

HOBBS OCD
JUL 20 2018
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COG OPERATING, LLC

Lea County, NM (NAD27) NMEZ

Zeppo 5 Federal COM

#15H

OH

Design: OH

Standard Survey Report

26 January, 2018

Survey Report

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #15H
Project:	Lea County, NM (NAD27) NMEZ	TVD Reference:	RKB @ 4117.00usft (Silver Oak 3 - KB=18')
Site:	Zeppo 5 Federal COM	MD Reference:	RKB @ 4117.00usft (Silver Oak 3 - KB=18')
Well:	#15H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Project	Lea County, NM (NAD27) NMEZ		
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	Zeppo 5 Federal COM		
Site Position:		Northing:	678,462.50 usft
From:	Map	Easting:	668,662.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 51' 50.294 N
		Longitude:	103° 47' 2.548 W
		Grid Convergence:	0.30 °

Well	#15H		
Well Position	+N/-S	0.00 usft	Northing: 678,459.10 usft
	+E/-W	0.00 usft	Easting: 667,703.00 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 50.309 N
		Longitude:	103° 47' 13.801 W
		Ground Level:	4,099.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2015	12/11/17	7.05	60.61	48,239.30391635

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.00	0.00	0.00	179.64	

Survey Program	Date 01/26/18				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.00	2,145.00	Survey #1 - Gyros (OH)	MWD	MWD v3: standard declination	
2,339.00	13,353.00	Survey #2 - VON MWD (OH)	MWD	MWD v3: standard declination	
13,409.00	13,409.00	Survey #3 - PTB (OH)	Projection	Projection	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(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	
SHL(Z5FC#16H) - O-Zeppo #25H										
100.00	0.42	158.97	100.00	-0.34	0.13	0.34	0.42	0.42	0.00	
200.00	0.32	197.94	200.00	-0.95	0.18	0.95	0.26	-0.10	38.97	
300.00	0.19	88.22	300.00	-1.21	0.26	1.21	0.42	-0.13	-109.72	
400.00	0.49	128.57	399.99	-1.47	0.76	1.48	0.37	0.30	40.35	
500.00	0.53	131.99	499.99	-2.05	1.43	2.06	0.05	0.04	3.42	
600.00	0.21	116.45	599.99	-2.44	1.94	2.45	0.33	-0.32	-15.54	
700.00	0.32	236.39	699.99	-2.68	1.87	2.69	0.46	0.11	119.94	

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Well:	#15H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

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)
800.00	0.25	355.76	799.99	-2.61	1.63	2.62	0.49	-0.07	119.37
900.00	0.36	277.47	899.99	-2.35	1.30	2.36	0.39	0.11	-78.29
1,000.00	0.22	202.81	999.99	-2.49	0.91	2.50	0.37	-0.14	-74.66
1,100.00	0.20	206.83	1,099.98	-2.82	0.76	2.83	0.02	-0.02	4.02
1,200.00	0.11	209.56	1,199.98	-3.06	0.63	3.07	0.09	-0.09	2.73
1,300.00	0.31	183.79	1,299.98	-3.42	0.57	3.42	0.22	0.20	-25.77
1,400.00	0.12	101.75	1,399.98	-3.71	0.65	3.71	0.32	-0.19	-82.04
1,500.00	0.32	188.17	1,499.98	-4.00	0.71	4.01	0.33	0.20	86.42
1,600.00	0.39	183.77	1,599.98	-4.62	0.65	4.62	0.08	0.07	-4.40
1,700.00	0.42	171.52	1,699.98	-5.32	0.68	5.33	0.09	0.03	-12.25
1,800.00	0.41	110.56	1,799.98	-5.81	1.07	5.82	0.42	-0.01	-60.96
1,900.00	0.43	78.11	1,899.97	-5.86	1.78	5.87	0.24	0.02	-32.45
2,000.00	0.65	75.01	1,999.97	-5.63	2.69	5.65	0.22	0.22	-3.10
2,100.00	0.86	81.25	2,099.96	-5.37	3.98	5.40	0.23	0.21	6.24
2,145.00	0.90	99.94	2,144.95	-5.38	4.66	5.41	0.64	0.09	41.53
2,339.00	1.34	68.42	2,338.92	-4.81	8.27	4.86	0.38	0.23	-16.25
2,434.00	1.46	58.04	2,433.89	-3.76	10.33	3.83	0.29	0.13	-10.93
2,528.00	1.28	52.18	2,527.86	-2.49	12.18	2.56	0.24	-0.19	-6.23
2,622.00	1.15	54.68	2,621.84	-1.30	13.78	1.38	0.15	-0.14	2.66
2,717.00	1.71	51.78	2,716.81	0.13	15.67	-0.03	0.59	0.59	-3.05
2,811.00	1.69	46.30	2,810.77	1.96	17.77	-1.85	0.17	-0.02	-5.83
2,904.00	1.49	49.40	2,903.74	3.69	19.68	-3.57	0.23	-0.22	3.33
2,998.00	1.28	44.26	2,997.71	5.24	21.34	-5.10	0.26	-0.22	-5.47
3,092.00	1.13	52.69	3,091.69	6.55	22.81	-6.41	0.25	-0.16	8.97
3,190.00	0.92	52.23	3,189.67	7.62	24.20	-7.47	0.21	-0.21	-0.47
3,284.00	1.48	53.14	3,283.65	8.81	25.77	-8.65	0.60	0.60	0.97
3,379.00	1.38	52.11	3,378.62	10.25	27.65	-10.07	0.11	-0.11	-1.08
3,473.00	1.27	51.91	3,472.60	11.59	29.37	-11.40	0.12	-0.12	-0.21
3,568.00	1.07	47.72	3,567.58	12.83	30.85	-12.64	0.23	-0.21	-4.41
3,663.00	1.60	73.52	3,662.55	13.81	32.78	-13.60	0.83	0.56	27.16
3,758.00	1.59	77.67	3,757.51	14.46	35.34	-14.24	0.12	-0.01	4.37
3,853.00	1.53	82.14	3,852.48	14.92	37.88	-14.68	0.14	-0.06	4.71
3,947.00	1.37	49.13	3,946.45	15.83	39.98	-15.57	0.89	-0.17	-35.12
4,042.00	1.53	40.11	4,041.42	17.54	41.65	-17.28	0.29	0.17	-9.49
4,136.00	1.14	61.83	4,135.40	18.94	43.29	-18.67	0.67	-0.41	23.11
4,230.00	1.10	61.73	4,229.38	19.81	44.90	-19.53	0.04	-0.04	-0.11
4,325.00	1.11	57.12	4,324.36	20.74	46.48	-20.45	0.09	0.01	-4.85
4,420.00	0.38	268.22	4,419.35	21.23	46.94	-20.93	1.52	-0.77	-156.74
4,515.00	0.58	277.03	4,514.35	21.28	46.15	-20.99	0.22	0.21	9.27
4,610.00	0.69	256.40	4,609.35	21.20	45.11	-20.92	0.27	0.12	-21.72
4,705.00	0.61	255.80	4,704.34	20.94	44.07	-20.67	0.08	-0.08	-0.63
4,799.00	0.69	244.71	4,798.33	20.58	43.07	-20.31	0.16	0.09	-11.80
4,894.00	0.49	251.39	4,893.33	20.21	42.17	-19.94	0.22	-0.21	7.03

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

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)
4,988.00	0.52	236.16	4,987.32	19.84	41.43	-19.58	0.15	0.03	-16.20
KOP: 4988.00' MD, 4987.32' TVD									
5,020.00	1.75	185.67	5,019.32	19.27	41.26	-19.01	4.61	3.84	-157.78
5,038.29	3.16	177.04	5,037.59	18.49	41.26	-18.23	7.96	7.72	-47.18
KOP(Z5FC#15H)									
5,052.00	4.24	174.38	5,051.27	17.61	41.33	-17.35	7.96	7.86	-19.42
5,083.00	7.29	172.37	5,082.11	14.52	41.71	-14.26	9.86	9.84	-6.48
5,114.00	10.72	173.29	5,112.73	9.70	42.30	-9.44	11.07	11.06	2.97
5,145.00	14.41	173.35	5,142.98	3.01	43.09	-2.74	11.90	11.90	0.19
5,177.00	18.48	174.77	5,173.66	-6.00	44.01	6.28	12.78	12.72	4.44
5,208.00	22.61	176.19	5,202.68	-16.85	44.86	17.13	13.42	13.32	4.58
5,240.00	26.77	177.39	5,231.75	-30.19	45.59	30.47	13.09	13.00	3.75
5,271.00	30.50	178.46	5,258.96	-45.03	46.12	45.32	12.14	12.03	3.45
5,303.00	33.42	179.01	5,286.10	-61.96	46.49	62.25	9.17	9.13	1.72
5,335.00	35.86	179.45	5,312.43	-80.15	46.73	80.44	7.66	7.63	1.38
5,366.00	38.80	180.09	5,337.08	-98.95	46.81	99.24	9.57	9.48	2.06
5,398.00	41.18	180.03	5,361.59	-119.51	46.79	119.80	7.44	7.44	-0.19
5,430.00	43.41	179.61	5,385.26	-141.04	46.85	141.33	7.02	6.97	-1.31
5,461.00	44.29	180.46	5,407.62	-162.52	46.84	162.81	3.42	2.84	2.74
5,492.00	44.62	180.53	5,429.74	-184.23	46.65	184.52	1.08	1.06	0.23
5,555.00	44.55	180.75	5,474.61	-228.45	46.16	228.73	0.27	-0.11	0.35
5,619.00	44.64	180.73	5,520.19	-273.38	45.58	273.66	0.14	0.14	-0.03
5,650.00	45.75	180.42	5,542.03	-295.37	45.36	295.65	3.65	3.58	-1.00
5,681.00	49.05	180.33	5,563.01	-318.19	45.21	318.47	10.65	10.65	-0.29
5,713.00	52.89	180.49	5,583.16	-343.04	45.03	343.32	12.01	12.00	0.50
5,744.00	57.19	180.86	5,600.92	-368.44	44.73	368.71	13.91	13.87	1.19
5,776.00	61.29	180.28	5,617.28	-395.93	44.46	396.20	12.91	12.81	-1.81
5,807.00	64.14	179.23	5,631.49	-423.48	44.58	423.75	9.67	9.19	-3.39
5,839.00	66.42	179.27	5,644.87	-452.54	44.96	452.81	7.13	7.13	0.13
5,870.00	68.71	177.86	5,656.70	-481.18	45.68	481.46	8.50	7.39	-4.55
5,885.09	69.96	177.74	5,662.03	-495.29	46.22	495.57	8.34	8.31	-0.79
Cross 330' Offset: 5885.09' MD, 5662.03' TVD, 69.96° INC									
5,892.76	70.60	177.68	5,664.61	-502.50	46.51	502.78	8.34	8.31	-0.78
PP(Z5FC#15H)									
5,902.00	71.37	177.61	5,667.63	-511.23	46.87	511.52	8.34	8.31	-0.77
5,933.00	73.93	178.52	5,676.87	-540.80	47.87	541.09	8.72	8.26	2.94
5,965.00	76.29	178.08	5,685.09	-571.71	48.79	572.01	7.49	7.38	-1.38
5,997.00	79.08	179.28	5,691.92	-602.96	49.50	603.26	9.46	8.72	3.75
6,028.00	81.74	180.31	5,697.08	-633.53	49.61	633.83	9.18	8.58	3.32
6,060.00	86.16	180.53	5,700.45	-665.34	49.38	665.64	13.83	13.81	0.69
6,091.00	88.27	180.04	5,701.96	-696.30	49.22	696.60	6.99	6.81	-1.58
EOC: 6091.00' MD, 5701.96' TVD, 88.27° INC, 180.04° AZ, 696.60' VS									
6,161.00	90.43	179.97	5,702.75	-766.29	49.22	766.59	3.09	3.09	-0.10
6,257.00	90.24	179.84	5,702.19	-862.29	49.38	862.58	0.24	-0.20	-0.14

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
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6,352.00	90.44	181.26	5,701.63	-957.28	48.47	957.57	1.51	0.21	1.49	
6,446.00	89.98	179.43	5,701.28	-1,051.28	47.90	1,051.56	2.01	-0.49	-1.95	
6,540.00	90.52	180.09	5,700.87	-1,145.27	48.29	1,145.55	0.91	0.57	0.70	
6,635.00	88.82	178.99	5,701.42	-1,240.26	49.06	1,240.55	2.13	-1.79	-1.16	
6,730.00	89.34	180.73	5,702.95	-1,335.25	49.29	1,335.53	1.91	0.55	1.83	
6,824.00	89.99	179.89	5,703.49	-1,429.24	48.78	1,429.52	1.13	0.69	-0.89	
6,919.00	89.51	179.47	5,703.91	-1,524.24	49.31	1,524.52	0.67	-0.51	-0.44	
7,014.00	88.33	179.05	5,705.70	-1,619.21	50.54	1,619.50	1.32	-1.24	-0.44	
7,106.00	89.13	180.57	5,707.74	-1,711.19	50.84	1,711.47	1.87	0.87	1.65	
7,201.00	88.66	179.83	5,709.57	-1,806.17	50.51	1,806.45	0.92	-0.49	-0.78	
7,296.00	88.82	178.77	5,711.66	-1,901.14	51.67	1,901.42	1.13	0.17	-1.12	
7,389.00	89.49	179.69	5,713.03	-1,994.12	52.92	1,994.41	1.22	0.72	0.99	
7,483.00	89.34	177.33	5,713.99	-2,088.07	55.36	2,088.38	2.52	-0.16	-2.51	
7,578.00	89.33	178.15	5,715.09	-2,182.99	59.11	2,183.32	0.86	-0.01	0.86	
7,673.00	90.00	179.25	5,715.65	-2,277.96	61.26	2,278.30	1.36	0.71	1.16	
7,768.00	90.19	180.09	5,715.49	-2,372.96	61.81	2,373.30	0.91	0.20	0.88	
7,862.00	88.97	177.58	5,716.18	-2,466.93	63.72	2,467.28	2.97	-1.30	-2.67	
7,957.00	89.76	179.15	5,717.23	-2,561.88	66.43	2,562.25	1.85	0.83	1.65	
8,052.00	88.82	178.34	5,718.41	-2,656.85	68.51	2,657.23	1.31	-0.99	-0.85	
8,147.00	88.94	178.87	5,720.27	-2,751.80	70.83	2,752.19	0.57	0.13	0.56	
8,241.00	89.32	179.12	5,721.70	-2,845.78	72.47	2,846.18	0.48	0.40	0.27	
8,336.00	89.81	179.88	5,722.42	-2,940.77	73.30	2,941.17	0.95	0.52	0.80	
8,431.00	90.17	180.93	5,722.43	-3,035.77	72.63	3,036.16	1.17	0.38	1.11	
8,526.00	89.39	180.14	5,722.80	-3,130.76	71.74	3,131.15	1.17	-0.82	-0.83	
8,621.00	90.29	181.09	5,723.06	-3,225.75	70.73	3,226.13	1.38	0.95	1.00	
8,715.00	89.10	178.36	5,723.56	-3,319.74	71.18	3,320.12	3.17	-1.27	-2.90	
8,810.00	89.09	178.36	5,725.06	-3,414.69	73.89	3,415.09	0.01	-0.01	0.00	
8,905.00	89.11	178.57	5,726.56	-3,509.64	76.44	3,510.05	0.22	0.02	0.22	
9,000.00	88.63	181.12	5,728.43	-3,604.62	76.70	3,605.03	2.73	-0.51	2.68	
9,095.00	89.35	179.43	5,730.10	-3,699.60	76.24	3,700.00	1.93	0.76	-1.78	
9,190.00	89.58	180.79	5,730.99	-3,794.59	76.06	3,794.99	1.45	0.24	1.43	
9,284.00	89.88	181.46	5,731.44	-3,888.57	74.21	3,888.96	0.78	0.32	0.71	
9,379.00	89.96	181.42	5,731.57	-3,983.54	71.83	3,983.91	0.09	0.08	-0.04	
9,473.00	90.07	182.17	5,731.54	-4,077.49	68.88	4,077.84	0.81	0.12	0.80	
9,568.00	88.65	181.14	5,732.60	-4,172.44	66.14	4,172.78	1.85	-1.49	-1.08	
9,663.00	88.12	179.21	5,735.28	-4,267.40	65.85	4,267.73	2.11	-0.56	-2.03	
9,756.00	87.90	179.44	5,738.51	-4,360.34	66.94	4,360.67	0.34	-0.24	0.25	
9,850.00	89.38	179.89	5,740.74	-4,454.31	67.49	4,454.64	1.65	1.57	0.48	
9,945.00	89.84	178.93	5,741.39	-4,549.30	68.47	4,549.64	1.12	0.48	-1.01	
10,040.00	90.15	180.15	5,741.40	-4,644.29	69.23	4,644.64	1.33	0.33	1.28	
10,135.00	89.86	178.21	5,741.39	-4,739.28	70.59	4,739.63	2.06	-0.31	-2.04	
10,230.00	89.76	178.45	5,741.70	-4,834.24	73.36	4,834.60	0.27	-0.11	0.25	
10,325.00	88.78	177.52	5,742.91	-4,929.17	76.70	4,929.55	1.42	-1.03	-0.98	
10,420.00	88.17	179.70	5,745.44	-5,024.10	79.00	5,024.50	2.38	-0.64	2.29	

Survey Report

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #15H
Project:	Lea County, NM (NAD27) NMEZ	TVD Reference:	RKB @ 4117.00usft (Silver Oak 3 - KB=18')
Site:	Zeppo 5 Federal COM	MD Reference:	RKB @ 4117.00usft (Silver Oak 3 - KB=18')
Well:	#15H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

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)
10,515.00	90.22	180.72	5,746.78	-5,119.09	78.66	5,119.48	2.41	2.16	1.07
10,609.00	91.24	182.11	5,745.58	-5,213.05	76.33	5,213.42	1.83	1.09	1.48
10,704.00	90.54	179.36	5,744.10	-5,308.02	75.12	5,308.38	2.99	-0.74	-2.89
10,798.00	90.43	180.02	5,743.31	-5,402.01	75.63	5,402.38	0.71	-0.12	0.70
10,893.00	91.56	179.70	5,741.66	-5,496.99	75.86	5,497.36	1.24	1.19	-0.34
10,989.00	90.33	179.47	5,740.08	-5,592.98	76.55	5,593.35	1.30	-1.28	-0.24
11,084.00	89.97	179.55	5,739.83	-5,687.97	77.36	5,688.35	0.39	-0.38	0.08
11,179.00	89.41	179.23	5,740.34	-5,782.97	78.38	5,783.34	0.68	-0.59	-0.34
11,274.00	88.17	178.83	5,742.35	-5,877.93	79.98	5,878.32	1.37	-1.31	-0.42
11,368.00	87.50	178.72	5,745.90	-5,971.84	81.99	5,972.24	0.72	-0.71	-0.12
11,463.00	89.94	179.45	5,748.02	-6,066.80	83.51	6,067.20	2.68	2.57	0.77
11,557.00	89.99	179.25	5,748.08	-6,160.79	84.57	6,161.20	0.22	0.05	-0.21
11,651.00	90.36	179.65	5,747.79	-6,254.79	85.48	6,255.20	0.58	0.39	0.43
11,746.00	90.60	179.78	5,746.99	-6,349.78	85.95	6,350.20	0.29	0.25	0.14
11,841.00	91.15	180.13	5,745.54	-6,444.77	86.02	6,445.18	0.69	0.58	0.37
11,934.00	89.06	178.30	5,745.37	-6,537.75	87.30	6,538.17	2.99	-2.25	-1.97
12,028.00	88.88	178.22	5,747.06	-6,631.69	90.15	6,632.13	0.21	-0.19	-0.09
12,123.00	89.53	178.95	5,748.38	-6,726.65	92.50	6,727.10	1.03	0.68	0.77
12,217.00	90.52	179.30	5,748.34	-6,820.64	93.93	6,821.10	1.12	1.05	0.37
12,312.00	89.73	180.44	5,748.13	-6,915.64	94.15	6,916.09	1.46	-0.83	1.20
12,407.00	88.23	179.87	5,749.82	-7,010.62	93.89	7,011.07	1.69	-1.58	-0.60
12,502.00	89.06	179.88	5,752.07	-7,105.59	94.10	7,106.04	0.87	0.87	0.01
12,597.00	89.98	180.17	5,752.87	-7,200.59	94.06	7,201.04	1.02	0.97	0.31
12,692.00	88.05	180.73	5,754.50	-7,295.57	93.31	7,296.01	2.12	-2.03	0.59
12,787.00	88.59	180.55	5,757.28	-7,390.52	92.25	7,390.95	0.60	0.57	-0.19
12,880.00	89.53	179.74	5,758.81	-7,483.50	92.02	7,483.93	1.33	1.01	-0.87
12,975.00	89.09	179.52	5,759.95	-7,578.49	92.63	7,578.93	0.52	-0.46	-0.23
13,069.00	87.35	178.93	5,762.87	-7,672.44	93.90	7,672.88	1.95	-1.85	-0.63
13,134.21	87.90	178.46	5,765.58	-7,737.57	95.39	7,738.02	1.11	0.84	-0.73
Cross 330' Offset: 13134.21' MD, 5765.58' TVD, 87.90° INC									
13,164.00	88.15	178.24	5,766.60	-7,767.33	96.24	7,767.78	1.11	0.84	-0.73
13,259.00	89.52	178.48	5,768.53	-7,862.27	98.96	7,862.74	1.46	1.44	0.25
13,353.00	90.42	179.44	5,768.58	-7,956.25	100.67	7,956.73	1.40	0.96	1.02
Final MWD Survey: 13353.00' MD, 5768.58' TVD									
13,409.00	90.42	179.44	5,768.17	-8,012.25	101.22	8,012.73	0.00	0.00	0.00
BHL: 13409.00' MD, 5768.17' TVD, 90.42° INC, 179.44° AZ, -8012.25' +N/-S, 101.22' +E/-W, 8012.73' VS - BHL: 354' FWL / 59' FSL - PHBL_3'									

Survey Report

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #15H
Project:	Lea County, NM (NAD27) NMEZ	TVD Reference:	RKB @ 4117.00usft (Silver Oak 3 - KB=18')
Site:	Zeppo 5 Federal COM	MD Reference:	RKB @ 4117.00usft (Silver Oak 3 - KB=18')
Well:	#15H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,988.00	4,987.32	19.84	41.43	KOP: 4988.00' MD, 4987.32' TVD
5,885.09	5,662.03	-495.29	46.22	Cross 330' Offset: 5885.09' MD, 5662.03' TVD, 69.96° INC
6,091.00	5,701.96	-696.30	49.22	EOC: 6091.00' MD, 5701.96' TVD, 88.27° INC, 180.04° AZ, 696.60' VS
13,134.21	5,765.58	-7,737.57	95.39	Cross 330' Offset: 13134.21' MD, 5765.58' TVD, 87.90° INC
13,353.00	5,768.58	-7,956.25	100.67	Final MWD Survey: 13353.00' MD, 5768.58' TVD
13,409.00	5,768.17	-8,012.25	101.22	BHL: 13409.00' MD, 5768.17' TVD, 90.42° INC, 179.44° AZ, -8012.25' +N/-S, 11
13,409.00	5,768.17	-8,012.25	101.22	BHL: 354' FWL / 59' FSL

Checked By: _____ Approved By: _____ Date: _____



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

HOBBS OCD
JUL 20 2018
RECEIVED

January 26, 2018

COG, LLC
One Concho Center
600 W. Illinois Ave.
Midland, TX 79701

RE: Zeppo 5 Fed Com 15H
2490' FNL & 2335' FEL
Sec. 5, T17S, R32E
Lea County, New Mexico

Dear Sir,

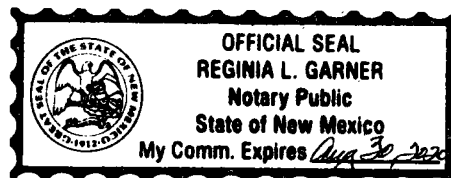
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Chris Graham
Asst. Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 26th day of January, 2018.

Notary Public

Zeppo 5 Fed Com 15H

Date	Depth	Deviation	Direction	TVD
1/7/2018	230	0.90		
1/7/2018	423	0.60		
1/7/2018	659	0.50		
1/7/2018	876	0.80		
1/8/2018	933	1.00		
1/9/2018	1233	0.10		
1/9/2018	1493	0.20		
1/10/2018	1737	0.20		
1/10/2018	1990	0.20		
1/11/2018	2339	1.34	68.42	2338.00
1/11/2018	2434	1.46	58.04	2433.00
1/11/2018	2528	1.28	52.18	2577.00
1/11/2018	2622	1.15	54.68	2621.00
1/12/2018	2717	1.71	51.78	
1/12/2018	2811	1.69	46.30	
1/12/2018	2903	1.49	49.40	
1/12/2018	3092	1.13	52.69	
1/12/2018	3190	0.92	52.23	
1/12/2018	3284	1.48	53.14	
1/12/2018	3379	1.38	52.11	3378.00
1/12/2018	3473	1.27	51.91	3472.00
1/12/2018	3568	1.07	47.72	3567.00
1/12/2018	3758	1.59	77.67	3757.00
1/12/2018	3853	1.53	82.14	3852.00
1/13/2018	4042	1.53	40.11	
1/13/2018	4136	1.14	61.83	
1/13/2018	4230	1.10	61.73	
1/13/2018	4325	1.11	57.12	
1/13/2018	4420	0.38	268.22	
1/13/2018	4515	0.58	277.03	
1/13/2018	4610	0.69	256.00	4609.00
1/13/2018	4705	0.61	255.00	4704.00
1/13/2018	4799	0.69	214.00	4795.00
1/13/2018	4894	0.49	251.00	4893.00
1/13/2018	5052	4.24	174.00	5082.00
1/13/2018	5083	7.29	172.00	5082.00
1/14/2018	5145	14.41	173.33	
1/14/2018	5177	18.18	174.77	
1/14/2018	5208	22.61	176.19	
1/14/2018	5240	26.77	177.39	
1/14/2018	5271	30.50	178.46	
1/14/2018	5303	33.42	179.01	

Date	Depth	Deviation	Direction	TVD
1/14/2018	5335	35.86	179.45	
1/14/2018	5366	38.80	180.09	
1/14/2018	5398	41.18	180.30	
1/14/2018	5430	45.41	179.61	
1/14/2018	5461	44.29	180.48	
1/14/2018	5555	44.55	180.75	
1/14/2018	5619	44.64		
1/14/2018	5650	45.75	180.42	
1/14/2018	5681	41.03	180.00	5563.00
1/14/2018	5807	64.14	179.00	5631.00
1/14/2018	5902	71.37	177.00	5643.00
1/14/2018	5997	79.08	179.00	5667.00
1/14/2018	6028	81.74	180.31	5673.00
1/15/2018	6161	90.43	179.00	5702.00
1/15/2018	6257	90.24	179.00	5702.00
1/15/2018	6352	90.44	1.81	5701.00
1/16/2018	6540	90.52	180.09	
1/16/2018	6635	88.82	178.89	
1/16/2018	6730	89.34	180.73	
1/16/2018	6824	89.99	179.89	
1/16/2018	6919	89.51	179.47	
1/16/2018	7014	88.33	179.05	
1/16/2018	7106	89.13	180.57	
1/16/2018	7201	88.66	179.00	5709.00
1/16/2018	7296	88.82	178.00	5711.00
1/16/2018	7389	89.49	179.00	5713.00
1/16/2018	7483	89.34	177.00	5713.00
1/16/2018	7578	89.33	178.00	5715.00
1/16/2018	7673	90.00	179.00	57.15
1/17/2018	7768	90.19	180.09	
1/17/2018	7862	88.97	177.58	
1/17/2018	7957	89.76	179.15	
1/17/2018	8052	88.82	178.34	
1/17/2018	8147	88.94	178.87	
1/17/2018	8241	89.32	179.12	
1/17/2018	8336	89.81	179.88	
1/17/2018	8526	89.39	180.00	5722.00
1/17/2018	8621	90.29	181.00	5723.00
1/17/2018	8715	89.10	178.00	5723.00
1/17/2018	8810	89.09	178.00	5725.00
1/17/2018	8905	89.11	178.00	5726.00
1/17/2018	9000	88.63	181.00	5728.00
1/18/2018	9095	89.35	179.43	5730.09
1/18/2018	9190	89.53	180.79	5730.99
1/18/2018	9284	89.88	181.46	5731.43

Date	Depth	Deviation	Direction	TVD
1/18/2018	9379	89.96	181.42	5731.57
1/18/2018	9473	90.07	182.17	5731.54
1/18/2018	9663	83.12	179.21	5735.28
1/18/2018	9756	87.90	179.44	5738.51
1/18/2018	9850	89.38	179.89	5740.00
1/18/2018	9945	89.84	178.93	5741.39
1/18/2018	10135	89.86	178.21	5741.39
1/18/2018	10230	89.76	178.45	5741.00
1/19/2018	10325	88.78	177.52	5742.91
1/19/2018	10420	88.17	179.70	5745.44
1/19/2018	10515	90.22	180.72	5746.78
1/19/2018	10609	91.24	182.11	5745.58
1/20/2018	10704	90.54	179.36	5744.10
1/20/2018	10983	91.56	179.70	5741.66
1/20/2018	10989	90.33	179.47	5740.08
1/20/2018	11084	89.97	179.55	5739.83
1/20/2018	11179	89.41	179.23	5740.34
1/20/2018	11274	88.17	178.83	5742.35
1/20/2018	11368	87.50	178.72	5972.24
1/20/2018	11456	89.94	179.45	5748.02
1/20/2018	11557	89.99	179.25	5748.08
1/20/2018	11651	90.36	179.65	5747.79
1/21/2018	11841	91.15	180.13	6445.18
1/21/2018	11934	89.06	178.30	5745.37
1/21/2018	12123	89.53	178.95	6727.10
1/21/2018	12217	90.52	179.30	5748.34
1/21/2018	12312	89.73	180.44	5748.13
1/21/2018	12407	88.23	179.87	5749.00
1/21/2018	12502	89.06	179.88	5752.00
1/21/2018	12597	89.98	180.17	5752.00
1/21/2018	12692	88.05	180.73	5754.00
1/21/2018	12787	88.59	180.55	5757.00
1/22/2018	12880	89.53	179.74	5758.81
1/22/2018	12975	89.09	179.52	5759.95
1/22/2018	13069	87.35	178.93	5762.87
1/22/2018	13164	88.15	178.24	5766.60
1/22/2018	13259	89.52	178.48	5768.53
1/22/2018	13354	90.42	179.44	5768.58

HOBBS OCD

JUL 20 2018

RECEIVED

January 15, 2018

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

Attn: Kanicia Castillo

RE: Zeppo 5 Federal Com 15H

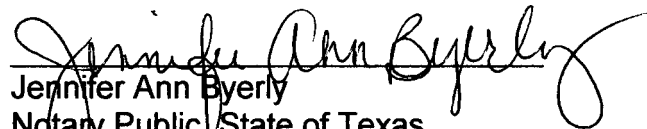
Please find enclosed a copy of the survey from 0' to 2145' ran on the above referenced well.

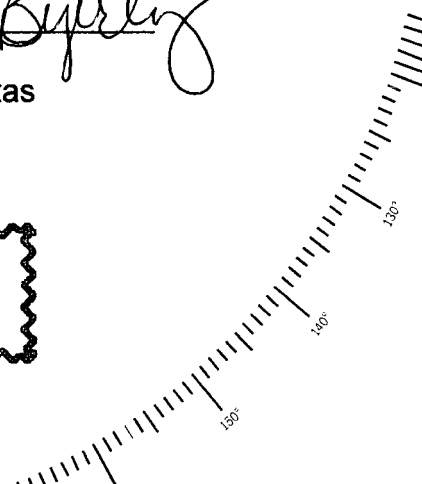
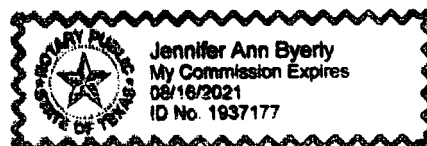
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 15th day of January,
A.D., 2017, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG OPERATING
Lease/Well: ZEPP0 5 FEDERAL COM/15H

Rig Name: SILVER OAK 3
State/County: NEW MEXICO/LEA
VS-Azi: 0.00 Degrees
Latitude: 32.86409, Longitude: -103.78767
Grid North = True North -0.30 degs (NAD 27)
Grid Correction Applied = -0.30 degs



Depth Reference : RKB = 18 FEET

HOBBS OCD

DRILLOG HA GYRO SURVEY CALCULATIONS
Filename: e-line gyro-de_01.ut
Minimum Curvature Method
Report Date/Time: 1/15/2018 / 10:41

JUL 20 2018

RECEIVED

VES Survey International
Midland, TX
432-563-5444

Surveyor: Christopher Hair
Zeppo 5 Federal Com 15H / API 30-025-44140

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	0.42	158.97	100.00	-0.34	0.13	-0.34	0.37	158.97	0.42
200.00	0.32	197.94	200.00	-0.96	0.18	-0.96	0.97	169.49	0.27
300.00	0.19	88.22	300.00	-1.22	0.25	-1.22	1.24	168.24	0.42
400.00	0.49	128.57	399.99	-1.48	0.75	-1.48	1.66	153.11	0.37
500.00	0.53	131.99	499.99	-2.05	1.43	-2.05	2.50	145.22	0.05
600.00	0.21	116.45	599.99	-2.44	1.93	-2.44	3.12	141.64	0.33
700.00	0.32	236.39	699.99	-2.68	1.87	-2.68	3.27	145.19	0.47
800.00	0.25	355.76	799.99	-2.62	1.61	-2.62	3.08	148.36	0.50
900.00	0.36	277.47	899.99	-2.36	1.29	-2.36	2.69	151.41	0.40
1000.00	0.22	202.81	999.99	-2.50	0.90	-2.50	2.65	160.22	0.37
1100.00	0.20	206.83	1099.98	-2.83	0.74	-2.83	2.93	165.31	0.02
1200.00	0.11	209.56	1199.98	-3.08	0.62	-3.08	3.14	168.69	0.09
1300.00	0.31	183.79	1299.98	-3.43	0.55	-3.43	3.47	170.89	0.21
1400.00	0.12	101.75	1399.98	-3.72	0.63	-3.72	3.77	170.36	0.31
1500.00	0.32	188.17	1499.98	-4.01	0.69	-4.01	4.07	170.22	0.33
1600.00	0.39	183.77	1599.98	-4.62	0.63	-4.62	4.66	172.24	0.07

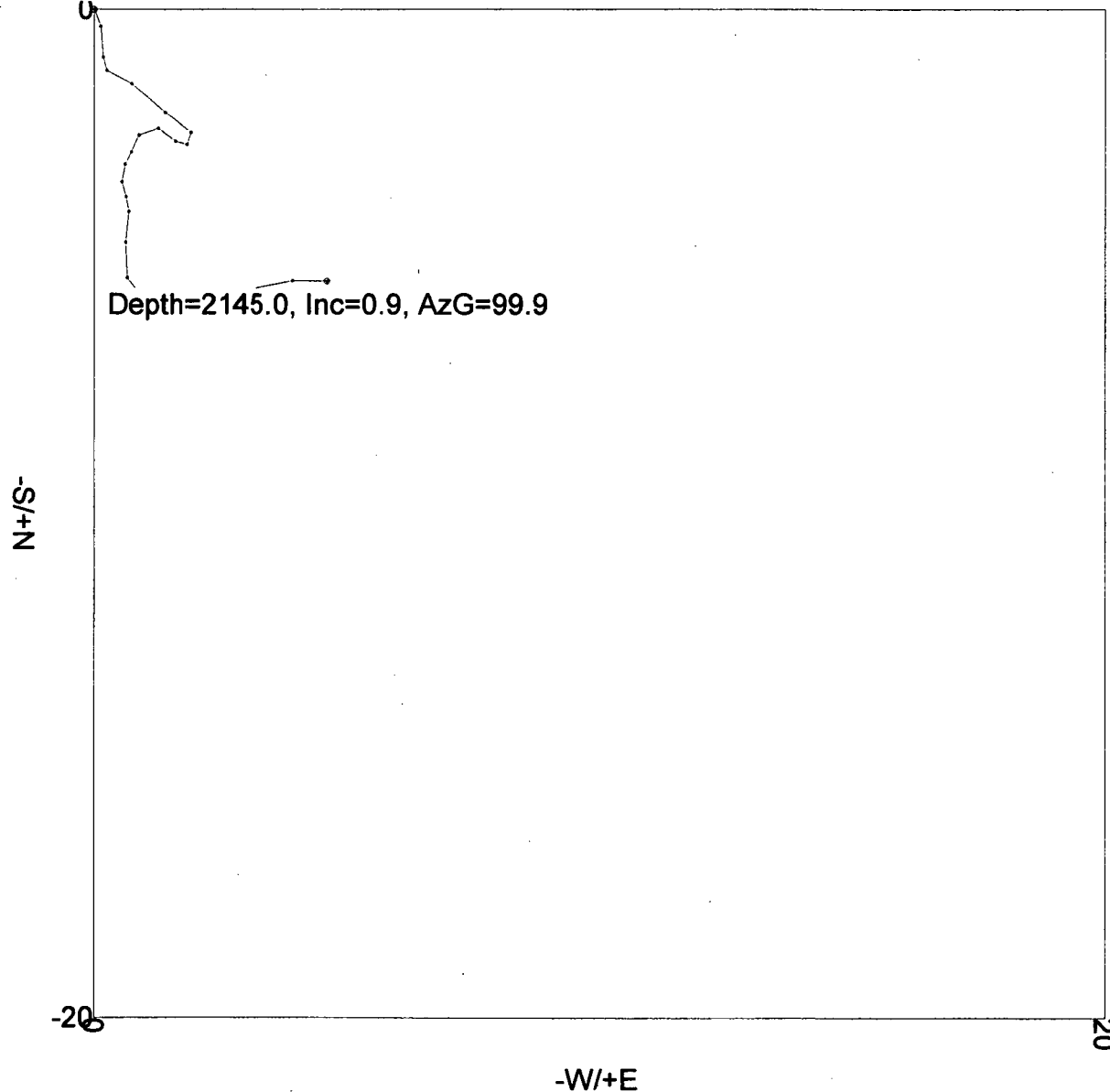
True Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dog Severity Deg/100
1700.00	0.42	171.52	1699.98	-5.32	0.66	-5.32	5.36	172.91	0.09
1800.00	0.41	110.56	1799.98	-5.82	1.05	-5.82	5.91	169.73	0.42
1900.00	0.43	78.11	1899.97	-5.86	1.76	-5.86	6.12	163.29	0.24
2000.00	0.65	75.01	1999.97	-5.64	2.68	-5.64	6.24	154.59	0.22
2100.00	0.86	81.25	2099.96	-5.38	3.97	-5.38	6.69	143.55	0.23
2145.00	0.90	99.94	2144.95	-5.39	4.66	-5.39	7.12	139.16	0.64



VES Survey International
Midland, TX
432-563-5444
Surveyor: Christopher Hair
Zeppo 5 Federal Com 15H / API 30-025-44140



Depth=0.0, Inc=0.0, AzG=0.0



Depth=2145.0, Inc=0.9, AzG=99.9

VES Survey Date: 1/9/2018



I Christopher Hair certify that I am employed by VES Survey International. That I did on the day(s) of 01/10/18 through 01/10/18 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,145.00 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 COG Operating for the Zeppo 5 Federal Com Well # 15H API # 30-025-44140 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 VES Survey International.

A handwritten signature in black ink, appearing to read "Chris Hair", is written over a horizontal line.

Christopher Hair
Service Technician
VES Survey International