



HOBBS OCD
OCT 24 2016
RECEIVED

COG Operating LLC

Lea County, NM (NAD-27 2015)

Sneed 9 Federal Com #13H

API #: 30-025-43285

SHL: 1513' FNL, 229' FWL, Sec 9, T17S, R32E, Unit E

PP: 1680' FNL, 330' FWL, Sec 9, T17S, R32E, Unit E

BHL: 1670' FNL, 967' FWL, Sec 10, T17S, R32E, Unit E

Design: Lateral #1

Standard Survey Report

16 August, 2016



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Sneed 9 Federal Com #13H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4094.00usft (Patriot 6)
Site:	Sneed 9 Federal Com #13H	MD Reference:	KB @ 4094.00usft (Patriot 6)
Well:	SHL: 1513' FNL, 229' FWL, Sec 9, T17S, R32E, Unit E	North Reference:	Grid
Wellbore:	BHL: 1670' FNL, 968' FWL, Sec 10, T17S, R32E, Unit E	Survey Calculation Method:	Minimum Curvature
Design:	Lateral #1	Database:	EDM 5000.1 Single User Db

Project	Lea 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	Sneed 9 Federal Com #13H				
Site Position:		Northing:	674,165.50 usft	Latitude:	32° 51' 7.691 N
From:	Map	Easting:	670,296.10 usft	Longitude:	103° 46' 43.664 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.30 °

Well	SHL: 1513' FNL, 229' FWL, Sec 9, T17S, R32E, Unit E					
Well Position	+N/-S	0.00 usft	Northing:	674,165.50 usft	Latitude:	32° 51' 7.691 N
	+E/-W	0.00 usft	Easting:	670,296.10 usft	Longitude:	103° 46' 43.664 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,076.00 usft

Wellbore	BHL: 1670' FNL, 968' FWL, Sec 10, T17S, R32E, Unit E				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/8/2016	7.20	60.62	48,381

Design	Lateral #1				
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	91.29	

Survey Program	Date	8/16/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,213.00	VES Gyro #1 (BHL: 1670' FNL, 968' FWL,	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro	
2,314.00	11,656.00	TDS MWD #2 (BHL: 1670' FNL, 968' 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	
100.00	0.34	218.07	100.00	-0.23	-0.18	-0.18	0.34	0.34	0.00	
200.00	0.25	212.63	200.00	-0.65	-0.48	-0.47	0.09	-0.09	-5.44	
300.00	0.32	223.86	300.00	-1.04	-0.79	-0.77	0.09	0.07	11.23	
400.00	0.37	192.31	400.00	-1.55	-1.06	-1.02	0.19	0.05	-31.55	
500.00	0.33	186.73	499.99	-2.15	-1.16	-1.11	0.05	-0.04	-5.58	
600.00	0.27	178.40	599.99	-2.68	-1.19	-1.13	0.07	-0.06	-8.33	
700.00	0.13	265.58	699.99	-2.92	-1.29	-1.23	0.29	-0.14	87.18	

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Wellbore:	BHL: 1670' FNL, 968' FWL, Sec 10, T17S, R32E, Unit E	Survey Calculation Method:	Minimum Curvature
Design:	Lateral #1	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)
800.00	0.15	162.43	799.99	-3.05	-1.37	-1.30	0.22	0.02	-103.15
900.00	0.15	348.13	899.99	-3.05	-1.35	-1.29	0.30	0.00	-174.30
1,000.00	0.25	354.71	999.99	-2.70	-1.40	-1.34	0.10	0.10	6.58
1,100.00	0.27	354.35	1,099.99	-2.25	-1.44	-1.39	0.02	0.02	-0.36
1,200.00	0.41	13.15	1,199.99	-1.67	-1.39	-1.35	0.18	0.14	18.80
1,300.00	0.61	46.57	1,299.98	-0.96	-0.92	-0.90	0.35	0.20	33.42
1,400.00	0.65	37.77	1,399.98	-0.14	-0.18	-0.18	0.10	0.04	-8.80
1,500.00	0.54	40.84	1,499.97	0.66	0.47	0.46	0.11	-0.11	3.07
1,600.00	0.60	46.20	1,599.97	1.38	1.16	1.13	0.08	0.06	5.36
1,700.00	0.62	52.65	1,699.96	2.07	1.97	1.92	0.07	0.02	6.45
1,800.00	0.84	45.35	1,799.95	2.92	2.92	2.85	0.24	0.22	-7.30
1,900.00	1.21	46.97	1,899.94	4.15	4.21	4.12	0.37	0.37	1.62
2,000.00	1.47	50.65	1,999.91	5.69	5.97	5.84	0.27	0.26	3.68
2,100.00	1.80	72.96	2,099.87	6.96	8.47	8.31	0.71	0.33	22.31
2,200.00	1.41	65.19	2,199.83	7.94	11.09	10.90	0.45	-0.39	-7.77
2,213.00	1.32	66.66	2,212.83	8.06	11.37	11.18	0.74	-0.69	11.31
Tie-In to VES Gyro									
2,314.00	1.40	58.10	2,313.80	9.17	13.48	13.27	0.22	0.08	-8.48
First TDS MWD Survey									
2,377.00	0.80	60.70	2,376.79	9.80	14.52	14.30	0.96	-0.95	4.13
2,472.00	1.30	245.30	2,471.78	9.67	14.12	13.90	2.21	0.53	-184.63
2,568.00	3.80	249.00	2,567.68	8.08	10.16	9.98	2.61	2.60	3.85
2,663.00	5.90	244.80	2,662.33	4.87	2.80	2.69	2.24	2.21	-4.42
2,758.00	6.90	242.00	2,756.74	0.11	-6.65	-6.66	1.10	1.05	-2.95
2,853.00	7.60	233.80	2,850.98	-6.28	-16.76	-16.62	1.31	0.74	-8.63
2,948.00	7.90	228.40	2,945.12	-14.32	-26.71	-26.39	0.83	0.32	-5.68
3,043.00	8.20	225.50	3,039.18	-23.41	-36.43	-35.89	0.53	0.32	-3.05
3,139.00	8.40	224.30	3,134.17	-33.22	-46.21	-45.45	0.28	0.21	-1.25
3,234.00	7.80	229.70	3,228.23	-42.36	-55.97	-55.00	1.02	-0.63	5.68
3,329.00	6.60	233.70	3,322.48	-49.76	-65.29	-64.15	1.37	-1.26	4.21
3,424.00	5.90	229.70	3,416.91	-56.15	-73.41	-72.13	0.87	-0.74	-4.21
3,520.00	6.20	229.70	3,512.38	-62.70	-81.13	-79.70	0.31	0.31	0.00
3,615.00	6.60	226.60	3,606.79	-69.77	-89.01	-87.42	0.56	0.42	-3.26
3,710.00	7.30	227.00	3,701.09	-77.63	-97.39	-95.62	0.74	0.74	0.42
3,805.00	8.20	225.70	3,795.22	-86.48	-106.65	-104.68	0.97	0.95	-1.37
3,900.00	8.00	226.70	3,889.27	-95.75	-116.31	-114.13	0.26	-0.21	1.05
3,995.00	7.30	231.80	3,983.43	-104.01	-125.87	-123.49	1.03	-0.74	5.37
4,091.00	6.60	234.50	4,078.72	-110.99	-135.15	-132.62	0.80	-0.73	2.81
4,186.00	6.90	234.90	4,173.06	-117.44	-144.27	-141.58	0.32	0.32	0.42
4,281.00	7.70	235.10	4,267.29	-124.36	-154.15	-151.32	0.84	0.84	0.21
4,377.00	7.40	234.60	4,362.46	-131.62	-164.47	-161.46	0.32	-0.31	-0.52
4,472.00	7.90	234.30	4,456.61	-138.98	-174.76	-171.58	0.53	0.53	-0.32

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Survey									
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4,567.00	7.60	234.80	4,550.74	-146.41	-185.19	-181.85	0.32	-0.32	0.53
4,662.00	7.00	232.00	4,644.97	-153.59	-194.89	-191.38	0.73	-0.63	-2.95
4,757.00	6.20	229.40	4,739.34	-160.50	-203.34	-199.68	0.90	-0.84	-2.74
4,853.00	3.20	249.00	4,835.02	-164.83	-209.78	-206.02	3.50	-3.13	20.42
4,948.00	0.40	282.90	4,929.96	-165.71	-212.58	-208.80	3.03	-2.95	35.68
5,042.00	0.60	74.60	5,023.96	-165.50	-212.43	-208.65	1.03	0.21	161.38
5,074.00	2.80	95.90	5,055.94	-165.54	-211.49	-207.71	7.04	6.88	66.56
5,106.00	6.50	97.90	5,087.83	-165.87	-208.92	-205.13	11.57	11.56	6.25
5,138.00	10.30	96.70	5,119.48	-166.45	-204.28	-200.48	11.89	11.88	-3.75
5,169.00	14.10	94.20	5,149.78	-167.05	-197.76	-193.95	12.37	12.26	-8.06
5,201.00	17.90	94.00	5,180.53	-167.68	-188.96	-185.14	11.88	11.88	-0.63
5,232.00	21.00	96.10	5,209.76	-168.60	-178.68	-174.84	10.25	10.00	6.77
5,264.00	23.60	92.90	5,239.37	-169.54	-166.58	-162.72	8.96	8.13	-10.00
5,296.00	26.30	95.60	5,268.38	-170.55	-153.13	-149.25	9.16	8.44	8.44
5,328.00	28.70	94.70	5,296.76	-171.88	-138.41	-134.51	7.61	7.50	-2.81
5,359.00	30.90	94.40	5,323.66	-173.10	-123.05	-119.13	7.11	7.10	-0.97
5,391.00	32.60	93.20	5,350.87	-174.21	-106.25	-102.31	5.67	5.31	-3.75
5,423.00	34.50	92.00	5,377.54	-175.01	-88.59	-84.63	6.29	5.94	-3.75
5,455.00	37.50	89.90	5,403.42	-175.30	-69.79	-65.82	10.14	9.38	-6.56
5,486.00	42.70	88.00	5,427.13	-174.92	-49.83	-45.88	17.23	16.77	-6.13
5,523.00	47.80	86.20	5,453.17	-173.57	-23.60	-19.69	14.21	13.78	-4.86
5,555.00	48.40	86.20	5,474.54	-172.00	0.17	4.04	1.88	1.88	0.00
5,587.00	48.40	86.40	5,495.79	-170.45	24.05	27.88	0.47	0.00	0.63
5,618.00	48.30	86.80	5,516.39	-169.08	47.17	50.96	1.02	-0.32	1.29
5,651.00	48.20	87.00	5,538.36	-167.75	71.75	75.51	0.54	-0.30	0.61
5,682.00	48.40	86.90	5,558.99	-166.51	94.87	98.59	0.69	0.65	-0.32
5,690.42	48.48	86.98	5,564.57	-166.18	101.16	104.87	1.17	0.94	0.94
As-Drilled PP									
5,714.00	48.70	87.20	5,580.17	-165.28	118.82	122.51	1.17	0.94	0.94
5,746.00	50.80	87.50	5,600.84	-164.15	143.21	146.87	6.60	6.56	0.94
5,777.00	53.50	87.70	5,619.86	-163.13	167.67	171.30	8.72	8.71	0.65
5,809.00	56.10	87.20	5,638.31	-161.96	193.79	197.39	8.22	8.13	-1.56
5,841.00	58.80	87.40	5,655.52	-160.69	220.73	224.29	8.45	8.44	0.63
5,873.00	61.80	88.40	5,671.38	-159.68	248.50	252.04	9.76	9.38	3.13
5,904.00	65.00	90.00	5,685.26	-159.30	276.22	279.73	11.31	10.32	5.16
5,936.00	68.40	90.90	5,697.91	-159.53	305.60	309.11	10.93	10.63	2.81
5,968.00	71.50	91.10	5,708.88	-160.06	335.65	339.17	9.71	9.69	0.63
6,000.00	73.80	90.90	5,718.42	-160.59	366.19	369.71	7.21	7.19	-0.63
6,031.00	76.40	90.20	5,726.39	-160.87	396.14	399.66	8.67	8.39	-2.26
6,063.00	79.50	89.70	5,733.07	-160.85	427.43	430.95	9.81	9.69	-1.56
6,095.00	82.20	89.70	5,738.16	-160.68	459.02	462.53	8.44	8.44	0.00
6,127.00	85.30	90.10	5,741.64	-160.63	490.83	494.32	9.77	9.69	1.25

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6,158.00	88.00	90.30	5,743.46	-160.73	521.77	525.26	8.73	8.71	0.65
6,190.00	88.50	90.70	5,744.43	-161.01	553.76	557.24	2.00	1.56	1.25
6,285.00	88.80	90.70	5,746.67	-162.17	648.72	652.21	0.32	0.32	0.00
6,378.00	90.00	90.70	5,747.65	-163.31	741.71	745.20	1.29	1.29	0.00
6,410.00	90.50	90.60	5,747.51	-163.67	773.71	777.20	1.59	1.56	-0.31
6,505.00	92.20	87.30	5,745.27	-161.93	868.65	872.07	3.91	1.79	-3.47
6,600.00	92.00	87.50	5,741.79	-157.63	963.49	966.79	0.30	-0.21	0.21
6,696.00	91.90	87.90	5,738.52	-153.78	1,059.35	1,062.55	0.43	-0.10	0.42
6,791.00	90.60	90.60	5,736.45	-152.53	1,154.31	1,157.45	3.15	-1.37	2.84
6,886.00	91.30	90.70	5,734.87	-153.61	1,249.29	1,252.43	0.74	0.74	0.11
6,982.00	90.90	89.80	5,733.03	-154.03	1,345.27	1,348.40	1.03	-0.42	-0.94
7,077.00	91.70	90.30	5,730.87	-154.11	1,440.25	1,443.35	0.99	0.84	0.53
7,172.00	91.40	89.60	5,728.30	-154.03	1,535.21	1,538.29	0.80	-0.32	-0.74
7,268.00	91.30	89.80	5,726.04	-153.53	1,631.18	1,634.23	0.23	-0.10	0.21
7,363.00	91.30	90.70	5,723.89	-153.94	1,726.16	1,729.19	0.95	0.00	0.95
7,458.00	90.20	89.60	5,722.64	-154.19	1,821.15	1,824.16	1.64	-1.16	-1.16
7,553.00	90.50	90.10	5,722.06	-153.94	1,916.14	1,919.12	0.61	0.32	0.53
7,648.00	90.90	91.70	5,720.90	-155.43	2,011.12	2,014.11	1.74	0.42	1.68
7,743.00	90.70	91.20	5,719.58	-157.84	2,106.08	2,109.10	0.57	-0.21	-0.53
7,838.00	90.60	89.30	5,718.50	-158.25	2,201.07	2,204.08	2.00	-0.11	-2.00
7,933.00	90.90	89.00	5,717.25	-156.84	2,296.05	2,299.00	0.45	0.32	-0.32
8,029.00	90.90	88.40	5,715.75	-154.67	2,392.01	2,394.89	0.62	0.00	-0.63
8,124.00	91.00	89.30	5,714.17	-152.76	2,486.98	2,489.79	0.95	0.11	0.95
8,219.00	91.20	89.80	5,712.35	-152.01	2,581.96	2,584.73	0.57	0.21	0.53
8,314.00	91.00	88.80	5,710.52	-150.85	2,676.93	2,679.65	1.07	-0.21	-1.05
8,410.00	91.50	89.00	5,708.43	-149.01	2,772.89	2,775.55	0.56	0.52	0.21
8,505.00	91.50	89.60	5,705.94	-147.85	2,867.85	2,870.46	0.63	0.00	0.63
8,600.00	91.70	89.80	5,703.29	-147.35	2,962.82	2,965.38	0.30	0.21	0.21
8,695.00	91.30	88.80	5,700.80	-146.19	3,057.77	3,060.29	1.13	-0.42	-1.05
8,790.00	90.30	89.20	5,699.48	-144.53	3,152.75	3,155.20	1.13	-1.05	0.42
8,885.00	90.20	89.70	5,699.06	-143.62	3,247.74	3,250.15	0.54	-0.11	0.53
8,981.00	90.20	89.70	5,698.73	-143.12	3,343.74	3,346.12	0.00	0.00	0.00
9,076.00	90.50	89.80	5,698.15	-142.71	3,438.74	3,441.08	0.33	0.32	0.11
9,171.00	90.30	90.00	5,697.48	-142.54	3,533.74	3,536.05	0.30	-0.21	0.21
9,266.00	90.30	90.10	5,696.99	-142.62	3,628.73	3,631.03	0.11	0.00	0.11
9,361.00	90.50	90.80	5,696.32	-143.37	3,723.73	3,726.01	0.77	0.21	0.74
9,456.00	90.50	89.60	5,695.49	-143.70	3,818.72	3,820.99	1.26	0.00	-1.26
9,551.00	90.80	89.40	5,694.42	-142.87	3,913.71	3,915.94	0.38	0.32	-0.21
9,646.00	91.00	90.00	5,692.92	-142.37	4,008.70	4,010.89	0.67	0.21	0.63
9,742.00	91.30	90.00	5,691.00	-142.37	4,104.68	4,106.85	0.31	0.31	0.00
9,837.00	92.00	91.50	5,688.26	-143.62	4,199.63	4,201.80	1.74	0.74	1.58
9,932.00	92.50	92.80	5,684.53	-147.18	4,294.49	4,296.71	1.47	0.53	1.37

Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Sneed 9 Federal Com #13H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4094.00usft (Patriot 6)
Site:	Sneed 9 Federal Com #13H	MD Reference:	KB @ 4094.00usft (Patriot 6)
Well:	SHL: 1513' FNL, 229' FWL, Sec 9, T17S, R32E, Unit E	North Reference:	Grid
Wellbore:	BHL: 1670' FNL, 968' FWL, Sec 10, T17S, R32E, Unit E	Survey Calculation Method:	Minimum Curvature
Design:	Lateral #1	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)	
10,028.00	91.00	90.50	5,681.60	-149.94	4,390.39	4,392.66	2.86	-1.56	-2.40	
10,123.00	90.20	89.30	5,680.60	-149.77	4,485.39	4,487.62	1.52	-0.84	-1.26	
10,220.00	90.20	88.40	5,680.27	-147.83	4,582.36	4,584.53	0.93	0.00	-0.93	
10,315.00	90.00	88.60	5,680.10	-145.34	4,677.33	4,679.42	0.30	-0.21	0.21	
10,411.00	89.20	88.10	5,680.77	-142.58	4,773.29	4,775.29	0.98	-0.83	-0.52	
10,506.00	90.40	89.00	5,681.10	-140.17	4,868.25	4,870.18	1.58	1.26	0.95	
10,601.00	91.10	88.90	5,679.86	-138.43	4,963.23	4,965.09	0.74	0.74	-0.11	
10,696.00	91.60	90.00	5,677.62	-137.52	5,058.20	5,060.01	1.27	0.53	1.16	
10,791.00	91.50	90.30	5,675.05	-137.77	5,153.16	5,154.96	0.33	-0.11	0.32	
10,886.00	91.30	91.00	5,672.73	-138.85	5,248.13	5,249.92	0.77	-0.21	0.74	
10,982.00	92.00	90.10	5,669.97	-139.77	5,344.08	5,345.87	1.19	0.73	-0.94	
11,077.00	91.60	90.60	5,666.98	-140.35	5,439.03	5,440.81	0.67	-0.42	0.53	
11,171.00	91.50	89.80	5,664.44	-140.67	5,533.00	5,534.76	0.86	-0.11	-0.85	
11,266.00	91.10	90.00	5,662.28	-140.51	5,627.97	5,629.71	0.47	-0.42	0.21	
11,362.00	91.60	88.90	5,660.02	-139.59	5,723.94	5,725.63	1.26	0.52	-1.15	
11,457.00	91.40	89.10	5,657.53	-137.93	5,818.89	5,820.52	0.30	-0.21	0.21	
11,552.00	91.10	89.30	5,655.46	-136.60	5,913.86	5,915.44	0.38	-0.32	0.21	
11,592.00	90.90	89.50	5,654.76	-136.19	5,953.85	5,955.41	0.71	-0.50	0.50	
Final TDS MWD Survey										
11,656.00	90.90	89.50	5,653.76	-135.63	6,017.84	6,019.37	0.00	0.00	0.00	
Projection to Bit/TD										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
2,213.00	2,212.83	8.06	11.37	Tie-In to VES Gyro	
2,314.00	2,313.80	9.17	13.48	First TDS MWD Survey	
5,690.42	5,564.57	-166.18	101.16	As-Drilled PP	
11,592.00	5,654.76	-136.19	5,953.85	Final TDS MWD Survey	
11,656.00	5,653.76	-135.63	6,017.84	Projection to Bit/TD	

Checked By: _____	Approved By: _____	Date: _____
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August 3, 2016

HOBBS OCD
OCT 24 2016
RECEIVED

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

Attn: Kanicia Castillo

RE: **Sneed 9 Federal Com No. 013H**

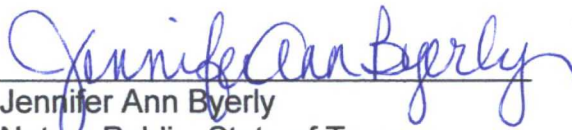
Please find enclosed a copy of the survey from 0' to 2213' ran on the above referenced well.

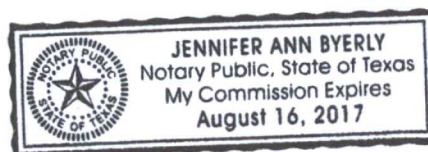
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 3rd day of August,
A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG Operating
Lease/Well: SNEED 9 FEDERAL COM NO./013H

Rig Name: PATRIOT 6
State/County: NEW MEXICO/LEA
VS-Azi: 0.00 Degrees
Latitude: 32.85210, Longitude: -103.77870
Grid North = True North -0.30 degs (NAD 27)
Grid Correction Applied = -0.30 degs



Depth Reference : RKB 18 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: eline gyro-de_01.ut
Minimum Curvature Method
Report Date/Time: 8/3/2016 / 12:49

VES Survey International
West Texas
432-563-5444

Surveyor: Dustin Byers
Sneed 9 Federal Com No. 013H / API 30-025-43285

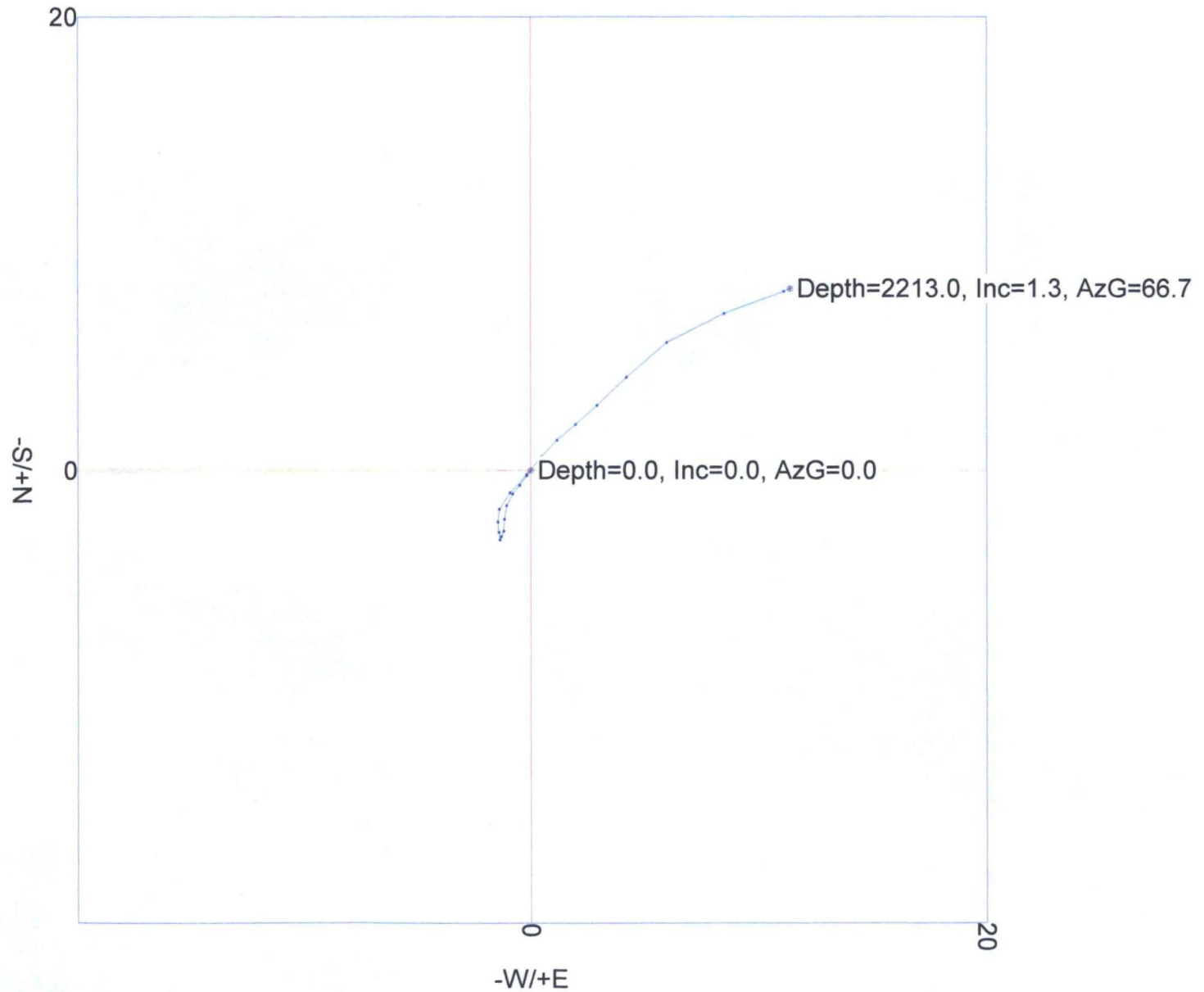
HOBBS COO
OCT 24 2016
RECEIVED

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	0.34	218.07	100.00	-0.23	-0.18	-0.23	0.30	218.07	0.34
200.00	0.25	212.63	200.00	-0.65	-0.49	-0.65	0.81	216.61	0.09
300.00	0.32	223.86	300.00	-1.04	-0.80	-1.04	1.31	217.47	0.09
400.00	0.37	192.31	400.00	-1.55	-1.06	-1.55	1.88	214.23	0.19
500.00	0.33	186.73	499.99	-2.16	-1.16	-2.16	2.45	208.25	0.05
600.00	0.27	178.40	599.99	-2.69	-1.19	-2.69	2.94	203.85	0.08
700.00	0.13	265.58	699.99	-2.93	-1.29	-2.93	3.21	203.81	0.30
800.00	0.15	162.43	799.99	-3.07	-1.37	-3.07	3.36	203.99	0.22
900.00	0.15	348.13	899.99	-3.07	-1.35	-3.07	3.36	203.74	0.30
1000.00	0.25	354.71	999.99	-2.73	-1.40	-2.73	3.07	207.08	0.10
1100.00	0.27	354.35	1099.99	-2.29	-1.44	-2.29	2.70	212.19	0.02
1200.00	0.41	13.15	1199.99	-1.71	-1.38	-1.71	2.20	218.95	0.18
1300.00	0.61	46.57	1299.98	-1.00	-0.91	-1.00	1.35	222.51	0.35
1400.00	0.65	37.77	1399.98	-0.18	-0.18	-0.18	0.26	224.47	0.10
1500.00	0.54	40.84	1499.97	0.62	0.47	0.62	0.78	37.41	0.12
1600.00	0.60	46.20	1599.97	1.33	1.15	1.33	1.76	40.91	0.08

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	0.62	52.65	1699.96	2.02	1.96	2.02	2.81	44.13	0.07
1800.00	0.84	45.35	1799.95	2.87	2.91	2.87	4.09	45.48	0.24
1900.00	1.21	46.97	1899.94	4.10	4.21	4.10	5.87	45.73	0.37
2000.00	1.47	50.65	1999.91	5.64	5.97	5.64	8.21	46.66	0.28
2100.00	1.80	72.96	2099.87	6.91	8.47	6.91	10.93	50.78	0.71
2200.00	1.41	65.19	2199.83	7.89	11.09	7.89	13.61	54.57	0.45
2213.00	1.32	66.66	2212.83	8.01	11.37	8.01	13.91	54.82	0.76



VES Survey International
West Texas
432-563-5444
Surveyor: Dustin Byers
Sneed 9 Federal Com No. 013H / API 30-025-43285



VES Survey Date: 7/28/2016



I Dustin Byers certify that I am employed by VES Survey International. That I did on the day(s) of 07/28/16 through 07/28/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,213.00 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 for the Sneed 9 Fed Com Well # 13H API # 30-025-43285 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 blue ink, appearing to read "Dustin Byers", is written over a horizontal line.

Dustin Byers
Service Technician
VES Survey International



I Dustin Byers certify that I am employed by VES Survey International. That I did on the day(s) of 07/28/16 through 07/28/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,213.00 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 for the Sneed 9 Fed Com Well # 13H API # 30-025-43285 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 blue ink, appearing to read "Dustin Byers", is written over a horizontal line.

Dustin Byers
Service Technician
VES Survey International



PATRIOT DRILLING, LLC

OPERATOR: COG Operating, LLC
WELL/LEASE: Sneed 9 Fed Com #13H
COUNTY: Lea Co., New Mexico
Sec. 9, T 17S, R 32E

**STATE OF NEW MEXICO
DEVIATION REPORT**

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
513	0	1,871	1
900	1/4	2,377	1
1,166	1/4	2,472	1 1/2
1,453	1/2		

Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-President

The foregoing instrument was acknowledged before me on this 22nd day of August 2016 by M. Leroy Peterson, Executive Vice-President of Patriot Drilling, LLC.

My Commission Expires: 02/01/2019

Lori T. Rowan
Notary Public for Ector Co., Texas

