



NM OIL CONSERVATION
ARTESIA DISTRICT

NOV 14 2016

RECEIVED

7/13/16

State of New Mexico
County of Eddy

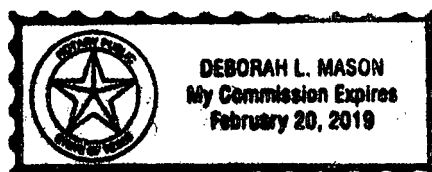
15-43667

I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 06/22/2016 through 07/03/2016 conduct or supervise the taking of a MWD survey from a depth of 2103 feet to a depth of 11456 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Terra Directional Services LLC; that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating LLC for the Puckett 13 Federal Com #17H Well API 30-015-43667 in Eddy County, New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Terra Directional Services LLC.

Donald D. Mason
President

State of Texas
County of Burnet

Before me, a notary public, on this day personally appeared Donald D. Mason, known to me to be the person whose name is subscribed to the foregoing document and, being by me first duly sworn, declared that the statements therein contained are true and correct.



Notary Public's Signature



COG Operating LLC

Eddy County, NM (NAD-27 2015)

Puckett 13 Federal Com #17H

API #: 30-015-43667

SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P

PP: 990' FSL, 904' FEL, Sec 12, T17S, R31E, Unit P

BHL: 375' FSL, 971' FEL, Sec 13, T17S, R31E, Unit P

Design: BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P

Standard Survey Report

04 July, 2016

NM OIL CONSERVATION
ARTESIA DISTRICT

NOV 14 2016

RECEIVED





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3992.00usft (Silver Oak 3)
Site:	Puckett 13 Federal Com #17H	MD Reference:	KB @ 3992.00usft (Silver Oak 3)
Well:	SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P	North Reference:	Grid
Wellbore:	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P	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	Puckett 13 Federal Com #17H		
Site Position:		Northing:	671,515.80 usft
From:	Map	Easting:	658,857.10 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 50' 42.046 N
		Longitude:	103° 48' 57.908 W
		Grid Convergence:	0.28 °

Well	SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P		
Well Position	+N/-S	0.00 usft	Northing: 671,515.80 usft
	+E/-W	0.00 usft	Easting: 658,857.10 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 50' 42.046 N
		Longitude:	103° 48' 57.908 W
		Ground Level:	3,974.00 usft

Wellbore	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	6/2/2016	7.23	60.61	48,384

Design	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P			
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	182.77

Survey Program	Date 7/4/2016				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,000.00	VES Gyro #1 (BHL: 350' FSL, 970' FEL, S	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro	
2,103.00	11,456.00	TDS MWD #2 (BHL: 350' FSL, 970' FEL, S	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	
100.00	0.35	217.30	100.00	-0.24	-0.19	0.25	0.35	0.35	0.00	
200.00	0.24	218.57	200.00	-0.65	-0.50	0.67	0.11	-0.11	1.27	
300.00	0.37	209.32	300.00	-1.09	-0.79	1.13	0.14	0.13	-9.25	
400.00	0.22	194.68	400.00	-1.56	-1.00	1.61	0.17	-0.15	-14.64	
500.00	0.35	220.99	499.99	-1.98	-1.25	2.04	0.18	0.13	26.31	
600.00	0.30	217.75	599.99	-2.42	-1.61	2.49	0.05	-0.05	-3.24	



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3992.00usft (Silver Oak 3)
Site:	Puckett 13 Federal Com #17H	MD Reference:	KB @ 3992.00usft (Silver Oak 3)
Well:	SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P	North Reference:	Grid
Wellbore:	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P	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)
700.00	0.19	247.61	699.99	-2.69	-1.92	2.78	0.17	-0.11	29.86
800.00	0.25	252.87	799.99	-2.81	-2.28	2.92	0.06	0.06	5.26
900.00	0.19	244.10	899.99	-2.95	-2.64	3.07	0.07	-0.06	-8.77
1,000.00	0.25	205.14	999.99	-3.22	-2.88	3.36	0.16	0.06	-38.96
1,100.00	0.25	155.43	1,099.99	-3.62	-2.88	3.75	0.21	0.00	-49.71
1,200.00	0.33	126.88	1,199.99	-3.99	-2.56	4.11	0.16	0.08	-28.55
1,300.00	0.17	112.90	1,299.99	-4.22	-2.19	4.32	0.17	-0.16	-13.98
1,400.00	0.40	83.23	1,399.99	-4.23	-1.71	4.31	0.27	0.23	-29.67
1,500.00	0.75	61.45	1,499.98	-3.88	-0.79	3.91	0.41	0.35	-21.78
1,600.00	0.73	49.95	1,599.97	-3.16	0.27	3.14	0.15	-0.02	-11.50
1,700.00	0.88	69.11	1,699.96	-2.47	1.48	2.40	0.31	0.15	19.16
1,800.00	1.24	66.74	1,799.94	-1.77	3.19	1.62	0.36	0.36	-2.37
1,900.00	1.60	75.22	1,899.91	-0.99	5.53	0.72	0.42	0.36	8.48
2,000.00	1.52	75.94	1,999.88	-0.31	8.17	-0.08	0.08	-0.08	0.72
Tie-In to VES Gyro									
2,103.00	1.40	81.20	2,102.84	0.21	10.74	-0.73	0.17	-0.12	5.11
First TDS MWD Survey									
2,166.00	1.10	20.40	2,165.83	0.90	11.71	-1.46	2.05	-0.48	-96.51
2,228.00	1.80	277.90	2,227.82	1.59	10.95	-2.12	3.72	1.13	-165.32
2,322.00	4.00	275.30	2,321.69	2.10	6.23	-2.39	2.34	2.34	-2.77
2,415.00	5.60	278.30	2,414.36	3.05	-1.50	-2.97	1.74	1.72	3.23
2,508.00	5.90	295.20	2,506.90	5.74	-10.31	-5.24	1.84	0.32	18.17
2,601.00	8.80	308.70	2,599.13	12.23	-20.19	-11.24	3.61	3.12	14.52
2,695.00	9.00	308.20	2,692.00	21.27	-31.58	-19.72	0.23	0.21	-0.53
2,789.00	8.40	307.00	2,784.92	29.95	-42.84	-27.84	0.67	-0.64	-1.28
2,882.00	7.80	306.20	2,876.99	37.76	-53.36	-35.14	0.66	-0.65	-0.86
2,976.00	8.10	299.60	2,970.09	44.80	-64.26	-41.64	1.02	0.32	-7.02
3,069.00	8.30	300.90	3,062.14	51.48	-75.72	-47.76	0.29	0.22	1.40
3,163.00	8.00	301.00	3,155.19	58.34	-87.15	-54.06	0.32	-0.32	0.11
3,256.00	8.90	292.80	3,247.18	64.46	-99.33	-59.58	1.61	0.97	-8.82
3,350.00	8.80	291.00	3,340.06	69.85	-112.75	-64.32	0.31	-0.11	-1.91
3,443.00	8.60	292.20	3,431.99	75.03	-125.83	-68.86	0.29	-0.22	1.29
3,536.00	9.00	294.30	3,523.90	80.65	-138.89	-73.84	0.55	0.43	2.26
3,630.00	8.90	295.50	3,616.76	86.81	-152.16	-79.35	0.23	-0.11	1.28
3,723.00	9.30	295.30	3,708.58	93.11	-165.44	-85.01	0.43	0.43	-0.22
3,816.00	9.20	295.30	3,800.38	99.50	-178.96	-90.74	0.11	-0.11	0.00
3,909.00	9.50	298.00	3,892.14	106.28	-192.46	-96.86	0.57	0.32	2.90
4,002.00	7.80	292.90	3,984.08	112.34	-205.05	-102.30	2.00	-1.83	-5.48
4,095.00	7.90	289.60	4,076.21	116.94	-216.88	-106.32	0.50	0.11	-3.55
4,189.00	7.70	290.90	4,169.34	121.36	-228.85	-110.15	0.28	-0.21	1.38
4,282.00	8.10	291.00	4,261.46	125.93	-240.79	-114.14	0.43	0.43	0.11



TDS
Survey Report



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Wellbore:	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P	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)
4,375.00	8.30	291.80	4,353.51	130.77	-253.14	-118.38	0.25	0.22	0.86
4,468.00	6.60	294.60	4,445.72	135.49	-264.23	-122.56	1.87	-1.83	3.01
4,561.00	5.10	304.90	4,538.23	140.08	-272.48	-126.74	1.96	-1.61	11.08
4,655.00	3.60	299.40	4,631.96	143.92	-278.48	-130.29	1.65	-1.60	-5.85
4,748.00	1.20	306.40	4,724.87	145.93	-281.81	-132.14	2.60	-2.58	7.53
4,842.00	1.10	157.10	4,818.87	145.68	-282.25	-131.87	2.36	-0.11	-158.83
4,873.00	1.80	159.70	4,849.85	144.95	-281.96	-131.15	2.27	2.26	8.39
4,904.00	3.90	162.30	4,880.81	143.49	-281.47	-129.72	6.79	6.77	8.39
4,935.00	7.20	170.20	4,911.67	140.57	-280.82	-126.83	10.90	10.65	25.48
4,966.00	10.70	174.90	4,942.28	135.79	-280.24	-122.08	11.52	11.29	15.16
4,997.00	13.50	179.90	4,972.59	129.30	-279.97	-115.62	9.64	9.03	16.13
5,028.00	16.70	181.30	5,002.52	121.23	-280.07	-107.55	10.39	10.32	4.52
5,059.00	19.60	182.10	5,031.97	111.58	-280.36	-97.90	9.39	9.35	2.58
5,090.00	22.80	179.80	5,060.87	100.37	-280.53	-86.70	10.66	10.32	-7.42
5,121.00	25.80	176.10	5,089.12	87.63	-280.05	-73.99	10.85	9.68	-11.94
5,152.00	28.30	175.00	5,116.73	73.58	-278.95	-60.01	8.22	8.06	-3.55
5,183.00	31.30	174.20	5,143.63	58.24	-277.50	-44.76	9.76	9.68	-2.58
5,214.00	35.20	174.30	5,169.55	41.33	-275.79	-27.96	12.58	12.58	0.32
5,245.00	38.70	174.60	5,194.32	22.79	-273.99	-9.52	11.31	11.29	0.97
5,276.00	41.50	175.30	5,218.03	2.90	-272.24	10.26	9.15	9.03	2.26
5,308.00	43.60	176.10	5,241.60	-18.68	-270.62	31.73	6.78	6.56	2.50
5,339.00	44.40	176.50	5,263.90	-40.17	-269.23	53.13	2.73	2.58	1.29
5,370.00	45.10	176.70	5,285.92	-61.95	-267.94	74.83	2.30	2.26	0.65
5,401.00	45.50	177.00	5,307.72	-83.95	-266.73	96.75	1.46	1.29	0.97
5,433.00	46.30	177.50	5,329.99	-106.91	-265.62	119.62	2.74	2.50	1.56
5,464.00	47.10	177.30	5,351.25	-129.45	-264.60	142.08	2.62	2.58	-0.65
5,495.00	47.90	177.90	5,372.19	-152.28	-263.64	164.84	2.95	2.58	1.94
5,520.96	48.74	177.73	5,389.46	-171.65	-262.91	184.16	3.26	3.23	-0.65
As-Drilled PP									
5,526.00	48.90	177.70	5,392.78	-175.44	-262.75	187.94	3.26	3.23	-0.64
5,558.00	50.90	177.50	5,413.39	-199.90	-261.73	212.31	6.27	6.25	-0.63
5,589.00	55.00	177.90	5,432.06	-224.62	-260.74	236.95	13.27	13.23	1.29
5,620.00	58.80	178.40	5,448.99	-250.57	-259.90	262.83	12.33	12.26	1.61
5,651.00	62.00	179.00	5,464.30	-277.51	-259.29	289.72	10.46	10.32	1.94
5,682.00	65.10	179.70	5,478.10	-305.26	-258.98	317.42	10.20	10.00	2.26
5,713.00	67.70	180.20	5,490.51	-333.66	-258.96	345.79	8.52	8.39	1.61
5,744.00	70.70	180.90	5,501.52	-362.64	-259.24	374.74	9.90	9.68	2.26
5,775.00	73.10	181.40	5,511.15	-392.10	-259.83	404.20	7.89	7.74	1.61
5,807.00	75.30	181.20	5,519.86	-422.88	-260.53	434.97	6.90	6.88	-0.63
5,838.00	77.60	181.10	5,527.13	-453.01	-261.13	465.10	7.43	7.42	-0.32
5,869.00	79.70	181.10	5,533.23	-483.39	-261.72	495.48	6.77	6.77	0.00



TDS
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5,900.00	82.20	181.00	5,538.10	-514.00	-262.28	526.07	8.07	8.06	-0.32	
5,931.00	83.70	180.60	5,541.91	-544.76	-262.71	556.82	5.01	4.84	-1.29	
5,967.00	85.80	181.00	5,545.20	-580.61	-263.21	592.65	5.94	5.83	1.11	
5,998.00	87.90	181.40	5,546.90	-611.55	-263.86	623.59	6.90	6.77	1.29	
6,029.00	88.70	182.00	5,547.82	-642.52	-264.77	654.57	3.23	2.58	1.94	
6,061.00	88.60	182.20	5,548.58	-674.49	-265.95	686.56	0.70	-0.31	0.63	
6,091.00	89.30	182.60	5,549.13	-704.46	-267.20	716.55	2.69	2.33	1.33	
6,123.00	90.80	182.90	5,549.10	-736.42	-268.74	748.55	4.78	4.69	0.94	
6,154.00	90.90	183.40	5,548.64	-767.37	-270.44	779.55	1.64	0.32	1.61	
6,247.00	91.00	181.70	5,547.10	-860.26	-274.58	872.53	1.83	0.11	-1.83	
6,341.00	91.80	179.60	5,544.80	-954.22	-275.64	966.43	2.39	0.85	-2.23	
6,434.00	91.30	179.70	5,542.29	-1,047.19	-275.08	1,059.26	0.55	-0.54	0.11	
6,527.00	91.00	180.40	5,540.42	-1,140.17	-275.16	1,152.13	0.82	-0.32	0.75	
6,622.00	90.70	180.80	5,539.01	-1,235.15	-276.15	1,247.05	0.53	-0.32	0.42	
6,715.00	90.50	181.30	5,538.04	-1,328.13	-277.86	1,340.01	0.58	-0.22	0.54	
6,809.00	91.00	180.50	5,536.81	-1,422.11	-279.33	1,433.95	1.00	0.53	-0.85	
6,902.00	90.70	181.20	5,535.43	-1,515.09	-280.71	1,526.89	0.82	-0.32	0.75	
6,996.00	92.30	180.80	5,532.97	-1,609.04	-282.35	1,620.80	1.75	1.70	-0.43	
7,088.00	91.90	181.50	5,529.59	-1,700.96	-284.20	1,712.71	0.88	-0.43	0.76	
7,182.00	91.60	179.80	5,526.72	-1,794.91	-285.26	1,806.59	1.84	-0.32	-1.81	
7,276.00	91.30	180.10	5,524.34	-1,888.87	-285.18	1,900.45	0.45	-0.32	0.32	
7,370.00	91.20	180.30	5,522.29	-1,982.85	-285.51	1,994.33	0.24	-0.11	0.21	
7,463.00	90.90	180.20	5,520.59	-2,075.84	-285.92	2,087.23	0.34	-0.32	-0.11	
7,557.00	90.80	180.50	5,519.20	-2,169.82	-286.49	2,181.13	0.34	-0.11	0.32	
7,650.00	90.70	178.50	5,517.98	-2,262.81	-285.68	2,273.97	2.15	-0.11	-2.15	
7,742.00	90.40	179.00	5,517.09	-2,354.78	-283.67	2,365.74	0.63	-0.33	0.54	
7,836.00	90.10	179.50	5,516.68	-2,448.77	-282.44	2,459.56	0.62	-0.32	0.53	
7,929.00	91.20	178.90	5,515.63	-2,541.75	-281.14	2,552.37	1.35	1.18	-0.65	
8,023.00	91.00	179.40	5,513.82	-2,635.73	-279.75	2,646.17	0.57	-0.21	0.53	
8,116.00	90.80	179.70	5,512.36	-2,728.71	-279.02	2,739.01	0.39	-0.22	0.32	
8,209.00	90.20	180.20	5,511.55	-2,821.71	-278.94	2,831.89	0.84	-0.65	0.54	
8,302.00	89.80	180.60	5,511.55	-2,914.70	-279.59	2,924.81	0.61	-0.43	0.43	
8,396.00	90.80	179.40	5,511.06	-3,008.70	-279.59	3,018.70	1.66	1.06	-1.28	
8,489.00	90.60	179.70	5,509.92	-3,101.69	-278.86	3,111.54	0.39	-0.22	0.32	
8,583.00	92.00	180.10	5,507.79	-3,195.66	-278.69	3,205.40	1.55	1.49	0.43	
8,674.00	91.90	180.50	5,504.69	-3,286.61	-279.17	3,296.26	0.45	-0.11	0.44	
8,705.00	92.00	180.70	5,503.64	-3,317.59	-279.49	3,327.22	0.72	0.32	0.65	
8,799.00	91.80	181.30	5,500.52	-3,411.52	-281.13	3,421.12	0.67	-0.21	0.64	
8,864.00	91.60	181.40	5,498.60	-3,476.48	-282.66	3,486.07	0.34	-0.31	0.15	
8,927.00	92.30	181.90	5,496.45	-3,539.41	-284.48	3,549.03	1.37	1.11	0.79	
9,020.00	91.00	181.10	5,493.77	-3,632.34	-286.91	3,641.96	1.64	-1.40	-0.86	



TDS
Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Puckett 13 Federal Com #17H
Well: SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P
Wellbore: BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P
Design: BHL: 350' FSL, 970' FEL, Sec 13, T17S, R31E, Unit P
Local Co-ordinate Reference: Well SHL: 1160' FSL, 640' FEL, Sec 12, T17S, R31E, Unit P
TVD Reference: KB @ 3992.00usft (Silver Oak 3)
MD Reference: KB @ 3992.00usft (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)
9,113.00	91.30	178.50	5,491.91	-3,725.31	-286.58	3,734.81	2.81	0.32	-2.80
9,207.00	92.80	178.80	5,488.54	-3,819.22	-284.37	3,828.50	1.63	1.60	0.32
9,300.00	90.60	179.50	5,485.79	-3,912.17	-282.99	3,921.27	2.48	-2.37	0.75
9,393.00	91.80	180.00	5,483.84	-4,005.14	-282.59	4,014.12	1.40	1.29	0.54
9,486.00	91.10	179.20	5,481.48	-4,098.11	-281.94	4,106.95	1.14	-0.75	-0.86
9,579.00	92.40	179.70	5,478.64	-4,191.06	-281.05	4,199.74	1.50	1.40	0.54
9,674.00	90.20	179.60	5,476.49	-4,286.03	-280.47	4,294.57	2.32	-2.32	-0.11
9,768.00	91.00	179.90	5,475.51	-4,380.02	-280.05	4,388.44	0.91	0.85	0.32
9,861.00	89.70	179.50	5,474.94	-4,473.02	-279.57	4,481.30	1.46	-1.40	-0.43
9,954.00	90.80	180.00	5,474.53	-4,566.01	-279.16	4,574.17	1.30	1.18	0.54
10,048.00	91.90	180.60	5,472.32	-4,658.98	-279.65	4,668.05	1.33	1.17	0.64
10,141.00	90.60	180.40	5,470.29	-4,752.96	-280.47	4,760.96	1.41	-1.40	-0.22
10,234.00	91.70	180.70	5,468.42	-4,845.93	-281.36	4,853.87	1.23	1.18	0.32
10,327.00	91.10	180.30	5,466.15	-4,938.90	-282.17	4,946.76	0.78	-0.65	-0.43
10,421.00	89.40	180.40	5,465.74	-5,032.89	-282.74	5,040.68	1.81	-1.81	0.11
10,514.00	90.30	180.70	5,465.98	-5,125.89	-283.64	5,133.60	1.02	0.97	0.32
10,609.00	91.40	181.10	5,464.57	-5,220.86	-285.13	5,228.54	1.23	1.16	0.42
10,702.00	91.60	180.60	5,462.14	-5,313.82	-286.51	5,321.46	0.58	0.22	-0.54
10,796.00	89.90	180.60	5,460.91	-5,407.80	-287.49	5,415.38	1.81	-1.81	0.00
10,889.00	90.50	181.10	5,460.58	-5,500.79	-288.87	5,508.33	0.84	0.65	0.54
10,983.00	91.60	181.20	5,458.86	-5,594.76	-290.76	5,602.27	1.18	1.17	0.11
11,077.00	90.20	180.30	5,457.38	-5,688.73	-291.99	5,696.20	1.77	-1.49	-0.96
11,170.00	91.20	180.40	5,456.25	-5,781.72	-292.56	5,789.11	1.08	1.08	0.11
11,263.00	92.10	181.10	5,453.57	-5,874.68	-293.77	5,882.01	1.23	0.97	0.75
11,357.00	90.90	180.50	5,451.11	-5,968.63	-295.08	5,975.92	1.43	-1.28	-0.64
Final TDS MWD Survey									
11,456.00	90.90	180.50	5,449.56	-6,067.62	-295.95	6,074.83	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)	
2,000.00	1,999.88	-0.31	8.17	Tie-In to VES Gyro
2,103.00	2,102.84	0.21	10.74	First TDS MWD Survey
5,520.96	5,389.46	-171.65	-262.91	As-Drilled PP
11,357.00	5,451.11	-5,968.63	-295.08	Final TDS MWD Survey
11,456.00	5,449.56	-6,067.62	-295.95	Projection to Bit/TD

Checked By:

Deborah L. Mason

Approved By:

James H.

Date:

7/13/2016





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

July 13, 2016

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

RE: Puckett 13 Federal Com 17H
1160' FSL & 640' FEL
Sec. 12, T17S, R31E
Eddy County, New Mexico

Dear Sir,

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

Very truly yours,

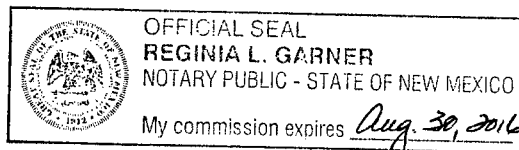
A handwritten signature in cursive script that reads "Graham".

Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 13th day of July, 2016.

A handwritten signature in cursive script that reads "Regina L. Garner".

Notary Public

Puckett 13 Fed Com 17H

Date	Depth	Deviation	Direction
6/19/2016	147	0.30	
6/19/2016	380	0.50	
6/19/2016	714	0.10	
6/21/2016	981	0.50	
6/21/2016	1448	0.70	
6/21/2016	1698	0.90	
6/22/2016	2103	1.40	81.20
6/22/2016	2166	1.10	201.00
6/22/2016	2228	1.80	277.90
6/22/2016	2322	4.00	275.30
6/22/2016	2415	5.60	278.30
6/22/2016	2508	5.90	295.20
6/22/2016	2601	8.80	308.70
6/22/2016	2695	9.00	308.24
6/22/2016	2784	8.40	307.00
6/22/2016	2882	7.80	306.20
6/23/2016	2976	8.10	299.60
6/23/2016	3069	8.30	300.90
6/23/2016	3163	8.00	301.00
6/23/2016	3256	8.90	292.80
6/23/2016	3433	8.60	292.20
6/23/2016	3536	9.00	294.30
6/23/2016	3630	8.90	295.50
6/23/2016	3723	9.30	295.30
6/23/2016	3816	9.20	295.30
6/23/2016	3909	9.50	298.00
6/23/2016	4002	7.80	292.90
6/23/2016	4095	7.90	289.60
6/23/2016	4189	7.70	290.90
6/23/2016	4282	8.10	291.00
6/23/2016	4561	5.40	304.90
6/23/2016	4655	3.60	299.40
6/24/2016	4748	1.20	306.40
6/24/2016	4842	1.10	157.10
6/24/2016	4873	1.80	159.70
6/24/2016	4935	7.20	170.20
6/24/2016	4966	10.70	174.90
6/24/2016	5059	19.60	182.10
6/24/2016	5090	22.80	179.80
6/24/2016	5121	25.80	176.10
6/24/2016	5152	28.30	175.00
6/24/2016	5183	31.30	174.20

Date	Depth	Deviation	Direction
6/24/2016	5214	35.20	174.30
6/24/2016	5245	38.70	174.60
6/24/2016	5276	41.50	175.30
6/24/2016	5339	44.40	176.50
6/24/2016	5433	46.30	177.50
6/24/2016	5495	47.90	177.90
6/24/2016	5620	58.80	178.40
6/24/2016	5682	65.10	179.10
6/25/2016	5713	57.70	180.20
6/25/2016	5744	70.70	180.90
6/25/2016	5807	75.30	181.20
6/25/2016	5967	85.80	181.00
6/25/2016	6029	88.70	182.00
6/25/2016	6091	89.30	182.60
6/25/2016	6154	91.90	183.40
6/25/2016	6247	91.00	181.70
6/26/2016	6434	91.30	179.70
6/26/2016	6527	91.00	180.40
6/26/2016	6622	90.70	180.80
6/26/2016	6715	90.50	181.30
6/26/2016	6809	91.00	180.50
6/26/2016	6902	90.70	181.20
6/26/2016	6996	92.30	180.80
6/26/2016	7182	91.60	179.80
6/26/2016	7276	91.30	180.10
6/26/2016	7463	90.90	180.20
6/26/2016	7557	90.80	180.50
6/27/2016	7650	90.70	178.50
6/27/2016	7742	90.40	179.00
6/27/2016	7836	90.10	179.50
6/27/2016	7929	91.20	178.90
6/27/2016	8023	91.00	179.40
6/27/2016	8116	90.80	179.70
6/27/2016	8209	90.20	180.20
6/27/2016	8302	89.80	180.60
6/27/2016	8396	90.80	179.40
6/27/2016	8489	90.60	179.70
6/28/2016	8583	92.00	180.10
6/28/2016	8674	91.90	180.50
6/28/2016	8705	92.00	180.70
7/1/2016	8864	91.60	181.40
7/1/2016	8927	92.30	181.90
7/1/2016	9020	91.00	181.10
7/1/2016	9113	91.30	178.50
7/1/2016	9207	92.80	178.80

Date	Depth	Deviation	Direction
7/1/2016	9300	90.60	179.50
7/2/2016	9393	91.80	180.00
7/2/2016	9486	91.10	179.20
7/2/2016	9579	92.40	179.70
7/2/2016	9674	90.20	179.60
7/2/2016	9768	91.00	179.90
7/2/2016	9861	89.70	179.50
7/2/2016	9954	90.80	180.00
7/2/2016	10048	91.90	180.60
7/2/2016	10141	90.60	180.40
7/2/2016	10234	91.70	180.70
7/2/2016	10327	91.10	180.30
7/3/2016	10421	89.40	180.40
7/3/2016	10514	90.30	180.70
7/3/2016	10609	91.40	181.10
7/3/2016	10702	91.60	180.60
7/3/2016	10796	89.90	180.60
7/3/2016	10889	90.50	181.10
7/3/2016	10983	91.60	181.20
7/3/2016	11077	90.20	180.30
7/3/2016	11170	91.20	180.40
7/3/2016	11263	92.10	181.10
7/3/2016	11357	90.90	180.50



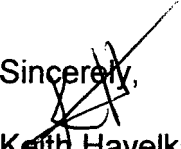
June 30, 2016

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

Attn: Kanicia Castillo

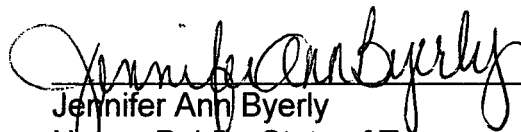
RE: Puckett 13 Federal Com No. 017H

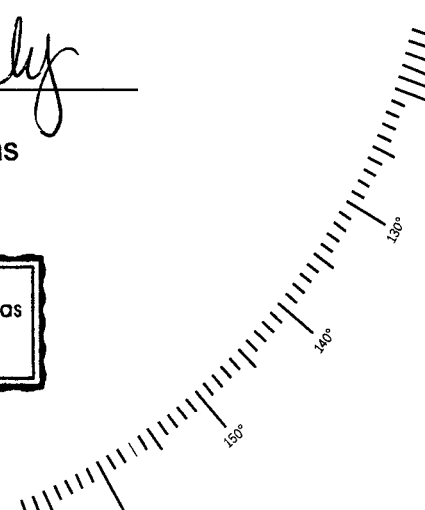
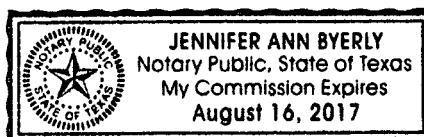
Please find enclosed a copy of the survey from 0' to 2000' ran on the above referenced well.

Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

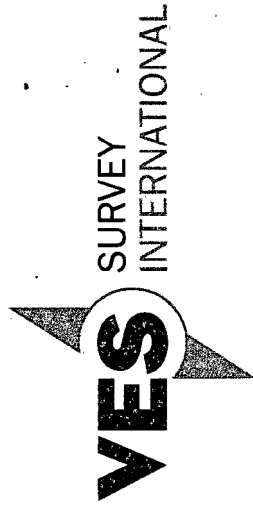
This instrument was acknowledged before me on the 30th day of June, A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG Operating
Lease/Well: Puckett 13 Federal Com No./017H



Rig Name: Silver Oak 3
State/County: New Mexico/Eddy
VS-Azi: 0.00 Degrees
Latitude: 32.84501, Longitude: -103.81609
Grid North = True North -0.28 degs (NAD 27)
Grid Correction Applied = -0.28 degs

Depth Reference : RKB = 18 Foot

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey-de_01.ut
Minimum Curvature Method
Report Date/Time: 6/30/2016 / 14:01

VES Survey International
Midland, Tx
(432) 563-5444

Surveyor: Gene Heiss

Puckett 13 Federal Com No. 017H / API 30-015-43667

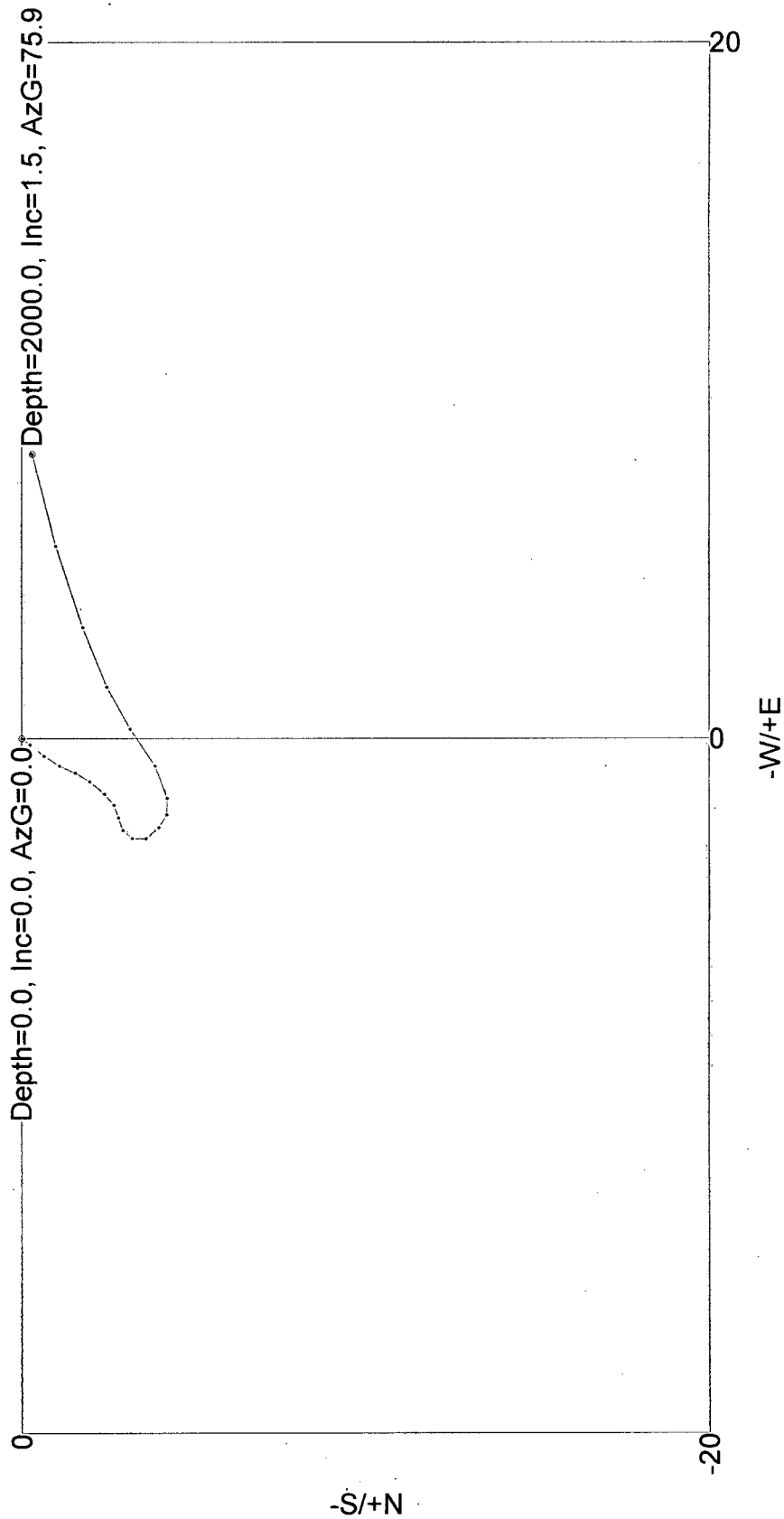
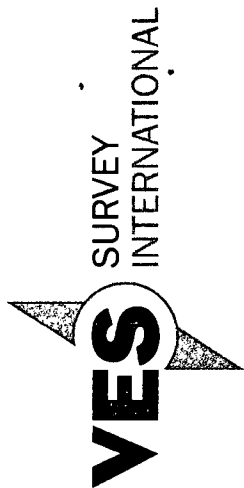
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.35	217.30	100.00	-0.24	-0.18	-0.24	0.30	217.30	0.35
200.00	0.24	218.57	200.00	-0.65	-0.50	-0.65	0.82	217.62	0.11
300.00	0.37	209.32	300.00	-1.09	-0.79	-1.09	1.35	215.79	0.14
400.00	0.22	194.68	400.00	-1.55	-0.99	-1.55	1.84	212.55	0.17
500.00	0.35	220.99	499.99	-1.96	-1.24	-1.96	2.32	212.22	0.18
600.00	0.30	217.75	599.99	-2.40	-1.60	-2.40	2.89	213.64	0.05
700.00	0.19	247.61	699.99	-2.68	-1.92	-2.68	3.29	215.62	0.17
800.00	0.25	252.87	799.99	-2.81	-2.28	-2.81	3.62	219.15	0.06
900.00	0.19	244.10	899.99	-2.94	-2.64	-2.94	3.95	221.91	0.07
1000.00	0.25	205.14	999.99	-3.21	-2.88	-3.21	4.31	221.87	0.16
1100.00	0.25	155.43	1099.99	-3.61	-2.88	-3.61	4.62	218.62	0.21
1200.00	0.33	126.88	1199.99	-3.98	-2.56	-3.98	4.73	212.75	0.17
1300.00	0.17	112.90	1299.99	-4.21	-2.19	-4.21	4.75	207.52	0.18
1400.00	0.40	83.23	1399.99	-4.23	-1.71	-4.23	4.56	202.07	0.27
1500.00	0.75	61.45	1499.98	-3.87	-0.79	-3.87	3.95	191.55	0.40
1600.00	0.73	49.95	1599.97	-3.15	0.27	-3.15	3.16	175.06	0.15

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	0.88	69.11	1699.96	-2.46	1.48	-2.46	2.87	149.04	0.30
1800.00	1.24	66.74	1799.94	-1.76	3.18	-1.76	3.64	118.99	0.36
1900.00	1.60	75.22	1899.91	-0.98	5.52	-0.98	5.61	100.10	0.42
2000.00	1.52	75.94	1999.88	-0.31	8.15	-0.31	8.16	92.15	0.08



VES Survey International
Midland, Tx
(432) 563-5444

Surveyor: Gene Heiss
Puckett 13 Federal Com No. 017H / API 30-015-43667





I Gene Heiss certify that I am employed by VES Survey International. That I did on the day(s) of 06/22/16 through 06/22/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,000.00 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 Puckett 13 Federal Com Well # 17H API # 30-015-43667 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.

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

Gene Heiss
Service Technician
VES Survey International