

COG Production L L C

Lea County, NM (NAD27 NME)

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

Vast State 3H

Wellbore #1

Design: Wellbore #1

HOBBS OCD
OCT 06 2016
RECEIVED

Survey Report - Geographic

31 May, 2016

Integrity Directional Services, LLC

Survey Report - Geographic

Company:	COG Production L L C	Local Co-ordinate Reference:	Well Vast State 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Site:	Sec. 17, T 26 S. , R 33 E	MD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Well:	Vast State 3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #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:	377,872.30 usft	Latitude:	32° 2' 12.155 N
From:	Map	Easting:	730,181.40 usft	Longitude:	103° 35' 25.847 W
Position Uncertainty:	5.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.39 °

Well	Vast State 3H				
Well Position	+N-S	0.00 ft	Northing:	377,872.30 usft	Latitude: 32° 2' 12.155 N
	+E-W	0.00 ft	Easting:	730,181.40 usft	Longitude: 103° 35' 25.847 W
Position Uncertainty		5.00 ft	Wellhead Elevation:	0.00 ft	Ground Level: 3,263.01 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	3/10/2016	7.09	59.90	47,956

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N-S (ft)	+E-W (ft)	Direction (°)	
	0.00	0.00	0.00	6.70	

Survey Program	Date	5/31/2016			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	4,771.00	Gyros (Wellbore #1)	MWD	MWD - Standard	
4,927.00	14,220.00	MWD (Wellbore #1)	MWD	MWD - Standard	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	377,872.30	730,181.40	32° 2' 12.155 N	103° 35' 25.847 W	
100.00	0.33	77.29	100.00	0.06	0.28	377,872.36	730,181.68	32° 2' 12.155 N	103° 35' 25.844 W	
First Gyro										
200.00	0.24	228.23	200.00	-0.01	0.41	377,872.29	730,181.80	32° 2' 12.154 N	103° 35' 25.842 W	
300.00	0.30	78.63	300.00	-0.10	0.51	377,872.20	730,181.90	32° 2' 12.154 N	103° 35' 25.841 W	
400.00	0.23	31.47	400.00	0.12	0.87	377,872.42	730,182.26	32° 2' 12.156 N	103° 35' 25.837 W	
500.00	0.25	147.22	500.00	0.11	1.09	377,872.41	730,182.49	32° 2' 12.156 N	103° 35' 25.834 W	
600.00	0.18	190.64	600.00	-0.23	1.18	377,872.07	730,182.58	32° 2' 12.152 N	103° 35' 25.833 W	
700.00	0.18	216.88	700.00	-0.51	1.06	377,871.79	730,182.45	32° 2' 12.150 N	103° 35' 25.835 W	
800.00	0.19	237.56	800.00	-0.72	0.82	377,871.58	730,182.22	32° 2' 12.147 N	103° 35' 25.837 W	
900.00	0.23	77.46	900.00	-0.77	0.88	377,871.53	730,182.27	32° 2' 12.147 N	103° 35' 25.837 W	

Integrity Directional Services, LLC

Survey Report - Geographic

Company:	COG Production L L C	Local Co-ordinate Reference:	Well Vast State 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Site:	Sec. 17, T 26 S. , R 33 E	MD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Well:	Vast State 3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,000.00	0.15	170.14	999.99	-0.85	1.10	377,871.45	730,182.49	32° 2' 12.146 N	103° 35' 25.834 W
1,100.00	0.12	154.18	1,099.99	-1.08	1.16	377,871.22	730,182.56	32° 2' 12.144 N	103° 35' 25.833 W
1,200.00	1.27	114.58	1,199.99	-1.63	2.22	377,870.67	730,183.61	32° 2' 12.138 N	103° 35' 25.821 W
1,300.00	1.31	120.48	1,299.96	-2.67	4.21	377,869.63	730,185.61	32° 2' 12.128 N	103° 35' 25.798 W
1,400.00	1.46	131.16	1,399.93	-4.09	6.16	377,868.21	730,187.55	32° 2' 12.114 N	103° 35' 25.776 W
1,500.00	1.58	132.87	1,499.90	-5.87	8.12	377,866.43	730,189.52	32° 2' 12.096 N	103° 35' 25.753 W
1,600.00	1.31	118.89	1,599.86	-7.36	10.14	377,864.94	730,191.53	32° 2' 12.081 N	103° 35' 25.730 W
1,700.00	1.33	126.81	1,699.84	-8.61	12.07	377,863.69	730,193.46	32° 2' 12.069 N	103° 35' 25.707 W
1,800.00	1.23	106.96	1,799.81	-9.61	14.02	377,862.68	730,195.42	32° 2' 12.059 N	103° 35' 25.685 W
1,900.00	1.39	131.07	1,899.79	-10.72	15.96	377,861.58	730,197.36	32° 2' 12.047 N	103° 35' 25.662 W
2,000.00	1.14	124.39	1,999.76	-12.08	17.70	377,860.22	730,199.09	32° 2' 12.034 N	103° 35' 25.642 W
2,100.00	0.82	130.51	2,099.75	-13.11	19.06	377,859.19	730,200.46	32° 2' 12.024 N	103° 35' 25.626 W
2,200.00	1.24	138.64	2,199.73	-14.39	20.32	377,857.91	730,201.72	32° 2' 12.011 N	103° 35' 25.612 W
2,300.00	0.88	132.22	2,299.72	-15.71	21.61	377,856.58	730,203.00	32° 2' 11.998 N	103° 35' 25.597 W
2,400.00	1.35	139.18	2,399.70	-17.12	22.94	377,855.18	730,204.34	32° 2' 11.984 N	103° 35' 25.582 W
2,500.00	0.74	146.04	2,499.68	-18.55	24.08	377,853.75	730,205.47	32° 2' 11.969 N	103° 35' 25.569 W
2,600.00	0.55	143.59	2,599.67	-19.47	24.72	377,852.83	730,206.12	32° 2' 11.960 N	103° 35' 25.561 W
2,700.00	0.66	120.54	2,699.67	-20.15	25.50	377,852.15	730,206.90	32° 2' 11.953 N	103° 35' 25.552 W
2,800.00	0.65	142.02	2,799.66	-20.89	26.35	377,851.41	730,207.74	32° 2' 11.946 N	103° 35' 25.542 W
2,900.00	1.10	141.36	2,899.65	-22.09	27.30	377,850.21	730,208.69	32° 2' 11.934 N	103° 35' 25.532 W
3,000.00	1.11	157.27	2,999.63	-23.73	28.27	377,848.57	730,209.67	32° 2' 11.918 N	103° 35' 25.520 W
3,100.00	1.05	174.74	3,099.61	-25.53	28.73	377,846.76	730,210.12	32° 2' 11.900 N	103° 35' 25.515 W
3,200.00	1.53	172.28	3,199.59	-27.77	28.99	377,844.53	730,210.39	32° 2' 11.878 N	103° 35' 25.512 W
3,300.00	1.27	182.21	3,299.56	-30.20	29.13	377,842.10	730,210.52	32° 2' 11.854 N	103° 35' 25.511 W
3,400.00	1.57	166.23	3,399.53	-32.64	29.41	377,839.66	730,210.81	32° 2' 11.830 N	103° 35' 25.508 W
3,500.00	0.91	130.86	3,499.50	-34.49	30.34	377,837.81	730,211.73	32° 2' 11.811 N	103° 35' 25.497 W
3,600.00	1.49	90.88	3,599.48	-35.03	32.24	377,837.27	730,213.63	32° 2' 11.806 N	103° 35' 25.475 W
3,700.00	1.73	70.92	3,699.45	-34.55	34.96	377,837.74	730,216.36	32° 2' 11.810 N	103° 35' 25.443 W
3,800.00	1.17	40.25	3,799.41	-33.28	37.05	377,839.02	730,218.45	32° 2' 11.823 N	103° 35' 25.419 W
3,900.00	0.35	349.25	3,899.41	-32.20	37.65	377,840.10	730,219.05	32° 2' 11.833 N	103° 35' 25.412 W
4,000.00	0.74	261.71	3,999.40	-32.00	36.96	377,840.30	730,218.35	32° 2' 11.835 N	103° 35' 25.420 W
4,100.00	0.87	267.23	4,099.39	-32.13	35.56	377,840.17	730,216.96	32° 2' 11.834 N	103° 35' 25.436 W
4,200.00	0.83	261.69	4,199.38	-32.27	34.08	377,840.03	730,215.48	32° 2' 11.833 N	103° 35' 25.453 W
4,300.00	0.46	234.83	4,299.37	-32.60	33.04	377,839.70	730,214.44	32° 2' 11.830 N	103° 35' 25.466 W
4,400.00	0.63	141.94	4,399.37	-33.27	33.05	377,839.03	730,214.45	32° 2' 11.823 N	103° 35' 25.466 W
4,500.00	0.72	110.32	4,499.37	-33.92	33.98	377,838.38	730,215.38	32° 2' 11.817 N	103° 35' 25.455 W
4,600.00	1.68	123.58	4,599.34	-34.95	35.79	377,837.35	730,217.19	32° 2' 11.806 N	103° 35' 25.434 W
4,700.00	1.95	121.92	4,699.29	-36.66	38.45	377,835.64	730,219.85	32° 2' 11.789 N	103° 35' 25.403 W
4,771.00	1.97	119.04	4,770.25	-37.89	40.55	377,834.41	730,221.94	32° 2' 11.777 N	103° 35' 25.379 W
Final Gyro									
4,927.00	1.80	120.90	4,926.17	-40.45	44.99	377,831.85	730,226.39	32° 2' 11.751 N	103° 35' 25.327 W
First MWD Survey									
5,020.00	2.70	111.80	5,019.09	-42.01	48.28	377,830.29	730,229.68	32° 2' 11.736 N	103° 35' 25.289 W
5,114.00	3.80	99.30	5,112.94	-43.34	53.41	377,828.96	730,234.81	32° 2' 11.722 N	103° 35' 25.230 W
5,208.00	4.30	98.30	5,206.71	-44.35	59.97	377,827.95	730,241.37	32° 2' 11.712 N	103° 35' 25.154 W
5,302.00	4.60	97.00	5,300.42	-45.32	67.20	377,826.98	730,248.60	32° 2' 11.702 N	103° 35' 25.070 W
5,395.00	5.70	104.20	5,393.05	-46.90	75.38	377,825.39	730,256.78	32° 2' 11.685 N	103° 35' 24.975 W
5,488.00	7.40	105.60	5,485.44	-49.65	85.63	377,822.65	730,267.02	32° 2' 11.657 N	103° 35' 24.856 W
5,582.00	8.00	106.30	5,578.59	-53.11	97.73	377,819.19	730,279.13	32° 2' 11.622 N	103° 35' 24.716 W
5,675.00	8.10	105.70	5,670.67	-56.70	110.25	377,815.60	730,291.65	32° 2' 11.586 N	103° 35' 24.571 W
5,769.00	8.50	104.90	5,763.69	-60.28	123.34	377,812.02	730,304.74	32° 2' 11.550 N	103° 35' 24.419 W
5,862.00	9.00	98.90	5,855.61	-63.17	137.17	377,809.13	730,318.57	32° 2' 11.520 N	103° 35' 24.258 W
5,955.00	8.50	98.30	5,947.53	-65.29	151.16	377,807.01	730,332.55	32° 2' 11.498 N	103° 35' 24.096 W
6,049.00	8.50	98.70	6,040.49	-67.34	164.90	377,804.95	730,346.30	32° 2' 11.477 N	103° 35' 23.937 W
6,143.00	8.90	99.80	6,133.41	-69.63	178.93	377,802.67	730,360.33	32° 2' 11.453 N	103° 35' 23.774 W

Integrity Directional Services, LLC

Survey Report - Geographic

Company:	COG Production L L C	Local Co-ordinate Reference:	Well Vast State 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Site:	Sec. 17, T 26 S. , R 33 E	MD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Well:	Vast State 3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,236.00	9.10	99.80	6,225.27	-72.11	193.27	377,800.19	730,374.66	32° 2' 11.428 N	103° 35' 23.607 W
6,331.00	9.30	99.90	6,319.04	-74.71	208.23	377,797.59	730,389.63	32° 2' 11.401 N	103° 35' 23.434 W
6,425.00	9.60	100.20	6,411.77	-77.40	223.43	377,794.90	730,404.83	32° 2' 11.373 N	103° 35' 23.258 W
6,519.00	9.80	100.80	6,504.42	-80.29	239.00	377,792.01	730,420.40	32° 2' 11.344 N	103° 35' 23.077 W
6,613.00	9.20	99.30	6,597.13	-83.00	254.28	377,789.30	730,435.67	32° 2' 11.316 N	103° 35' 22.900 W
6,707.00	7.70	94.20	6,690.11	-84.68	267.97	377,787.62	730,449.37	32° 2' 11.298 N	103° 35' 22.741 W
6,800.00	7.80	95.50	6,782.26	-85.74	280.47	377,786.56	730,461.86	32° 2' 11.287 N	103° 35' 22.596 W
6,894.00	7.70	95.90	6,875.40	-87.00	293.08	377,785.30	730,474.48	32° 2' 11.274 N	103° 35' 22.449 W
6,988.00	7.80	95.50	6,968.55	-88.26	305.70	377,784.04	730,487.09	32° 2' 11.260 N	103° 35' 22.303 W
7,081.00	7.90	96.10	7,060.67	-89.54	318.33	377,782.76	730,499.73	32° 2' 11.247 N	103° 35' 22.156 W
7,174.00	8.10	96.90	7,152.77	-91.01	331.19	377,781.29	730,512.59	32° 2' 11.231 N	103° 35' 22.007 W
7,268.00	8.20	97.80	7,245.82	-92.71	344.41	377,779.59	730,525.80	32° 2' 11.214 N	103° 35' 21.853 W
7,361.00	8.10	98.10	7,337.88	-94.53	357.46	377,777.76	730,538.86	32° 2' 11.195 N	103° 35' 21.702 W
7,454.00	9.10	101.60	7,429.83	-96.94	371.16	377,775.36	730,552.55	32° 2' 11.170 N	103° 35' 21.543 W
7,547.00	9.20	104.20	7,521.65	-100.24	385.57	377,772.06	730,566.96	32° 2' 11.136 N	103° 35' 21.376 W
7,641.00	9.20	105.10	7,614.44	-104.04	400.11	377,768.26	730,581.50	32° 2' 11.098 N	103° 35' 21.207 W
7,735.00	9.10	106.60	7,707.25	-108.12	414.49	377,764.18	730,595.88	32° 2' 11.056 N	103° 35' 21.041 W
7,829.00	9.00	107.10	7,800.08	-112.41	428.64	377,759.89	730,610.03	32° 2' 11.013 N	103° 35' 20.876 W
7,923.00	8.50	106.90	7,892.98	-116.59	442.31	377,755.71	730,623.71	32° 2' 10.971 N	103° 35' 20.718 W
8,016.00	8.60	106.90	7,984.95	-120.61	455.54	377,751.69	730,636.94	32° 2' 10.930 N	103° 35' 20.565 W
8,110.00	8.60	107.90	8,077.89	-124.81	468.95	377,747.49	730,650.35	32° 2' 10.888 N	103° 35' 20.409 W
8,204.00	8.60	106.70	8,170.84	-128.99	482.37	377,743.31	730,663.77	32° 2' 10.845 N	103° 35' 20.254 W
8,297.00	8.60	107.40	8,262.79	-133.07	495.67	377,739.23	730,677.06	32° 2' 10.804 N	103° 35' 20.099 W
8,391.00	6.90	107.40	8,355.93	-136.86	507.76	377,735.44	730,689.16	32° 2' 10.766 N	103° 35' 19.959 W
8,484.00	5.80	105.60	8,448.36	-139.79	517.62	377,732.51	730,699.02	32° 2' 10.736 N	103° 35' 19.845 W
8,578.00	4.20	101.10	8,542.00	-141.73	525.57	377,730.57	730,706.97	32° 2' 10.716 N	103° 35' 19.753 W
8,672.00	2.20	101.80	8,635.84	-142.76	530.72	377,729.53	730,712.11	32° 2' 10.706 N	103° 35' 19.693 W
8,761.00	0.90	120.40	8,724.81	-143.47	532.99	377,728.83	730,714.39	32° 2' 10.699 N	103° 35' 19.667 W
8,844.00	2.90	24.10	8,807.77	-141.88	534.41	377,730.42	730,715.81	32° 2' 10.714 N	103° 35' 19.650 W
8,876.00	7.20	18.60	8,839.64	-139.24	535.38	377,733.06	730,716.78	32° 2' 10.740 N	103° 35' 19.639 W
8,938.00	15.00	20.20	8,900.43	-128.01	539.40	377,744.29	730,720.80	32° 2' 10.851 N	103° 35' 19.591 W
8,970.00	19.30	18.90	8,931.00	-119.12	542.54	377,753.18	730,723.94	32° 2' 10.939 N	103° 35' 19.554 W
9,001.00	23.30	15.70	8,959.88	-108.36	545.86	377,763.94	730,727.26	32° 2' 11.045 N	103° 35' 19.514 W
9,032.00	27.40	9.90	8,987.89	-95.43	548.75	377,776.87	730,730.15	32° 2' 11.173 N	103° 35' 19.480 W
9,063.00	30.60	6.30	9,015.01	-80.55	550.84	377,791.75	730,732.24	32° 2' 11.320 N	103° 35' 19.454 W
9,110.00	35.50	5.50	9,054.39	-55.06	553.47	377,817.24	730,734.86	32° 2' 11.572 N	103° 35' 19.422 W
9,157.00	39.30	5.20	9,091.72	-26.65	556.12	377,845.65	730,737.52	32° 2' 11.853 N	103° 35' 19.389 W
9,204.00	45.40	8.40	9,126.44	4.76	559.92	377,877.06	730,741.32	32° 2' 12.164 N	103° 35' 19.342 W
9,252.00	48.50	8.20	9,159.21	39.47	564.98	377,911.77	730,746.38	32° 2' 12.507 N	103° 35' 19.280 W
9,299.00	53.60	4.60	9,188.75	75.78	569.01	377,948.07	730,750.41	32° 2' 12.866 N	103° 35' 19.231 W
9,346.00	60.00	0.70	9,214.48	115.03	570.78	377,987.33	730,752.18	32° 2' 13.254 N	103° 35' 19.207 W
9,354.90	60.68	0.74	9,218.88	122.76	570.88	377,995.06	730,752.27	32° 2' 13.331 N	103° 35' 19.205 W
Sec17 South 330' HL Crossing 9354.90'MD/9218.88'TVD									
9,393.00	63.60	0.90	9,236.68	156.44	571.36	378,028.74	730,752.76	32° 2' 13.664 N	103° 35' 19.197 W
9,441.00	66.90	2.80	9,256.78	200.00	572.78	378,072.30	730,754.17	32° 2' 14.095 N	103° 35' 19.177 W
9,488.00	73.90	4.70	9,272.54	244.15	575.69	378,116.45	730,757.08	32° 2' 14.531 N	103° 35' 19.140 W
9,534.00	80.40	5.40	9,282.76	288.80	579.64	378,161.10	730,761.03	32° 2' 14.973 N	103° 35' 19.090 W
9,581.00	83.90	4.80	9,289.18	335.17	583.77	378,207.47	730,765.17	32° 2' 15.432 N	103° 35' 19.038 W
9,629.00	88.40	2.30	9,292.40	382.95	586.74	378,255.25	730,768.13	32° 2' 15.904 N	103° 35' 19.000 W
9,662.00	91.40	1.20	9,292.46	415.93	587.74	378,288.23	730,769.14	32° 2' 16.231 N	103° 35' 18.986 W
9,755.00	91.10	1.30	9,290.43	508.89	589.77	378,381.19	730,771.17	32° 2' 17.150 N	103° 35' 18.955 W
9,849.00	90.10	1.70	9,289.45	602.85	592.23	378,475.15	730,773.63	32° 2' 18.080 N	103° 35' 18.919 W
9,942.00	89.60	1.60	9,289.69	695.81	594.91	378,568.11	730,776.31	32° 2' 19.000 N	103° 35' 18.880 W
10,036.00	89.20	1.00	9,290.67	789.78	597.04	378,662.08	730,778.44	32° 2' 19.929 N	103° 35' 18.848 W
10,130.00	89.50	1.20	9,291.74	883.76	598.85	378,756.05	730,780.24	32° 2' 20.859 N	103° 35' 18.819 W

Integrity Directional Services, LLC

Survey Report - Geographic

Company:	COG Production L L C	Local Co-ordinate Reference:	Well Vast State 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Site:	Sec. 17, T 26 S , R 33 E	MD Reference:	KB=26' @ 3289.01ft (Scandril Freedom)
Well:	Vast State 3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,223.00	91.20	0.70	9,291.17	976.74	600.39	378,849.04	730,781.78	32° 2' 21.779 N	103° 35' 18.794 W
10,317.00	92.30	0.30	9,288.30	1,070.69	601.21	378,942.99	730,782.60	32° 2' 22.709 N	103° 35' 18.777 W
10,410.00	92.40	0.80	9,284.49	1,163.61	602.10	379,035.90	730,783.50	32° 2' 23.628 N	103° 35' 18.759 W
10,504.00	92.70	1.60	9,280.31	1,257.49	604.07	379,129.79	730,785.46	32° 2' 24.557 N	103° 35' 18.729 W
10,599.00	91.50	0.90	9,276.82	1,352.40	606.14	379,224.70	730,787.53	32° 2' 25.496 N	103° 35' 18.697 W
10,693.00	92.00	0.80	9,273.95	1,446.35	607.53	379,318.64	730,788.93	32° 2' 26.426 N	103° 35' 18.673 W
10,786.00	91.40	0.20	9,271.20	1,539.30	608.34	379,411.60	730,789.74	32° 2' 27.346 N	103° 35' 18.657 W
10,880.00	90.70	358.90	9,269.47	1,633.28	607.60	379,505.58	730,789.00	32° 2' 28.276 N	103° 35' 18.658 W
10,974.00	90.40	359.50	9,268.57	1,727.27	606.29	379,599.56	730,787.69	32° 2' 29.206 N	103° 35' 18.665 W
11,068.00	90.70	359.80	9,267.67	1,821.26	605.72	379,693.56	730,787.11	32° 2' 30.136 N	103° 35' 18.664 W
11,162.00	90.90	0.30	9,266.36	1,915.25	605.80	379,787.55	730,787.20	32° 2' 31.066 N	103° 35' 18.656 W
11,255.00	91.20	0.40	9,264.65	2,008.24	606.37	379,880.53	730,787.76	32° 2' 31.986 N	103° 35' 18.642 W
11,349.00	91.30	0.70	9,262.60	2,102.21	607.27	379,974.50	730,788.67	32° 2' 32.916 N	103° 35' 18.624 W
11,443.00	90.30	0.90	9,261.29	2,196.19	608.58	380,068.48	730,789.98	32° 2' 33.846 N	103° 35' 18.601 W
11,537.00	92.60	0.20	9,258.91	2,290.15	609.48	380,162.44	730,790.88	32° 2' 34.776 N	103° 35' 18.583 W
11,631.00	93.40	0.90	9,253.99	2,384.01	610.39	380,256.31	730,791.78	32° 2' 35.705 N	103° 35' 18.565 W
11,725.00	92.60	359.60	9,249.07	2,477.88	610.80	380,350.17	730,792.19	32° 2' 36.634 N	103° 35' 18.553 W
11,819.00	93.60	359.00	9,243.99	2,571.73	609.65	380,444.03	730,791.04	32° 2' 37.562 N	103° 35' 18.559 W
11,913.00	91.50	358.70	9,239.81	2,665.62	607.76	380,537.91	730,789.16	32° 2' 38.492 N	103° 35' 18.573 W
12,006.00	91.50	359.00	9,237.37	2,758.57	605.90	380,630.86	730,787.29	32° 2' 39.412 N	103° 35' 18.587 W
12,100.00	91.50	358.90	9,234.91	2,852.52	604.18	380,724.81	730,785.57	32° 2' 40.341 N	103° 35' 18.600 W
12,193.00	91.60	359.20	9,232.39	2,945.47	602.63	380,817.76	730,784.03	32° 2' 41.261 N	103° 35' 18.610 W
12,286.00	92.80	0.20	9,228.82	3,038.40	602.15	380,910.69	730,783.54	32° 2' 42.181 N	103° 35' 18.608 W
12,381.00	90.90	359.00	9,225.76	3,133.34	601.48	381,005.63	730,782.88	32° 2' 43.121 N	103° 35' 18.609 W
12,475.00	91.10	359.30	9,224.12	3,227.32	600.09	381,099.61	730,781.49	32° 2' 44.051 N	103° 35' 18.617 W
12,568.00	90.70	359.20	9,222.66	3,320.30	598.87	381,192.59	730,780.27	32° 2' 44.971 N	103° 35' 18.624 W
12,661.00	91.20	359.50	9,221.11	3,413.28	597.82	381,285.57	730,779.21	32° 2' 45.891 N	103° 35' 18.629 W
12,755.00	91.30	359.00	9,219.06	3,507.25	596.59	381,379.54	730,777.98	32° 2' 46.821 N	103° 35' 18.635 W
12,849.00	89.80	358.60	9,218.16	3,601.22	594.62	381,473.51	730,776.01	32° 2' 47.751 N	103° 35' 18.651 W
12,942.00	90.40	358.70	9,218.00	3,694.19	592.43	381,566.48	730,773.82	32° 2' 48.671 N	103° 35' 18.669 W
13,036.00	90.20	359.10	9,217.51	3,788.17	590.62	381,660.46	730,772.02	32° 2' 49.601 N	103° 35' 18.682 W
13,129.00	90.20	359.70	9,217.18	3,881.17	589.65	381,753.46	730,771.05	32° 2' 50.522 N	103° 35' 18.686 W
13,223.00	91.00	359.90	9,216.20	3,975.16	589.32	381,847.45	730,770.72	32° 2' 51.452 N	103° 35' 18.682 W
13,317.00	91.30	0.30	9,214.31	4,069.14	589.49	381,941.43	730,770.88	32° 2' 52.382 N	103° 35' 18.673 W
13,411.00	92.00	1.10	9,211.60	4,163.09	590.63	382,035.38	730,772.03	32° 2' 53.312 N	103° 35' 18.652 W
13,505.00	92.30	1.70	9,208.08	4,257.00	592.93	382,129.29	730,774.32	32° 2' 54.241 N	103° 35' 18.618 W
13,599.00	91.50	0.10	9,204.96	4,350.93	594.40	382,223.22	730,775.80	32° 2' 55.170 N	103° 35' 18.593 W
13,693.00	92.60	0.80	9,201.60	4,444.87	595.14	382,317.16	730,776.54	32° 2' 56.100 N	103° 35' 18.577 W
13,786.00	92.20	359.10	9,197.70	4,537.78	595.06	382,410.07	730,776.46	32° 2' 57.019 N	103° 35' 18.571 W
13,880.00	91.60	358.70	9,194.59	4,631.71	593.26	382,504.00	730,774.65	32° 2' 57.949 N	103° 35' 18.584 W
13,973.00	91.80	359.40	9,191.83	4,724.66	591.72	382,596.95	730,773.11	32° 2' 58.869 N	103° 35' 18.594 W
13,997.63	91.67	359.56	9,191.08	4,749.28	591.49	382,621.56	730,772.89	32° 2' 59.112 N	103° 35' 18.595 W
Sec17 North 330' HL Crossing 13997.63'MD/ 9191.08'TVD									
14,067.00	91.30	0.00	9,189.29	4,818.62	591.22	382,690.91	730,772.62	32° 2' 59.798 N	103° 35' 18.593 W
14,163.00	91.70	0.80	9,186.77	4,914.59	591.89	382,786.87	730,773.29	32° 3' 0.748 N	103° 35' 18.577 W
Final MWD Survey									
14,220.00	91.70	0.80	9,185.08	4,971.55	592.69	382,843.84	730,774.08	32° 3' 1.312 N	103° 35' 18.563 W
Projection to TD									

Integrity Directional Services, LLC

Survey Report - Geographic

Company:	COG Production L L C	Local Co-ordinate Reference:	Well Vast State 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3289.01ft (Scandriil Freedom)
Site:	Sec. 17, T 26 S. , R 33 E	MD Reference:	KB=26' @ 3289.01ft (Scandriil Freedom)
Well:	Vast State 3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
100.00	100.00	0.06	0.28	First Gyro
4,771.00	4,770.25	-37.89	40.55	Final Gyro
4,927.00	4,926.17	-40.45	44.99	First MWD Survey
9,354.90	9,218.88	122.76	570.88	Sec17 South 330' HL Crossing 9354.90'MD/9218.88'TVD
13,997.63	9,191.08	4,749.28	591.49	Sec17 North 330' HL Crossing 13997.63'MD/ 9191.08'TVD
14,163.00	9,186.77	4,914.59	591.89	Final MWD Survey
14,220.00	9,185.08	4,971.55	592.69	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------



Company: Concho
Lease/Well: Vast State No/003H

Rig Name: Scan Freedom
State/County: New Mexico/Lea
VS-Azi: 6.70 Degrees

Latitude: 32.03671, Longitude: -103.59051
Grid North = True North -0.39 degs (NAD 27)
Grid Correction Applied = -0.39 degs



Depth Reference : RKB = 27 feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 5/20/2016 / 09:49

VES Survey International
Midland, Texas
432-563-5444

Surveyor: Adam Askew
Vast State No 003H / API 30-025-42943

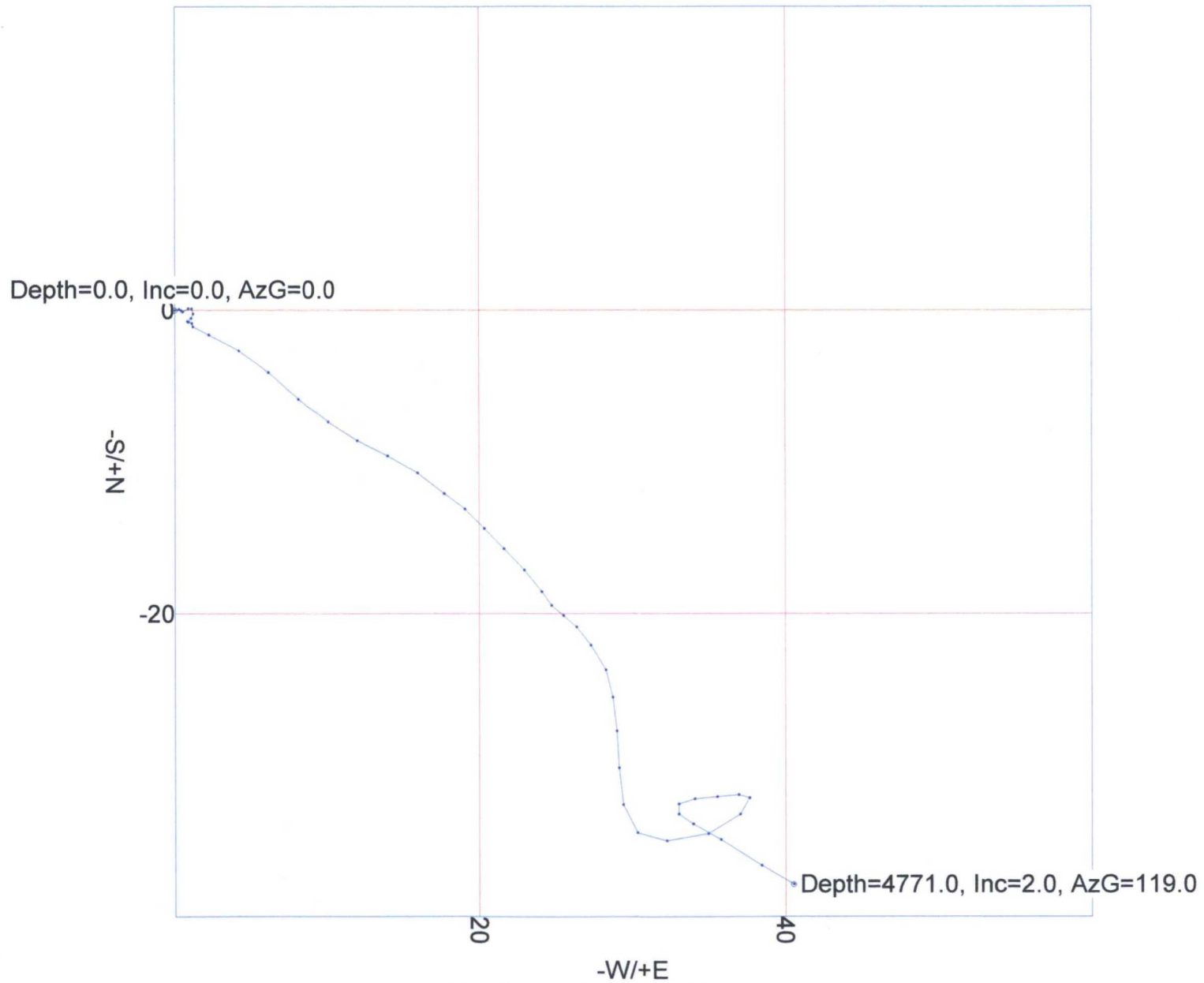
HOBBS OCD
OCT 06 2016
RECEIVED

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.33	77.29	100.00	0.06	0.28	0.09	0.28	77.29	0.33
200.00	0.24	228.23	200.00	-0.01	0.40	0.03	0.40	91.81	0.54
300.00	0.30	78.63	300.00	-0.10	0.51	-0.04	0.51	100.98	0.52
400.00	0.23	31.47	400.00	0.12	0.87	0.22	0.88	81.94	0.22
500.00	0.25	147.22	500.00	0.11	1.09	0.23	1.10	84.42	0.41
600.00	0.18	190.64	600.00	-0.23	1.18	-0.09	1.20	101.22	0.17
700.00	0.18	216.88	700.00	-0.52	1.06	-0.39	1.18	116.02	0.08
800.00	0.19	237.56	800.00	-0.73	0.82	-0.63	1.10	131.57	0.07
900.00	0.23	77.46	900.00	-0.77	0.88	-0.67	1.18	131.19	0.42
1000.00	0.15	170.14	999.99	-0.86	1.11	-0.72	1.40	127.81	0.28
1100.00	0.12	154.18	1099.99	-1.08	1.17	-0.94	1.60	132.61	0.05
1200.00	1.27	114.58	1199.99	-1.63	2.23	-1.36	2.76	126.24	1.19
1300.00	1.31	120.48	1299.96	-2.67	4.22	-2.16	5.00	122.35	0.14
1400.00	1.46	131.16	1399.93	-4.09	6.17	-3.34	7.40	123.57	0.30
1500.00	1.58	132.87	1499.90	-5.87	8.13	-4.88	10.03	125.80	0.13
1600.00	1.31	118.89	1599.86	-7.36	10.14	-6.12	12.53	125.95	0.44

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1700.00	1.33	126.81	1699.84	-8.61	12.08	-7.14	14.83	125.47	0.18
1800.00	1.23	106.96	1799.81	-9.62	14.04	-7.91	17.02	124.41	0.45
1900.00	1.39	131.07	1899.79	-10.73	15.98	-8.79	19.25	123.87	0.57
2000.00	1.14	124.39	1999.76	-12.08	17.72	-9.94	21.44	124.30	0.29
2100.00	0.82	130.51	2099.75	-13.11	19.08	-10.79	23.15	124.50	0.34
2200.00	1.24	138.64	2199.73	-14.39	20.34	-11.92	24.91	125.28	0.45
2300.00	0.88	132.22	2299.72	-15.72	21.62	-13.09	26.73	126.01	0.39
2400.00	1.35	139.18	2399.70	-17.12	22.96	-14.32	28.64	126.71	0.49
2500.00	0.74	146.04	2499.68	-18.54	24.08	-15.60	30.39	127.59	0.62
2600.00	0.55	143.59	2599.67	-19.46	24.73	-16.44	31.46	128.20	0.19
2700.00	0.66	120.54	2699.67	-20.14	25.50	-17.02	32.49	128.29	0.26
2800.00	0.65	142.02	2799.66	-20.88	26.35	-17.66	33.62	128.39	0.24
2900.00	1.10	141.36	2899.65	-22.08	27.30	-18.74	35.11	128.96	0.45
3000.00	1.11	157.27	2999.63	-23.72	28.27	-20.26	36.90	129.99	0.31
3100.00	1.05	174.74	3099.61	-25.52	28.73	-21.99	38.42	131.61	0.33
3200.00	1.53	172.28	3199.59	-27.74	28.99	-24.17	40.13	133.74	0.48
3300.00	1.27	182.21	3299.56	-30.17	29.13	-26.57	41.94	136.01	0.35
3400.00	1.57	166.23	3399.53	-32.61	29.41	-28.96	43.91	137.96	0.49
3500.00	0.91	130.86	3499.51	-34.46	30.34	-30.69	45.91	138.64	0.98
3600.00	1.49	90.88	3599.48	-35.00	32.23	-31.00	47.58	137.36	0.98
3700.00	1.73	70.92	3699.45	-34.53	34.95	-30.21	49.13	134.65	0.61
3800.00	1.17	40.25	3799.42	-33.25	37.04	-28.70	49.78	131.92	0.93
3900.00	0.35	349.25	3899.41	-32.17	37.64	-27.56	49.52	130.52	0.99
4000.00	0.74	261.71	3999.40	-31.97	36.94	-27.44	48.85	130.87	0.81
4100.00	0.87	267.23	4099.39	-32.10	35.54	-27.73	47.89	132.08	0.15
4200.00	0.83	261.69	4199.38	-32.24	34.06	-28.04	46.90	133.42	0.09
4300.00	0.46	234.83	4299.38	-32.57	33.01	-28.50	46.38	134.62	0.47
4400.00	0.63	141.94	4399.37	-33.24	33.02	-29.16	46.86	135.19	0.80
4500.00	0.72	110.32	4499.37	-33.89	33.95	-29.70	47.98	134.95	0.38
4600.00	1.68	123.58	4599.34	-34.92	35.77	-30.51	49.99	134.32	0.99
4700.00	1.95	121.92	4699.29	-36.64	38.43	-31.90	53.10	133.63	0.28
4771.00	1.97	119.04	4770.25	-37.87	40.53	-32.88	55.47	133.06	0.14



VES Survey International
Midland, Texas
432-563-5444
Surveyor: Adam Askew
Vast State No 003H / API 30-025-42943



VES Survey Date: 5/15/2016



HOBBS OCD
OCT 06 2016
RECEIVED

I Adam Askew certify that I am employed by VES Survey International. That I did on the day(s) of 05/16/16 through 05/16/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 4,771.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of Concho for the Vast State Well # 3H API # 30-025-42943 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services

A handwritten signature in blue ink, appearing to read "Adam Askew", is written over a horizontal line.

Adam Askew
Service Technician
Vaughn Energy Services

May 20, 2016

HOBBS OCD
OCT 06 2016
RECEIVED

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: **Vast State No 003H**

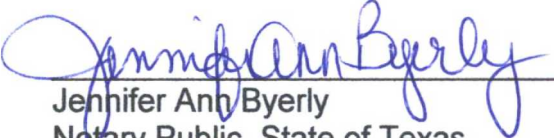
Please find enclosed a copy of the survey from 0' to 4771' ran on the above referenced well.

Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 20th day of May,
A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas

