27	180.15	12,424.00	-4,561.87	-11.78	4,561.88	0.00	0.00	0.00
16,900.00	90.27	180.15	12,423.53	-4,661.87	-12.04	4,661.88	0.00	0.00	0.00
17,000.00	90.27	180.15	12,423.06	-4,761.87	-12.30	4,761.88	0.00	0.00	0.00
17,100.00	90.27	180.15	12,422.60	-4,861.86	-12.55	4,861.88	0.00	0.00	0.00
17,200.00	90.27	180.15	12,422.13	-4,961.86	-12.81	4,961.88	0.00	0.00	0.00
17,300.00	90.27	180.15	12,421.67	-5,061.86	-13.07	5,061.88	0.00	0.00	0.00
17,400.00	90.27	180.15	12,421.20	-5,161.86	-13.33	5,161.88	0.00	0.00	0.00
17,500.00	90.27	180.15	12,420.74	-5,261.86	-13.59	5,261.88	0.00	0.00	0.00
17,600.00	90.27	180.15	12,420.27	-5,361.86	-13.85	5,361.88	0.00	0.00	0.00
17,700.00	90.27	180.15	12,419.81	-5,461.86	-14.10	5,461.87	0.00	0.00	0.00
17,800.00	90.27	180.15	12,419.34	-5,561.85	-14.36	5,561.87	0.00	0.00	0.00
17,900.00	90.27	180.15	12,418.87	-5,661.85	-14.62	5,661.87	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Well:	Columbus Fee 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #2	Database:	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
18,000.00	90.27	180.15	12,418.41	-5,761.85	-14.88	5,761.87	0.00	0.00	0.00
18,100.00	90.27	180.15	12,417.94	-5,861.85	-15.14	5,861.87	0.00	0.00	0.00
18,200.00	90.27	180.15	12,417.48	-5,961.85	-15.39	5,961.87	0.00	0.00	0.00
18,300.00	90.27	180.15	12,417.01	-6,061.85	-15.65	6,061.87	0.00	0.00	0.00
18,400.00	90.27	180.15	12,416.55	-6,161.85	-15.91	6,161.87	0.00	0.00	0.00
18,500.00	90.27	180.15	12,416.08	-6,261.84	-16.17	6,261.87	0.00	0.00	0.00
18,600.00	90.27	180.15	12,415.62	-6,361.84	-16.43	6,361.86	0.00	0.00	0.00
18,700.00	90.27	180.15	12,415.15	-6,461.84	-16.69	6,461.86	0.00	0.00	0.00
18,800.00	90.27	180.15	12,414.69	-6,561.84	-16.94	6,561.86	0.00	0.00	0.00
18,900.00	90.27	180.15	12,414.22	-6,661.84	-17.20	6,661.86	0.00	0.00	0.00
19,000.00	90.27	180.15	12,413.75	-6,761.84	-17.46	6,761.86	0.00	0.00	0.00
19,100.00	90.27	180.15	12,413.29	-6,861.84	-17.72	6,861.86	0.00	0.00	0.00
19,200.00	90.27	180.15	12,412.82	-6,961.83	-17.98	6,961.86	0.00	0.00	0.00
19,300.00	90.27	180.15	12,412.36	-7,061.83	-18.24	7,061.86	0.00	0.00	0.00
19,400.00	90.27	180.15	12,411.89	-7,161.83	-18.49	7,161.86	0.00	0.00	0.00
19,500.00	90.27	180.15	12,411.43	-7,261.83	-18.75	7,261.85	0.00	0.00	0.00
19,600.00	90.27	180.15	12,410.96	-7,361.83	-19.01	7,361.85	0.00	0.00	0.00
19,700.00	90.27	180.15	12,410.50	-7,461.83	-19.27	7,461.85	0.00	0.00	0.00
19,800.00	90.27	180.15	12,410.03	-7,561.83	-19.53	7,561.85	0.00	0.00	0.00
19,900.00	90.27	180.15	12,409.57	-7,661.83	-19.78	7,661.85	0.00	0.00	0.00
20,000.00	90.27	180.15	12,409.10	-7,761.82	-20.04	7,761.85	0.00	0.00	0.00
20,100.00	90.27	180.15	12,408.63	-7,861.82	-20.30	7,861.85	0.00	0.00	0.00
20,200.00	90.27	180.15	12,408.17	-7,961.82	-20.56	7,961.85	0.00	0.00	0.00
20,300.00	90.27	180.15	12,407.70	-8,061.82	-20.82	8,061.85	0.00	0.00	0.00
20,400.00	90.27	180.15	12,407.24	-8,161.82	-21.08	8,161.85	0.00	0.00	0.00
20,500.00	90.27	180.15	12,406.77	-8,261.82	-21.33	8,261.84	0.00	0.00	0.00
20,600.00	90.27	180.15	12,406.31	-8,361.82	-21.59	8,361.84	0.00	0.00	0.00
20,700.00	90.27	180.15	12,405.84	-8,461.81	-21.85	8,461.84	0.00	0.00	0.00
20,800.00	90.27	180.15	12,405.38	-8,561.81	-22.11	8,561.84	0.00	0.00	0.00
20,900.00	90.27	180.15	12,404.91	-8,661.81	-22.37	8,661.84	0.00	0.00	0.00
21,000.00	90.27	180.15	12,404.44	-8,761.81	-22.62	8,761.84	0.00	0.00	0.00
21,100.00	90.27	180.15	12,403.98	-8,861.81	-22.88	8,861.84	0.00	0.00	0.00
21,200.00	90.27	180.15	12,403.51	-8,961.81	-23.14	8,961.84	0.00	0.00	0.00
21,300.00	90.27	180.15	12,403.05	-9,061.81	-23.40	9,061.84	0.00	0.00	0.00
21,400.00	90.27	180.15	12,402.58	-9,161.80	-23.66	9,161.83	0.00	0.00	0.00
21,500.00	90.27	180.15	12,402.12	-9,261.80	-23.92	9,261.83	0.00	0.00	0.00
21,600.00	90.27	180.15	12,401.65	-9,361.80	-24.17	9,361.83	0.00	0.00	0.00
21,700.00	90.27	180.15	12,401.19	-9,461.80	-24.43	9,461.83	0.00	0.00	0.00
21,800.00	90.27	180.15	12,400.72	-9,561.80	-24.69	9,561.83	0.00	0.00	0.00
21,900.00	90.27	180.15	12,400.26	-9,661.80	-24.95	9,661.83	0.00	0.00	0.00
22,000.00	90.27	180.15	12,399.79	-9,761.80	-25.21	9,761.83	0.00	0.00	0.00
22,100.00	90.27	180.15	12,399.32	-9,861.79	-25.47	9,861.83	0.00	0.00	0.00
22,200.00	90.27	180.15	12,398.86	-9,961.79	-25.72	9,961.83	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Well:	Columbus Fee 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #2	Database:	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
22,300.00	90.27	180.15	12,398.39	-10,061.79	-25.98	10,061.82	0.00	0.00	0.00
22,384.53	90.27	180.15	12,398.00	-10,146.32	-26.20	10,146.35	0.00	0.00	0.00
TD at 22384.53									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
24H Drilling Window	0.00	0.01	0.00	0.00	0.00	398,624.5000	740,007.8000	32° 5' 36.830 N	103° 33' 29.965 W
- plan hits target center									
- Rectangle (sides W100.00 H10,146.32 D0.00)									
Columbus Fee 24H B	0.00	0.00	12,398.00	-10,146.32	-26.20	388,478.2000	739,981.6000	32° 3' 56.427 N	103° 33' 31.117 W
- plan hits target center									
- Point									

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
11,966	11,966	0	0	Start Build 12.00
12,718	12,443	-480	-1	Start 9666.77 hold at 12717.76 MD
22,385	12,398	-10,146	-26	TD at 22384.53

Checked By: _____ Approved By: _____ Date: _____