



COG OPERATING

COG Operating LLC

Eddy County, NM (NAD-27 2015)

Carmen 3 Fed Com #13H

API #: 30-015-43644

SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H

PP: 1677' FNL, 330' FEL, Sec 3, T17S, R30E, Unit H

BHL: 1691' FNL, 229' FWL, Sec 3, T17S, R30E, Unit E

Design: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Standard Survey Report

27 January, 2017

NM OIL CONSERVATION
ARTESIA DISTRICT

MAY 24 2017

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TDS
Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Carmen 3 Fed Com #13H
Well: SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H
Wellbore: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E
Design: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Local Co-ordinate Reference: Well SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H
TVD Reference: KB @ 3770.00usft (Silver Oak 3)
MD Reference: KB @ 3770.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project	Eddy County, NM (NAD-27 2015)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Carmen 3 Fed Com #13H				
Site Position:		Northing:	679,015.20 usft	Latitude:	32° 51' 58.002 N
From:	Map	Easting:	617,349.70 usft	Longitude:	103° 57' 4.120 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.21 °

Well	SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H				
Well Position	+N/-S	0.00 usft	Northing:	679,015.20 usft	Latitude: 32° 51' 58.002 N
	+E/-W	0.00 usft	Easting:	617,349.70 usft	Longitude: 103° 57' 4.120 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	0.00 usft	Ground Level: 3,752.00 usft

Wellbore	BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/30/2016	7.23	60.59	48,324

Design	BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	269.45	

Survey Program	Date	1/27/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
25.00	1,420.00	VES Gyro #1 (BHL: 1682' FNL, 220' FWL,	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro	
1,503.00	9,463.00	TDS MWD #2 (BHL: 1682' FNL, 220' FWL	MWD	MWD - Standard	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	0.22	326.87	25.00	0.04	-0.03	0.03	0.88	0.88	0.00
50.00	0.24	281.65	50.00	0.09	-0.10	0.10	0.71	0.08	-180.88
75.00	0.29	251.72	75.00	0.08	-0.22	0.21	0.58	0.20	-119.72
100.00	0.21	244.24	100.00	0.04	-0.32	0.32	0.34	-0.32	-29.92
125.00	0.28	247.01	125.00	0.00	-0.41	0.41	0.28	0.28	11.08
150.00	0.18	273.22	150.00	-0.02	-0.51	0.51	0.57	-0.40	104.84



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

TVD Reference: KB @ 3770.00usft (Silver Oak 3)

Site: Carmen 3 Fed Com #13H

MD Reference: KB @ 3770.00usft (Silver Oak 3)

Well: SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H

North Reference: Grid

Wellbore: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Survey Calculation Method: Minimum Curvature

Design: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Database: EDM 5000.1 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)
175.00	0.16	350.82	175.00	0.01	-0.55	0.55	0.85	-0.08	310.40
200.00	0.38	18.97	200.00	0.13	-0.53	0.53	1.00	0.88	112.60
225.00	0.47	48.04	225.00	0.27	-0.43	0.43	0.92	0.36	116.28
250.00	0.71	53.88	250.00	0.43	-0.23	0.22	0.99	0.96	23.36
275.00	0.93	60.73	274.99	0.62	0.07	-0.08	0.96	0.88	27.40
300.00	0.98	62.68	299.99	0.82	0.44	-0.45	0.24	0.20	7.80
325.00	0.96	68.50	324.99	1.00	0.83	-0.84	0.40	-0.08	23.28
350.00	0.85	79.77	349.98	1.11	1.20	-1.21	0.83	-0.44	45.08
375.00	0.76	95.34	374.98	1.12	1.55	-1.56	0.94	-0.36	62.28
400.00	0.92	106.68	399.98	1.05	1.91	-1.92	0.92	0.64	45.36
425.00	1.03	119.85	424.98	0.88	2.30	-2.30	1.00	0.44	52.68
450.00	0.99	124.13	449.97	0.65	2.67	-2.67	0.34	-0.16	17.12
475.00	0.86	125.26	474.97	0.42	3.00	-3.00	0.53	-0.52	4.52
500.00	0.86	125.24	499.97	0.20	3.31	-3.31	0.00	0.00	-0.08
525.00	0.70	128.27	524.96	0.00	3.58	-3.58	0.66	-0.64	12.12
550.00	0.53	128.94	549.96	-0.17	3.79	-3.79	0.68	-0.68	2.68
575.00	0.59	139.12	574.96	-0.34	3.96	-3.96	0.46	0.24	40.72
600.00	0.66	132.37	599.96	-0.53	4.15	-4.15	0.41	0.28	-27.00
625.00	0.52	130.42	624.96	-0.70	4.35	-4.34	0.57	-0.56	-7.80
650.00	0.56	150.35	649.96	-0.88	4.49	-4.49	0.76	0.16	79.72
675.00	0.62	134.98	674.95	-1.09	4.65	-4.64	0.67	0.24	-61.48
700.00	0.71	136.31	699.95	-1.29	4.85	-4.84	0.37	0.36	5.32
725.00	0.84	140.72	724.95	-1.55	5.08	-5.06	0.57	0.52	17.64
750.00	0.70	129.00	749.95	-1.78	5.31	-5.29	0.84	-0.56	-46.88
775.00	0.50	117.89	774.95	-1.93	5.53	-5.51	0.92	-0.80	-44.44
800.00	0.53	121.61	799.95	-2.04	5.72	-5.70	0.18	0.12	14.88
825.00	0.77	123.69	824.94	-2.20	5.96	-5.94	0.96	0.96	8.32
850.00	0.74	113.95	849.94	-2.36	6.25	-6.22	0.53	-0.12	-38.96
875.00	0.57	114.93	874.94	-2.47	6.51	-6.48	0.68	-0.68	3.92
900.00	0.63	122.26	899.94	-2.60	6.74	-6.71	0.39	0.24	29.32
925.00	0.71	112.93	924.94	-2.73	6.99	-6.97	0.54	0.32	-37.32
950.00	0.66	107.61	949.94	-2.84	7.27	-7.25	0.32	-0.20	-21.28
975.00	0.60	101.24	974.93	-2.91	7.54	-7.51	0.37	-0.24	-25.48
1,000.00	0.69	114.31	999.93	-2.99	7.81	-7.78	0.69	0.36	52.28
1,025.00	0.79	103.13	1,024.93	-3.10	8.11	-8.08	0.70	0.40	-44.72
1,050.00	0.74	84.90	1,049.93	-3.12	8.44	-8.41	0.99	-0.20	-72.92
1,075.00	0.72	93.25	1,074.93	-3.11	8.76	-8.73	0.43	-0.08	33.40
1,100.00	0.70	92.04	1,099.92	-3.13	9.07	-9.04	0.10	-0.08	-4.84
1,125.00	0.78	96.11	1,124.92	-3.15	9.39	-9.36	0.38	0.32	16.28
1,150.00	0.94	85.89	1,149.92	-3.16	9.76	-9.73	0.88	0.64	-40.88
1,175.00	1.02	88.76	1,174.92	-3.14	10.19	-10.16	0.38	0.32	11.48



TDS
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Local Co-ordinate Reference:

Well SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H

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

TVD Reference:

KB @ 3770.00usft (Silver Oak 3)

Site: Carmen 3 Fed Com #13H

MD Reference:

KB @ 3770.00usft (Silver Oak 3)

Well: SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H

North Reference:

Grid

Wellbore: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Survey Calculation Method:

Minimum Curvature

Design: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Database:

EDM 5000.1 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)
1,200.00	1.10	93.63	1,199.91	-3.15	10.65	-10.62	0.48	0.32	19.48
1,225.00	1.23	92.13	1,224.91	-3.17	11.16	-11.13	0.53	0.52	-6.00
1,250.00	1.20	84.41	1,249.90	-3.16	11.69	-11.66	0.67	-0.12	-30.88
1,275.00	1.05	87.41	1,274.90	-3.12	12.18	-12.15	0.64	-0.60	12.00
1,300.00	1.16	95.55	1,299.89	-3.13	12.66	-12.63	0.77	0.44	32.56
1,325.00	1.19	92.27	1,324.89	-3.17	13.17	-13.14	0.29	0.12	-13.12
1,350.00	1.06	86.39	1,349.88	-3.16	13.66	-13.63	0.69	-0.52	-23.52
1,375.00	0.99	75.95	1,374.88	-3.10	14.10	-14.07	0.80	-0.28	-41.76
1,400.00	0.90	75.95	1,399.87	-3.00	14.50	-14.47	0.36	-0.36	0.00
1,420.00	0.78	80.86	1,419.87	-2.94	14.79	-14.76	0.70	-0.60	24.55
Tie-In to VES Gyro									
1,503.00	0.70	88.30	1,502.87	-2.83	15.85	-15.82	0.15	-0.10	8.96
First TDS MWD Survey									
1,594.00	2.00	91.70	1,593.84	-2.86	17.99	-17.96	1.43	1.43	3.74
1,685.00	2.20	91.70	1,684.78	-2.96	21.33	-21.30	0.22	0.22	0.00
1,776.00	2.10	93.20	1,775.71	-3.11	24.74	-24.71	0.13	-0.11	1.65
1,867.00	3.10	93.60	1,866.62	-3.36	28.86	-28.82	1.10	1.10	0.44
1,959.00	3.00	92.30	1,958.49	-3.61	33.75	-33.71	0.13	-0.11	-1.41
2,052.00	2.80	92.40	2,051.37	-3.80	38.45	-38.41	0.22	-0.22	0.11
2,143.00	2.50	89.90	2,142.27	-3.89	42.65	-42.61	0.35	-0.33	-2.75
2,234.00	2.20	85.90	2,233.19	-3.76	46.38	-46.34	0.38	-0.33	-4.40
2,325.00	2.00	85.90	2,324.13	-3.52	49.71	-49.67	0.22	-0.22	0.00
2,418.00	3.20	92.80	2,417.04	-3.53	53.92	-53.88	1.33	1.29	7.42
2,509.00	3.00	93.00	2,507.90	-3.78	58.83	-58.79	0.22	-0.22	0.22
2,600.00	2.70	90.90	2,598.79	-3.94	63.35	-63.31	0.35	-0.33	-2.31
2,691.00	3.20	103.20	2,689.67	-4.56	67.97	-67.92	0.88	0.55	13.52
2,753.00	3.20	103.30	2,751.57	-5.35	71.34	-71.28	0.01	0.00	0.16
2,848.00	3.20	104.00	2,846.43	-6.60	76.49	-76.42	0.04	0.00	0.74
2,943.00	3.00	103.80	2,941.29	-7.83	81.48	-81.40	0.21	-0.21	-0.21
3,038.00	3.00	103.90	3,036.16	-9.02	86.30	-86.21	0.01	0.00	0.11
3,133.00	3.00	103.00	3,131.03	-10.18	91.14	-91.04	0.05	0.00	-0.95
3,228.00	3.00	103.30	3,225.90	-11.31	95.98	-95.87	0.02	0.00	0.32
3,323.00	3.00	105.40	3,320.77	-12.54	100.80	-100.67	0.12	0.00	2.21
3,418.00	2.90	107.10	3,415.64	-13.91	105.49	-105.35	0.14	-0.11	1.79
3,512.00	2.90	108.80	3,509.52	-15.38	110.02	-109.86	0.09	0.00	1.81
3,607.00	2.80	109.50	3,604.40	-16.93	114.48	-114.31	0.11	-0.11	0.74
3,702.00	2.70	111.60	3,699.29	-18.52	118.75	-118.56	0.15	-0.11	2.21
3,797.00	2.60	110.60	3,794.19	-20.11	122.84	-122.64	0.12	-0.11	-1.05
3,892.00	2.50	114.20	3,889.10	-21.71	126.75	-126.54	0.20	-0.11	3.79
3,987.00	0.60	116.10	3,984.06	-22.78	129.09	-128.86	2.00	-2.00	2.00
4,018.00	0.40	121.50	4,015.06	-22.91	129.32	-129.10	0.66	-0.65	17.42



TDS
Survey Report



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Site: Carmen 3 Fed Com #13H

Well: SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H

Wellbore: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

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4,050.00	0.20	120.80	4,047.06	-23.00	129.47	-129.24	0.63	-0.63	-2.19
4,082.00	0.80	270.70	4,079.06	-23.02	129.29	-129.06	3.06	1.88	468.44
4,113.00	3.00	268.30	4,110.04	-23.04	128.26	-128.04	7.10	7.10	-7.74
4,145.00	6.10	268.10	4,141.93	-23.12	125.73	-125.50	9.69	9.69	-0.63
4,177.00	9.50	268.40	4,173.63	-23.25	121.39	-121.16	10.63	10.63	0.94
4,208.00	13.00	269.50	4,204.03	-23.36	115.34	-115.11	11.31	11.29	3.55
4,240.00	16.60	271.10	4,234.96	-23.30	107.17	-106.94	11.32	11.25	5.00
4,272.00	20.30	272.70	4,265.31	-22.95	97.05	-96.83	11.67	11.56	5.00
4,303.00	24.10	272.30	4,294.01	-22.44	85.35	-85.13	12.27	12.26	-1.29
4,335.00	27.60	271.40	4,322.80	-22.00	71.41	-71.19	11.01	10.94	-2.81
4,366.00	31.40	269.90	4,349.78	-21.84	56.15	-55.94	12.49	12.26	-4.84
4,398.00	34.80	268.30	4,376.58	-22.12	38.68	-38.46	10.97	10.63	-5.00
4,429.00	38.70	268.00	4,401.42	-22.73	20.14	-19.93	12.59	12.58	-0.97
4,461.00	42.80	268.00	4,425.66	-23.45	-0.73	0.95	12.81	12.81	0.00
4,493.00	45.40	268.30	4,448.63	-24.17	-22.98	23.21	8.15	8.13	0.94
4,525.00	46.20	268.20	4,470.94	-24.87	-45.91	46.15	2.51	2.50	-0.31
4,556.00	46.60	268.10	4,492.32	-25.60	-68.35	68.59	1.31	1.29	-0.32
4,588.00	46.90	267.70	4,514.25	-26.45	-91.64	91.89	1.31	0.94	-1.25
4,619.00	46.50	269.10	4,535.51	-27.08	-114.19	114.45	3.53	-1.29	4.52
4,651.00	46.50	269.60	4,557.54	-27.35	-137.40	137.66	1.13	0.00	1.56
4,682.00	47.50	269.30	4,578.68	-27.56	-160.07	160.33	3.30	3.23	-0.97
4,708.47	50.56	268.88	4,596.03	-27.88	-180.06	180.32	11.62	11.56	-1.58
As-Drilled PP									
4,714.00	51.20	268.80	4,599.52	-27.97	-184.35	184.61	11.62	11.57	-1.49
4,746.00	55.10	268.50	4,618.71	-28.57	-209.94	210.20	12.21	12.19	-0.94
4,777.00	58.20	268.80	4,635.75	-29.18	-235.82	236.09	10.03	10.00	0.97
4,809.00	59.40	269.80	4,652.32	-29.52	-263.19	263.46	4.61	3.75	3.13
4,840.00	62.00	271.10	4,667.49	-29.30	-290.22	290.49	9.15	8.39	4.19
4,872.00	64.50	271.50	4,681.90	-28.65	-318.79	319.05	7.89	7.81	1.25
4,904.00	68.20	271.30	4,694.73	-27.93	-348.09	348.34	11.58	11.56	-0.63
4,935.00	72.70	271.00	4,705.10	-27.35	-377.29	377.53	14.54	14.52	-0.97
4,967.00	76.00	270.30	4,713.73	-27.00	-408.09	408.33	10.53	10.31	-2.19
4,999.00	78.90	270.30	4,720.69	-26.84	-439.33	439.56	9.06	9.06	0.00
5,030.00	81.00	271.00	4,726.09	-26.49	-469.85	470.08	7.13	6.77	2.26
5,062.00	83.20	271.00	4,730.49	-25.94	-501.54	501.76	6.88	6.88	0.00
5,093.00	86.70	270.40	4,733.22	-25.56	-532.41	532.63	11.45	11.29	-1.94
5,125.00	90.10	270.40	4,734.11	-25.34	-564.39	564.61	10.63	10.63	0.00
5,156.00	90.80	269.90	4,733.87	-25.26	-595.39	595.60	2.77	2.26	-1.61
5,255.00	91.60	269.80	4,731.80	-25.52	-694.37	694.58	0.81	0.81	-0.10
5,350.00	91.50	270.30	4,729.23	-25.43	-789.33	789.54	0.54	-0.11	0.53
5,445.00	91.30	270.30	4,726.91	-24.94	-884.30	884.50	0.21	-0.21	0.00



TDS Survey Report



Company: COG Operating LLC

Local Co-ordinate Reference: Well SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H

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

TVD Reference: KB @ 3770.00usft (Silver Oak 3)

Site: Carmen 3 Fed Com #13H

MD Reference: KB @ 3770.00usft (Silver Oak 3)

Well: SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H

North Reference: Grid

Wellbore: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Survey Calculation Method: Minimum Curvature

Design: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Database: EDM 5000.1 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)
5,540.00	90.80	270.50	4,725.17	-24.27	-979.28	979.47	0.57	-0.53	0.21
5,635.00	91.00	271.20	4,723.67	-22.86	-1,074.26	1,074.43	0.77	0.21	0.74
5,729.00	91.20	271.80	4,721.87	-20.40	-1,168.21	1,168.35	0.67	0.21	0.64
5,824.00	90.50	271.10	4,720.46	-18.00	-1,263.17	1,263.28	1.04	-0.74	-0.74
5,919.00	89.40	269.20	4,720.54	-17.75	-1,358.16	1,358.27	2.31	-1.16	-2.00
6,014.00	89.40	269.50	4,721.54	-18.83	-1,453.15	1,453.26	0.32	0.00	0.32
6,109.00	88.90	269.60	4,722.95	-19.57	-1,548.14	1,548.25	0.54	-0.53	0.11
6,204.00	90.20	268.60	4,723.69	-21.07	-1,643.12	1,643.25	1.73	1.37	-1.05
6,299.00	89.20	268.10	4,724.19	-23.80	-1,738.08	1,738.22	1.18	-1.05	-0.53
6,393.00	90.30	269.00	4,724.60	-26.18	-1,832.04	1,832.21	1.51	1.17	0.96
6,488.00	90.80	269.60	4,723.69	-27.34	-1,927.03	1,927.20	0.82	0.53	0.63
6,583.00	90.40	269.60	4,722.69	-28.00	-2,022.02	2,022.20	0.42	-0.42	0.00
6,678.00	90.20	270.10	4,722.20	-28.25	-2,117.02	2,117.19	0.57	-0.21	0.53
6,773.00	90.30	270.30	4,721.78	-27.92	-2,212.02	2,212.19	0.24	0.11	0.21
6,868.00	89.50	270.50	4,721.95	-27.26	-2,307.02	2,307.17	0.87	-0.84	0.21
6,962.00	90.50	269.60	4,721.95	-27.18	-2,401.01	2,401.16	1.43	1.06	-0.96
7,057.00	90.90	269.90	4,720.79	-27.59	-2,496.01	2,496.16	0.53	0.42	0.32
7,152.00	90.50	270.30	4,719.63	-27.42	-2,591.00	2,591.14	0.60	-0.42	0.42
7,247.00	92.40	269.70	4,717.22	-27.42	-2,685.96	2,686.10	2.10	2.00	-0.63
7,342.00	90.90	268.80	4,714.49	-28.67	-2,780.91	2,781.06	1.84	-1.58	-0.95
7,437.00	89.30	268.00	4,714.32	-31.32	-2,875.87	2,876.04	1.88	-1.68	-0.84
7,531.00	90.40	269.40	4,714.57	-33.45	-2,969.84	2,970.03	1.89	1.17	1.49
7,626.00	90.90	270.30	4,713.49	-33.70	-3,064.83	3,065.02	1.08	0.53	0.95
7,721.00	90.10	270.00	4,712.66	-33.45	-3,159.83	3,160.01	0.90	-0.84	-0.32
7,816.00	89.80	270.30	4,712.74	-33.20	-3,254.83	3,255.00	0.45	-0.32	0.32
7,911.00	91.20	269.80	4,711.91	-33.12	-3,349.82	3,349.99	1.56	1.47	-0.53
8,005.00	91.10	270.10	4,710.03	-33.20	-3,443.80	3,443.96	0.34	-0.11	0.32
8,100.00	91.30	270.30	4,708.04	-32.87	-3,538.78	3,538.93	0.30	0.21	0.21
8,195.00	90.90	270.70	4,706.21	-32.04	-3,633.76	3,633.90	0.60	-0.42	0.42
8,290.00	90.10	269.20	4,705.39	-32.13	-3,728.75	3,728.89	1.79	-0.84	-1.58
8,384.00	90.80	268.40	4,704.65	-34.09	-3,822.73	3,822.88	1.13	0.74	-0.85
8,479.00	90.40	268.30	4,703.65	-36.83	-3,917.68	3,917.86	0.43	-0.42	-0.11
8,573.00	91.10	269.50	4,702.42	-38.63	-4,011.66	4,011.84	1.48	0.74	1.28
8,668.00	91.40	269.80	4,700.35	-39.21	-4,106.63	4,106.82	0.45	0.32	0.32
8,763.00	91.30	270.10	4,698.11	-39.30	-4,201.61	4,201.79	0.33	-0.11	0.32
8,857.00	91.20	270.60	4,696.06	-38.72	-4,295.58	4,295.75	0.54	-0.11	0.53
8,952.00	90.50	268.80	4,694.65	-39.22	-4,390.56	4,390.74	2.03	-0.74	-1.89
9,047.00	89.30	268.50	4,694.82	-41.46	-4,485.54	4,485.73	1.30	-1.26	-0.32
9,141.00	91.00	268.00	4,694.57	-44.33	-4,579.49	4,579.70	1.89	1.81	-0.53
9,235.00	90.70	267.90	4,693.18	-47.69	-4,673.42	4,673.66	0.34	-0.32	-0.11
9,329.00	90.00	267.70	4,692.60	-51.30	-4,767.35	4,767.62	0.77	-0.74	-0.21



TDS
Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Carmen 3 Fed Com #13H
Well: SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H
Wellbore: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E
Design: BHL: 1682' FNL, 220' FWL, Sec 3, T17S, R30E, Unit E

Local Co-ordinate Reference: Well SHL: 1650' FNL, 150' FEL, Sec 3, T17S, R30E, Unit H
TVD Reference: KB @ 3770.00usft (Silver Oak 3)
MD Reference: KB @ 3770.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 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)
9,401.00	90.60	268.10	4,692.23	-53.94	-4,839.30	4,839.59	1.00	0.83	0.56
Last TDS MWD Survey									
9,463.00	90.60	268.10	4,691.58	-55.99	-4,901.26	4,901.57	0.00	0.00	0.00
Projection to Bit/TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,420.00	1,419.87	-2.94	14.79	Tie-In to VES Gyro
1,503.00	1,502.87	-2.83	15.85	First TDS MWD Survey
4,708.47	4,596.03	-27.88	-180.06	As-Drilled PP
9,401.00	4,692.23	-53.94	-4,839.30	Last TDS MWD Survey
9,463.00	4,691.58	-55.99	-4,901.26	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____



NM OIL CONSERVATION
ARTESIA DISTRICT

MAY 24 2017

RECEIVED

January 24, 2017

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

Attn: Kanicia Castillo

RE: **Carmen 3 Federal Com No. 013H**

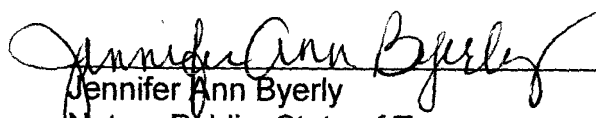
Please find enclosed a copy of the survey from 0' to 1420' ran on the above referenced well.

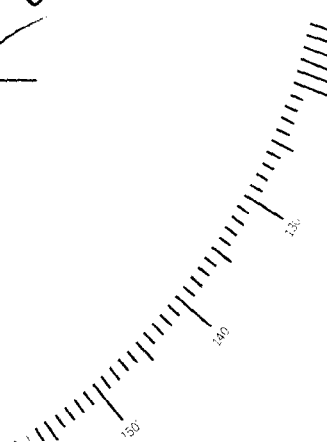
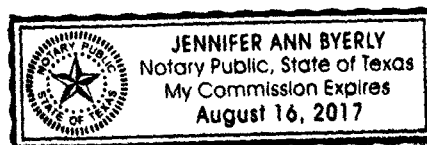
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 24th day of January
A.D., 2017, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: Concho Oil & Gas
Lease/Well: Carmen 3 Federal Com No./013H

Rig Name: Silver Oak 3
State/County: New Mexico/Eddy
VS-Azi: 0.00 Degrees

Latitude: 32.86611, Longitude: -103.95114
Grid North = True North -0.21 degs (NAD 27)
Grid Correction Applied = -0.21 degs

VES SURVEY

Depth Reference : RKB= 18 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS
Filename: carmen 3 fedcom 13h-de_01.ut
Minimum Curvature Method
Report Date/Time: 1/24/2017 / 13:08

VES Survey International
Fort Worth, Texas
Office 817-741-3610

Surveyor: Gregg Wilson

Carmen 3 Federal Com No. 013H / API 30-015-43644

NEW OIL CONSERVATION
ARTESIA DISTRICT

MAY 24 2017

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	****
25.00	0.22	326.87	25.00	0.04	-0.03	0.04	0.05	326.87	0.88
50.00	0.24	281.65	50.00	0.09	-0.10	0.09	0.14	311.10	0.72
75.00	0.29	251.72	75.00	0.08	-0.22	0.08	0.23	290.84	0.57
100.00	0.21	244.24	100.00	0.04	-0.32	0.04	0.32	277.78	0.35
125.00	0.28	247.01	125.00	0.00	-0.41	0.00	0.41	269.98	0.30
150.00	0.18	273.22	150.00	-0.02	-0.51	-0.02	0.51	267.54	0.57
175.00	0.16	350.82	175.00	0.02	-0.55	0.02	0.55	271.61	0.86
200.00	0.38	18.97	200.00	0.13	-0.53	0.13	0.55	283.66	0.99
225.00	0.47	48.04	225.00	0.28	-0.43	0.28	0.51	302.76	0.92
250.00	0.71	53.86	250.00	0.44	-0.23	0.44	0.49	332.49	1.02
275.00	0.93	60.73	274.99	0.63	0.08	0.63	0.63	6.93	0.95
300.00	0.98	62.68	299.99	0.82	0.44	0.82	0.94	28.27	0.24
325.00	0.96	68.50	324.99	1.00	0.83	1.00	1.30	39.67	0.40
350.00	0.85	79.77	349.98	1.11	1.21	1.11	1.64	47.41	0.85
375.00	0.76	95.34	374.98	1.13	1.56	1.13	1.92	54.05	0.94
400.00	0.92	106.68	399.98	1.05	1.91	1.05	2.18	61.12	0.92

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
425.00	1.03	119.85	424.97	0.89	2.30	0.89	2.46	68.93	0.99
450.00	0.99	124.13	449.97	0.65	2.67	0.65	2.75	76.27	0.33
475.00	0.86	125.26	474.97	0.42	3.01	0.42	3.04	82.00	0.53
500.00	0.86	125.24	499.96	0.21	3.31	0.21	3.32	86.46	0.01
525.00	0.70	128.27	524.96	0.00	3.59	0.00	3.59	89.98	0.67
550.00	0.53	128.94	549.96	-0.17	3.80	-0.17	3.80	92.51	0.69
575.00	0.59	139.12	574.96	-0.34	3.97	-0.34	3.99	94.84	0.45
600.00	0.66	132.37	599.96	-0.53	4.16	-0.53	4.20	97.26	0.42
625.00	0.52	130.42	624.96	-0.70	4.36	-0.70	4.41	99.15	0.57
650.00	0.56	150.35	649.96	-0.88	4.50	-0.88	4.59	101.07	0.76
675.00	0.62	134.98	674.95	-1.08	4.66	-1.08	4.78	103.08	0.67
700.00	0.71	136.31	699.95	-1.29	4.86	-1.29	5.03	104.86	0.38
725.00	0.84	140.72	724.95	-1.54	5.08	-1.54	5.31	106.89	0.55
750.00	0.70	129.00	749.95	-1.78	5.32	-1.78	5.61	108.51	0.84
775.00	0.50	117.89	774.95	-1.93	5.53	-1.93	5.86	109.20	0.90
800.00	0.53	121.61	799.95	-2.04	5.73	-2.04	6.08	109.59	0.16
825.00	0.77	123.69	824.94	-2.19	5.96	-2.19	6.35	110.17	0.97
850.00	0.74	113.95	849.94	-2.35	6.25	-2.35	6.68	110.60	0.52
875.00	0.57	114.93	874.94	-2.47	6.51	-2.47	6.96	110.76	0.70
900.00	0.63	122.26	899.94	-2.59	6.74	-2.59	7.22	111.05	0.39
925.00	0.71	112.93	924.94	-2.73	7.00	-2.73	7.51	111.29	0.54
950.00	0.66	107.61	949.94	-2.83	7.28	-2.83	7.81	111.25	0.32
975.00	0.60	101.24	974.93	-2.90	7.55	-2.90	8.09	111.03	0.36
1000.00	0.69	114.31	999.93	-2.99	7.81	-2.99	8.37	110.93	0.68
1025.00	0.79	103.13	1024.93	-3.09	8.12	-3.09	8.69	110.84	0.70
1050.00	0.74	84.90	1049.93	-3.11	8.45	-3.11	9.00	110.24	0.99
1075.00	0.72	93.25	1074.93	-3.11	8.76	-3.11	9.30	109.53	0.43
1100.00	0.70	92.04	1099.92	-3.12	9.08	-3.12	9.60	108.99	0.11
1125.00	0.78	96.11	1124.92	-3.15	9.40	-3.15	9.91	108.51	0.39
1150.00	0.94	86.89	1149.92	-3.15	9.77	-3.15	10.27	107.87	0.88
1175.00	1.02	88.76	1174.92	-3.13	10.20	-3.13	10.67	107.06	0.36
1200.00	1.10	93.63	1199.91	-3.14	10.66	-3.14	11.11	106.42	0.48
1225.00	1.23	92.13	1224.91	-3.17	11.17	-3.17	11.61	105.83	0.57
1250.00	1.20	84.41	1249.90	-3.15	11.70	-3.15	12.11	105.08	0.67
1275.00	1.05	87.41	1274.90	-3.11	12.18	-3.11	12.58	104.34	0.65
1300.00	1.16	95.55	1299.89	-3.13	12.66	-3.13	13.04	103.88	0.77
1325.00	1.19	92.27	1324.89	-3.16	13.17	-3.16	13.55	103.50	0.30
1350.00	1.06	86.39	1349.88	-3.16	13.67	-3.16	14.03	103.02	0.68
1375.00	0.99	75.95	1374.88	-3.09	14.11	-3.09	14.44	102.37	0.81

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
1400.00	0.90	75.95	1399.87	-2.99	14.51	-2.99	14.81	101.66	0.33
1420.00	0.78	80.86	1419.87	-2.93	14.79	-2.93	15.08	101.21	0.73



VES Survey International
Fort Worth, Texas
Office 817-741-3610
Surveyor: Gregg Wilson
Carmen 3 Federal Com No. 013H / API 30-015-43644



20

0
-S/+N

Depth=0.0, Inc=0.0, AzG=0.0
Depth=1420.0, Inc=0.8, AzG=80.9

0

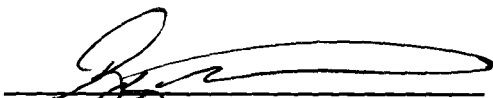
20

-W/+E

V.E.S. Survey Date: 4/17/2017

VES SURVEY

I Gregg Wilson certify that I am employed by VES Survey International. That I did on the day(s) of 01/17/17 through 01/17/17 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 1,420.00 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 Oil & Gas for the Carmen 3 Fedcom Well # 13H API # 30-015-43644 in Eddy 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.



Gregg Wilson
Service Technician
VES Survey International

NM OIL CONSERVATION
ARTESIA DISTRICT

MAY 24 2017

RECEIVED