



COG Operating L L C
Project: Lea County, NM (NAD27 NME)
Site: Sec. 17, T 26 S., R 33 E
Well: Vast State 24H
Wellbore: Wellbore #1
Plan: Plan #1 (Vast State 24H/Wellbore #1)

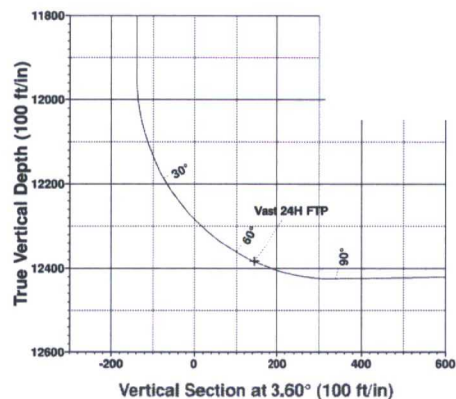
WELL DETAILS: Vast State 24H

Ground Elevation:: 3262.00
RKB Elevation: KB=28' @ 3290.00ft
Rig Name:

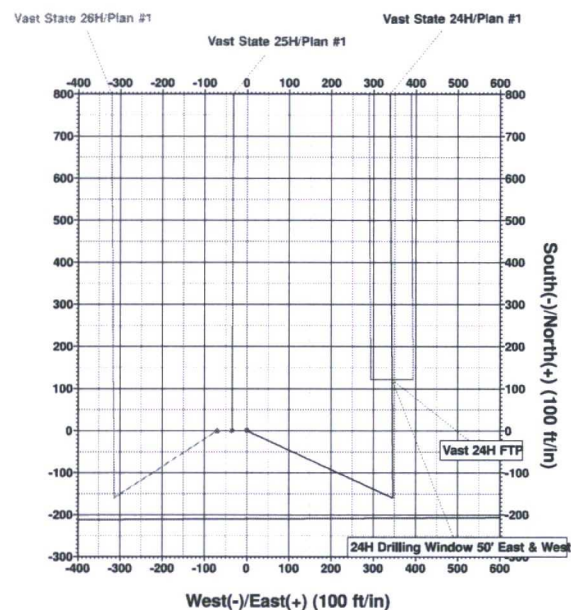
Northing 377870.1000 Easting 729806.5000 Latitude 32° 2' 12.158 N Longitude 103° 35' 30.202 W

Section Details

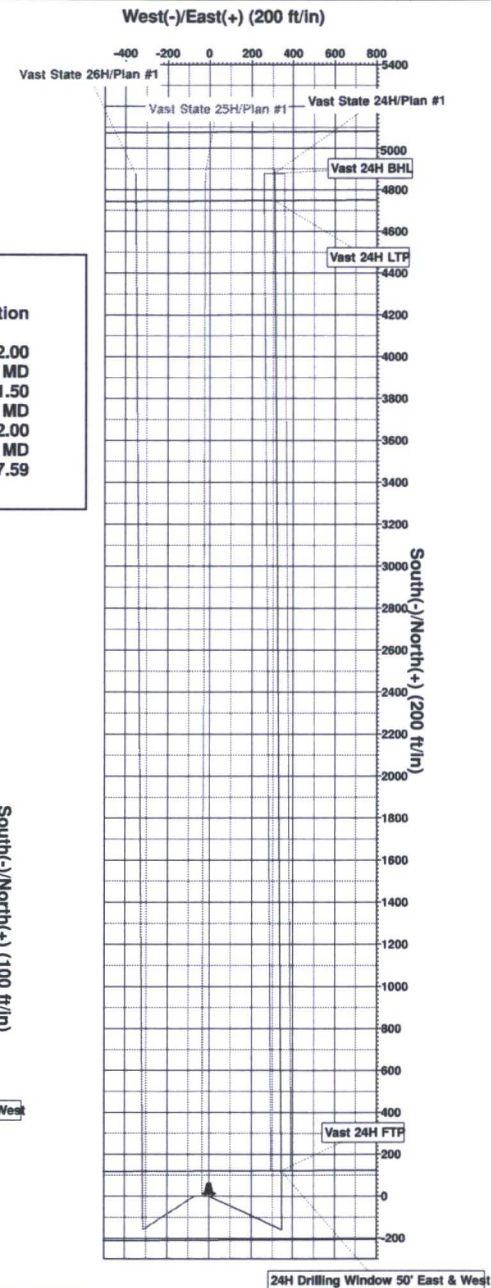
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.00
2	7747.77	0.00	0.00	7747.77	0.00	0.00	0.00	0.00	0.00	
3	8047.77	6.00	114.82	8047.22	-6.59	14.24	2.00	114.82	-5.68	Start 3296.56 hold at 8047.77 MD
4	11344.34	6.00	114.82	11325.73	-151.22	327.01	0.00	0.00	-130.39	Start Drop -1.50
5	11744.34	0.00	0.00	11725.00	-160.00	346.00	1.50	180.00	-137.96	Start 222.60 hold at 11744.34 MD
6	11966.94	0.00	0.00	11947.60	-160.00	346.00	0.00	0.00	-137.96	Start Build 12.00
7	12725.02	90.97	359.56	12425.00	325.53	342.23	12.00	359.56	346.37	Start 4552.57 hold at 12725.02 MD
8	17277.59	90.97	359.56	12348.00	4877.31	306.90	0.00	0.00	4886.96	TD at 17277.59



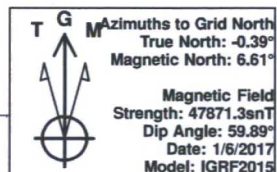
Vertical Section at 3.60° (200 ft/in)



Vast State 24H/Plan #1



24H Drilling Window 50' East & West



Magnetic Field
Strength: 47871.3snT
Dip Angle: 59.89°
Date: 1/6/2017
Model: IGRF2015

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



CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)

Sec. 17, T 26 S. , R 33 E

Vast State 24H

Wellbore #1

Plan: Plan #1

Standard Survey Report

06 January, 2017





Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Vast State 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=28' @ 3290.00ft
Site:	Sec. 17, T 26 S. , R 33 E	MD Reference:	KB=28' @ 3290.00ft
Well:	Vast State 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	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. 17, T 26 S. , R 33 E		
Site Position:		Northing:	377,872.3000 usft
From:	Map	Easting:	730,181.4000 usft
Position Uncertainty:	5.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 2' 12.155 N
		Longitude:	103° 35' 25.847 W
		Grid Convergence:	0.39 °

Well	Vast State 24H		
Well Position	+N/-S	0.00 ft	Northing: 377,870.1000 usft
	+E/-W	0.00 ft	Easting: 729,806.5000 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 2' 12.158 N
		Longitude:	103° 35' 30.202 W
		Ground Level:	3,262.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/6/2017	7.00	59.89	47,871

Design	Plan #1			
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	3.60

Survey Tool Program	Date 1/6/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,277.33	Plan #1 (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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Well:	Vast State 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	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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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)
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
7,747.77	0.00	0.00	7,747.77	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
7,800.00	1.04	114.82	7,800.00	-0.20	0.43	-0.17	2.00	2.00	0.00
7,900.00	3.04	114.82	7,899.93	-1.70	3.67	-1.46	2.00	2.00	0.00
8,000.00	5.04	114.82	7,999.67	-4.66	10.07	-4.02	2.00	2.00	0.00
8,047.77	6.00	114.82	8,047.22	-6.59	14.24	-5.68	2.00	2.00	0.00
Start 3296.56 hold at 8047.77 MD									
8,100.00	6.00	114.82	8,099.17	-8.88	19.20	-7.66	0.00	0.00	0.00
8,200.00	6.00	114.82	8,198.62	-13.27	28.69	-11.44	0.00	0.00	0.00
8,300.00	6.00	114.82	8,298.07	-17.65	38.17	-15.22	0.00	0.00	0.00
8,400.00	6.00	114.82	8,397.52	-22.04	47.66	-19.00	0.00	0.00	0.00
8,500.00	6.00	114.82	8,496.97	-26.43	57.15	-22.79	0.00	0.00	0.00
8,600.00	6.00	114.82	8,596.43	-30.81	66.64	-26.57	0.00	0.00	0.00
8,700.00	6.00	114.82	8,695.88	-35.20	76.12	-30.35	0.00	0.00	0.00
8,800.00	6.00	114.82	8,795.33	-39.59	85.61	-34.14	0.00	0.00	0.00
8,900.00	6.00	114.82	8,894.78	-43.98	95.10	-37.92	0.00	0.00	0.00
9,000.00	6.00	114.82	8,994.24	-48.36	104.59	-41.70	0.00	0.00	0.00
9,100.00	6.00	114.82	9,093.69	-52.75	114.07	-45.48	0.00	0.00	0.00
9,200.00	6.00	114.82	9,193.14	-57.14	123.56	-49.27	0.00	0.00	0.00



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9,300.00	6.00	114.82	9,292.59	-61.53	133.05	-53.05	0.00	0.00	0.00
9,400.00	6.00	114.82	9,392.04	-65.91	142.54	-56.83	0.00	0.00	0.00
9,500.00	6.00	114.82	9,491.50	-70.30	152.03	-60.62	0.00	0.00	0.00
9,600.00	6.00	114.82	9,590.95	-74.69	161.51	-64.40	0.00	0.00	0.00
9,700.00	6.00	114.82	9,690.40	-79.08	171.00	-68.18	0.00	0.00	0.00
9,800.00	6.00	114.82	9,789.85	-83.46	180.49	-71.97	0.00	0.00	0.00
9,900.00	6.00	114.82	9,889.31	-87.85	189.98	-75.75	0.00	0.00	0.00
10,000.00	6.00	114.82	9,988.76	-92.24	199.46	-79.53	0.00	0.00	0.00
10,100.00	6.00	114.82	10,088.21	-96.62	208.95	-83.31	0.00	0.00	0.00
10,200.00	6.00	114.82	10,187.66	-101.01	218.44	-87.10	0.00	0.00	0.00
10,300.00	6.00	114.82	10,287.11	-105.40	227.93	-90.88	0.00	0.00	0.00
10,400.00	6.00	114.82	10,386.57	-109.79	237.41	-94.66	0.00	0.00	0.00
10,500.00	6.00	114.82	10,486.02	-114.17	246.90	-98.45	0.00	0.00	0.00
10,600.00	6.00	114.82	10,585.47	-118.56	256.39	-102.23	0.00	0.00	0.00
10,700.00	6.00	114.82	10,684.92	-122.95	265.88	-106.01	0.00	0.00	0.00
10,800.00	6.00	114.82	10,784.38	-127.34	275.36	-109.79	0.00	0.00	0.00
10,900.00	6.00	114.82	10,883.83	-131.72	284.85	-113.58	0.00	0.00	0.00
11,000.00	6.00	114.82	10,983.28	-136.11	294.34	-117.36	0.00	0.00	0.00
11,100.00	6.00	114.82	11,082.73	-140.50	303.83	-121.14	0.00	0.00	0.00
11,200.00	6.00	114.82	11,182.18	-144.88	313.31	-124.93	0.00	0.00	0.00
11,300.00	6.00	114.82	11,281.64	-149.27	322.80	-128.71	0.00	0.00	0.00
11,344.34	6.00	114.82	11,325.73	-151.22	327.01	-130.39	0.00	0.00	0.00
Start Drop -1.50									
11,400.00	5.17	114.82	11,381.13	-153.49	331.92	-132.35	1.50	-1.50	0.00
11,500.00	3.67	114.82	11,480.83	-156.72	338.91	-135.13	1.50	-1.50	0.00
11,600.00	2.17	114.82	11,580.70	-158.86	343.53	-136.97	1.50	-1.50	0.00
11,700.00	0.67	114.82	11,680.66	-159.89	345.77	-137.87	1.50	-1.50	0.00
11,744.34	0.00	0.00	11,725.00	-160.00	346.00	-137.96	1.50	-1.50	-258.96
Start 222.60 hold at 11744.34 MD									
11,800.00	0.00	0.00	11,780.66	-160.00	346.00	-137.96	0.00	0.00	0.00
11,900.00	0.00	0.00	11,880.66	-160.00	346.00	-137.96	0.00	0.00	0.00
11,966.94	0.00	0.00	11,947.60	-160.00	346.00	-137.96	0.00	0.00	0.00
Start Build 12.00									
12,000.00	3.97	359.56	11,980.64	-158.86	345.99	-136.82	12.00	12.00	0.00
12,100.00	15.97	359.56	12,078.95	-141.58	345.86	-119.58	12.00	12.00	0.00
12,200.00	27.97	359.56	12,171.52	-104.24	345.57	-82.34	12.00	12.00	0.00
12,300.00	39.97	359.56	12,254.30	-48.47	345.13	-26.71	12.00	12.00	0.00
12,400.00	51.97	359.56	12,323.68	23.29	344.58	44.88	12.00	12.00	0.00
12,500.00	63.97	359.56	12,376.62	107.91	343.92	129.29	12.00	12.00	0.00
12,600.00	75.97	359.56	12,410.82	201.68	343.19	222.83	12.00	12.00	0.00
12,700.00	87.97	359.56	12,424.77	300.52	342.43	321.42	12.00	12.00	0.00
12,725.02	90.97	359.56	12,425.00	325.53	342.23	346.37	12.00	12.00	0.00
Start 4552.57 hold at 12725.02 MD									
12,800.00	90.97	359.56	12,423.73	400.50	341.65	421.16	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Vast State 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=28' @ 3290.00ft
Site:	Sec. 17, T 26 S. , R 33 E	MD Reference:	KB=28' @ 3290.00ft
Well:	Vast State 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	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)
12,900.00	90.97	359.56	12,422.04	500.48	340.87	520.90	0.00	0.00	0.00
13,000.00	90.97	359.56	12,420.35	600.46	340.10	620.63	0.00	0.00	0.00
13,100.00	90.97	359.56	12,418.66	700.45	339.32	720.37	0.00	0.00	0.00
13,200.00	90.97	359.56	12,416.97	800.43	338.55	820.11	0.00	0.00	0.00
13,300.00	90.97	359.56	12,415.27	900.41	337.77	919.84	0.00	0.00	0.00
13,400.00	90.97	359.56	12,413.58	1,000.39	336.99	1,019.58	0.00	0.00	0.00
13,500.00	90.97	359.56	12,411.89	1,100.38	336.22	1,119.32	0.00	0.00	0.00
13,600.00	90.97	359.56	12,410.20	1,200.36	335.44	1,219.05	0.00	0.00	0.00
13,700.00	90.97	359.56	12,408.51	1,300.34	334.66	1,318.79	0.00	0.00	0.00
13,800.00	90.97	359.56	12,406.82	1,400.32	333.89	1,418.53	0.00	0.00	0.00
13,900.00	90.97	359.56	12,405.13	1,500.31	333.11	1,518.26	0.00	0.00	0.00
14,000.00	90.97	359.56	12,403.43	1,600.29	332.34	1,618.00	0.00	0.00	0.00
14,100.00	90.97	359.56	12,401.74	1,700.27	331.56	1,717.74	0.00	0.00	0.00
14,200.00	90.97	359.56	12,400.05	1,800.26	330.78	1,817.47	0.00	0.00	0.00
14,300.00	90.97	359.56	12,398.36	1,900.24	330.01	1,917.21	0.00	0.00	0.00
14,400.00	90.97	359.56	12,396.67	2,000.22	329.23	2,016.95	0.00	0.00	0.00
14,500.00	90.97	359.56	12,394.98	2,100.20	328.46	2,116.68	0.00	0.00	0.00
14,600.00	90.97	359.56	12,393.29	2,200.19	327.68	2,216.42	0.00	0.00	0.00
14,700.00	90.97	359.56	12,391.60	2,300.17	326.90	2,316.16	0.00	0.00	0.00
14,800.00	90.97	359.56	12,389.90	2,400.15	326.13	2,415.89	0.00	0.00	0.00
14,900.00	90.97	359.56	12,388.21	2,500.13	325.35	2,515.63	0.00	0.00	0.00
15,000.00	90.97	359.56	12,386.52	2,600.12	324.58	2,615.37	0.00	0.00	0.00
15,100.00	90.97	359.56	12,384.83	2,700.10	323.80	2,715.10	0.00	0.00	0.00
15,200.00	90.97	359.56	12,383.14	2,800.08	323.02	2,814.84	0.00	0.00	0.00
15,300.00	90.97	359.56	12,381.45	2,900.06	322.25	2,914.58	0.00	0.00	0.00
15,400.00	90.97	359.56	12,379.76	3,000.05	321.47	3,014.31	0.00	0.00	0.00
15,500.00	90.97	359.56	12,378.06	3,100.03	320.70	3,114.05	0.00	0.00	0.00
15,600.00	90.97	359.56	12,376.37	3,200.01	319.92	3,213.79	0.00	0.00	0.00
15,700.00	90.97	359.56	12,374.68	3,300.00	319.14	3,313.52	0.00	0.00	0.00
15,800.00	90.97	359.56	12,372.99	3,399.98	318.37	3,413.26	0.00	0.00	0.00
15,900.00	90.97	359.56	12,371.30	3,499.96	317.59	3,513.00	0.00	0.00	0.00
16,000.00	90.97	359.56	12,369.61	3,599.94	316.82	3,612.73	0.00	0.00	0.00
16,100.00	90.97	359.56	12,367.92	3,699.93	316.04	3,712.47	0.00	0.00	0.00
16,200.00	90.97	359.56	12,366.23	3,799.91	315.26	3,812.21	0.00	0.00	0.00
16,300.00	90.97	359.56	12,364.53	3,899.89	314.49	3,911.94	0.00	0.00	0.00
16,400.00	90.97	359.56	12,362.84	3,999.87	313.71	4,011.68	0.00	0.00	0.00
16,500.00	90.97	359.56	12,361.15	4,099.86	312.94	4,111.42	0.00	0.00	0.00
16,600.00	90.97	359.56	12,359.46	4,199.84	312.16	4,211.15	0.00	0.00	0.00
16,700.00	90.97	359.56	12,357.77	4,299.82	311.38	4,310.89	0.00	0.00	0.00
16,800.00	90.97	359.56	12,356.08	4,399.81	310.61	4,410.63	0.00	0.00	0.00
16,900.00	90.97	359.56	12,354.39	4,499.79	309.83	4,510.36	0.00	0.00	0.00
17,000.00	90.97	359.56	12,352.70	4,599.77	309.05	4,610.10	0.00	0.00	0.00
17,100.00	90.97	359.56	12,351.00	4,699.75	308.28	4,709.84	0.00	0.00	0.00
17,200.00	90.97	359.56	12,349.31	4,799.74	307.50	4,809.57	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Vast State 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=28' @ 3290.00ft
Site:	Sec. 17, T 26 S. , R 33 E	MD Reference:	KB=28' @ 3290.00ft
Well:	Vast State 24H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	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)
17,277.59	90.97	359.56	12,348.00	4,877.31	306.90	4,886.96	0.00	0.00	0.00
TD at 17277.59									

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 E	0.00	0.00	0.00	121.80	343.80	377,991.8998	730,150.2994	32° 2' 13.340 N	103° 35' 26.199 W
- plan misses target center by 364.74ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Rectangle (sides W100.00 H4,755.51 D0.00)									
Vast 24H BHL	0.00	0.00	12,348.00	4,877.31	306.90	382,747.4000	730,113.4000	32° 3' 0.402 N	103° 35' 26.247 W
- plan hits target center									
- Point									
Vast 24H LTP	0.00	0.00	12,350.20	4,747.31	308.00	382,617.4000	730,114.5000	32° 2' 59.116 N	103° 35' 26.245 W
- plan misses target center by 0.09ft at 17147.56ft MD (12350.20 TVD, 4747.31 N, 307.91 E)									
- Point									
Vast 24H FTP	0.00	0.00	12,383.14	121.80	343.80	377,991.9000	730,150.3000	32° 2' 13.340 N	103° 35' 26.199 W
- plan misses target center by 0.04ft at 12515.31ft MD (12383.12 TVD, 121.77 N, 343.81 E)									
- Point									

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
7748	7748	0	0	Start Build 2.00
8048	8047	-7	14	Start 3296.56 hold at 8047.77 MD
11,344	11,326	-151	327	Start Drop -1.50
11,744	11,725	-160	346	Start 222.60 hold at 11744.34 MD
11,967	11,948	-160	346	Start Build 12.00
12,725	12,425	326	342	Start 4552.57 hold at 12725.02 MD
17,278	12,348	4877	307	TD at 17277.59

Checked By: _____ Approved By: _____ Date: _____