



HOBBS OCD

AUG 15 2016

RECEIVED

7/13/16

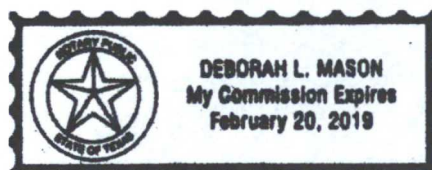
State of New Mexico
County of Lea

I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 05/16/2016 through 05/25/2016 conduct or supervise the taking of a MWD survey from a depth of 2444 feet to a depth of 11796 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 Pan Head Fee #13H Well API 30-025-42818 in Lea 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



HOBBS OCD

AUG 15 2016

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COG Operating LLC

Lea County, NM (NAD-27 2015)

Pan Head Fee #13H

API #: 30-025-42818

SHL: 245' FNL, 1770' FWL, Sec 11, T17S, R32E, Unit C

PP: 330' FNL, 1662' FWL, Sec 11, T17S, R32E, Unit C

BHL: 964' FNL, 1665' FWL, Sec 14, T17S, R32E, Unit C

Design: BHL: 966' FNL, 1668' FWL, Sec 14, T17S, R32E, Unit C

Standard Survey Report

26 May, 2016



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Pan Head Fee #13H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4175.00usft (Patriot 6)
Site:	Pan Head Fee #13H	MD Reference:	KB @ 4175.00usft (Patriot 6)
Well:	SHL: 245' FNL, 1770' FWL, Sec 11, T17S, R32E, Unit C	North Reference:	Grid
Wellbore:	BHL: 966' FNL, 1668' FWL, Sec 14, T17S, R32E, Unit C	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 966' FNL, 1668' FWL, Sec 14, T17S, R32E, Unit C	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	Pan Head Fee #13H				
Site Position:		Northing:	675,469.00 usft	Latitude:	32° 51' 19.939 N
From:	Map	Easting:	682,379.70 usft	Longitude:	103° 44' 21.932 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.32 °

Well	SHL: 245' FNL, 1770' FWL, Sec 11, T17S, R32E, Unit C					
Well Position	+N/-S	0.00 usft	Northing:	675,469.00 usft	Latitude:	32° 51' 19.939 N
	+E/-W	0.00 usft	Easting:	682,379.70 usft	Longitude:	103° 44' 21.932 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,157.00 usft

Wellbore	BHL: 966' FNL, 1668' FWL, Sec 14, T17S, R32E, Unit C				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	4/29/2016	7.20	60.63	48,407

Design	BHL: 966' FNL, 1668' FWL, Sec 14, T17S, R32E, Unit C				
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	180.64	

Survey Program	Date	5/26/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,309.00	VES Gyro #1 (BHL: 966' FNL, 1668' FWL,	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro	
2,444.00	11,796.00	TDS MWD #2 (BHL: 966' FNL, 1668' 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	0.27	218.12	100.00	-0.19	-0.15	0.19	0.27	0.27	0.00
200.00	0.33	230.52	200.00	-0.55	-0.51	0.56	0.09	0.06	12.40
300.00	0.43	209.78	300.00	-1.06	-0.92	1.07	0.17	0.10	-20.74
400.00	0.45	195.97	399.99	-1.77	-1.22	1.78	0.11	0.02	-13.81
500.00	0.22	220.75	499.99	-2.29	-1.45	2.30	0.27	-0.23	24.78
600.00	0.14	70.93	599.99	-2.39	-1.46	2.41	0.35	-0.08	-149.82

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Wellbore:	BHL: 966' FNL, 1668' FWL, Sec 14, T17S, R32E, Unit C	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 966' FNL, 1668' FWL, Sec 14, T17S, R32E, Unit C	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	0.23	269.80	699.99	-2.36	-1.54	2.37	0.37	0.09	-161.13
800.00	0.14	183.51	799.99	-2.48	-1.75	2.50	0.26	-0.09	-86.29
900.00	0.21	19.21	899.99	-2.43	-1.70	2.45	0.35	0.07	-164.30
1,000.00	0.13	20.79	999.99	-2.15	-1.60	2.17	0.08	-0.08	1.58
1,100.00	0.09	123.87	1,099.99	-2.09	-1.49	2.10	0.17	-0.04	103.08
1,200.00	0.28	257.68	1,199.99	-2.18	-1.67	2.20	0.35	0.19	133.81
1,300.00	0.26	351.26	1,299.99	-2.01	-1.94	2.03	0.39	-0.02	93.58
1,400.00	0.05	188.53	1,399.99	-1.83	-1.98	1.85	0.31	-0.21	-162.73
1,500.00	0.36	263.35	1,499.99	-1.91	-2.30	1.93	0.35	0.31	74.82
1,600.00	0.29	281.24	1,599.99	-1.89	-2.86	1.93	0.12	-0.07	17.89
1,700.00	0.22	332.56	1,699.99	-1.67	-3.20	1.71	0.23	-0.07	51.32
1,800.00	0.01	214.02	1,799.99	-1.51	-3.29	1.55	0.22	-0.21	-118.54
1,900.00	0.20	73.06	1,899.98	-1.47	-3.13	1.50	0.21	0.19	-140.96
2,000.00	0.15	351.07	1,999.98	-1.29	-2.98	1.32	0.23	-0.05	-81.99
2,100.00	0.27	25.42	2,099.98	-0.95	-2.90	0.98	0.17	0.12	34.35
2,200.00	0.71	55.71	2,199.98	-0.38	-2.29	0.41	0.50	0.44	30.29
2,309.00	0.66	93.42	2,308.97	-0.04	-1.10	0.05	0.41	-0.05	34.60
TIE-IN to VES Gyro									
2,444.00	1.00	80.40	2,443.96	0.11	0.83	-0.12	0.29	0.25	-9.64
First TDS MWD Survey									
2,539.00	2.20	42.30	2,538.92	1.60	2.88	-1.63	1.62	1.26	-40.11
2,634.00	3.60	11.30	2,633.80	5.87	4.69	-5.92	2.16	1.47	-32.63
2,729.00	3.60	352.80	2,728.62	11.75	4.90	-11.81	1.22	0.00	-19.47
2,824.00	4.70	314.70	2,823.39	17.45	1.76	-17.47	3.05	1.16	-40.11
2,920.00	4.60	310.70	2,919.07	22.73	-3.95	-22.68	0.35	-0.10	-4.17
3,015.00	4.40	304.70	3,013.78	27.29	-9.84	-27.18	0.54	-0.21	-6.32
3,110.00	4.40	327.00	3,108.51	32.42	-14.82	-32.25	1.79	0.00	23.47
3,205.00	4.20	332.10	3,203.24	38.55	-18.43	-38.34	0.45	-0.21	5.37
3,300.00	3.80	308.70	3,298.01	43.59	-22.52	-43.34	1.76	-0.42	-24.63
3,395.00	3.80	302.80	3,392.80	47.27	-27.62	-46.95	0.41	0.00	-6.21
3,490.00	3.30	319.30	3,487.62	51.04	-32.05	-50.68	1.19	-0.53	17.37
3,585.00	4.40	319.20	3,582.41	55.88	-36.21	-55.47	1.16	1.16	-0.11
3,681.00	4.20	314.80	3,678.14	61.14	-41.11	-60.68	0.40	-0.21	-4.58
3,776.00	3.80	307.50	3,772.91	65.51	-46.08	-64.99	0.68	-0.42	-7.68
3,871.00	4.40	332.80	3,867.67	70.67	-50.24	-70.10	1.99	0.63	26.63
3,966.00	4.30	335.50	3,962.40	77.15	-53.39	-76.55	0.24	-0.11	2.84
4,061.00	4.10	336.10	4,057.14	83.49	-56.24	-82.86	0.22	-0.21	0.63
4,156.00	4.10	337.10	4,151.90	89.73	-58.94	-89.06	0.08	0.00	1.05
4,252.00	5.20	317.70	4,247.59	96.11	-63.20	-95.40	1.98	1.15	-20.21
4,344.00	5.90	314.60	4,339.16	102.51	-69.37	-101.73	0.83	0.76	-3.37
4,439.00	5.20	314.30	4,433.71	108.95	-75.93	-108.09	0.74	-0.74	-0.32
4,534.00	4.40	315.40	4,528.38	114.55	-81.57	-113.63	0.85	-0.84	1.16

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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)
4,629.00	4.50	319.20	4,623.09	119.96	-86.56	-118.99	0.33	0.11	4.00
4,725.00	3.80	326.10	4,718.84	125.46	-90.80	-124.43	0.89	-0.73	7.19
4,820.00	3.90	324.20	4,813.62	130.69	-94.44	-129.63	0.17	0.11	-2.00
4,915.00	2.80	327.30	4,908.46	135.26	-97.59	-134.16	1.17	-1.16	3.26
5,010.00	1.80	341.40	5,003.38	138.63	-99.32	-137.51	1.20	-1.05	14.84
5,106.00	0.90	321.70	5,099.36	140.65	-100.27	-139.52	1.04	-0.94	-20.52
5,201.00	0.40	228.40	5,194.35	141.01	-100.98	-139.88	1.06	-0.53	-98.21
5,296.00	0.60	200.30	5,289.35	140.33	-101.40	-139.19	0.33	0.21	-29.58
5,327.00	1.30	186.50	5,320.34	139.83	-101.49	-138.68	2.36	2.26	-44.52
5,359.00	3.10	184.60	5,352.32	138.60	-101.60	-137.46	5.63	5.63	-5.94
5,391.00	5.60	182.90	5,384.22	136.18	-101.75	-135.04	7.82	7.81	-5.31
5,422.00	8.10	180.70	5,415.00	132.49	-101.86	-131.34	8.11	8.06	-7.10
5,454.00	10.60	179.90	5,446.57	127.29	-101.88	-126.14	7.82	7.81	-2.50
5,486.00	13.50	178.10	5,477.86	120.61	-101.75	-119.47	9.14	9.06	-5.63
5,518.00	17.00	177.70	5,508.73	112.20	-101.44	-111.06	10.94	10.94	-1.25
5,550.00	20.60	179.80	5,539.02	101.89	-101.23	-100.76	11.45	11.25	6.56
5,581.00	23.90	183.90	5,567.71	90.17	-101.64	-89.03	11.76	10.65	13.23
5,613.00	25.50	188.40	5,596.78	76.89	-103.09	-75.73	7.71	5.00	14.06
5,645.00	28.40	188.50	5,625.31	62.54	-105.22	-61.36	9.06	9.06	0.31
5,677.00	32.00	186.00	5,652.96	46.58	-107.23	-45.38	11.91	11.25	-7.81
5,708.00	35.60	183.40	5,678.72	29.40	-108.62	-28.18	12.51	11.61	-8.39
5,740.00	39.40	180.60	5,704.10	9.93	-109.28	-8.71	13.01	11.88	-8.75
5,771.00	43.70	179.10	5,727.30	-10.62	-109.22	11.84	14.24	13.87	-4.84
5,803.00	48.00	178.20	5,749.58	-33.57	-108.67	34.78	13.59	13.44	-2.81
5,835.00	52.20	178.10	5,770.10	-58.10	-107.88	59.30	13.13	13.13	-0.31
5,867.00	56.40	178.40	5,788.77	-84.07	-107.08	85.26	13.15	13.13	0.94
5,868.75	56.65	178.41	5,789.74	-85.53	-107.04	86.72	14.07	14.06	0.65
As-Drilled PP									
5,899.00	60.90	178.60	5,805.42	-111.38	-106.37	112.56	14.07	14.06	0.62
5,930.00	66.30	178.40	5,819.19	-139.13	-105.64	140.30	17.43	17.42	-0.65
5,962.00	72.80	177.90	5,830.37	-169.08	-104.67	170.24	20.37	20.31	-1.56
5,999.00	80.50	177.40	5,838.91	-205.02	-103.20	206.16	20.85	20.81	-1.35
6,031.00	84.70	177.80	5,843.03	-236.72	-101.87	237.84	13.18	13.13	1.25
6,062.00	87.40	178.60	5,845.16	-267.63	-100.90	268.74	9.08	8.71	2.58
6,094.00	89.90	179.70	5,845.92	-299.61	-100.42	300.72	8.53	7.81	3.44
6,158.00	90.20	180.10	5,845.86	-363.61	-100.31	364.71	0.78	0.47	0.63
6,253.00	89.90	180.00	5,845.78	-458.61	-100.39	459.71	0.33	-0.32	-0.11
6,348.00	88.90	180.20	5,846.77	-553.61	-100.56	554.69	1.07	-1.05	0.21
6,443.00	89.00	180.30	5,848.51	-648.59	-100.97	649.68	0.15	0.11	0.11
6,538.00	88.70	178.90	5,850.42	-743.56	-100.31	744.64	1.51	-0.32	-1.47
6,633.00	89.10	179.80	5,852.24	-838.54	-99.23	839.60	1.04	0.42	0.95
6,728.00	90.00	180.60	5,852.99	-933.53	-99.56	934.59	1.27	0.95	0.84

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6,823.00	89.20	179.10	5,853.65	-1,028.53	-99.32	1,029.57	1.79	-0.84	-1.58
6,919.00	89.20	179.10	5,854.99	-1,124.51	-97.81	1,125.53	0.00	0.00	0.00
7,014.00	89.70	179.80	5,855.91	-1,219.50	-96.90	1,220.50	0.91	0.53	0.74
7,109.00	90.80	180.00	5,855.49	-1,314.50	-96.73	1,315.49	1.18	1.16	0.21
7,204.00	90.50	178.50	5,854.41	-1,409.48	-95.49	1,410.46	1.61	-0.32	-1.58
7,299.00	90.20	178.40	5,853.83	-1,504.44	-92.92	1,505.39	0.33	-0.32	-0.11
7,394.00	90.00	179.00	5,853.67	-1,599.42	-90.76	1,600.33	0.67	-0.21	0.63
7,489.00	90.00	179.30	5,853.67	-1,694.41	-89.35	1,695.30	0.32	0.00	0.32
7,584.00	89.60	179.60	5,854.00	-1,789.40	-88.44	1,790.28	0.53	-0.42	0.32
7,680.00	90.70	179.30	5,853.75	-1,885.39	-87.52	1,886.25	1.19	1.15	-0.31
7,775.00	90.90	179.80	5,852.42	-1,980.38	-86.77	1,981.23	0.57	0.21	0.53
7,870.00	91.00	178.70	5,850.85	-2,075.36	-85.53	2,076.19	1.16	0.11	-1.16
7,965.00	91.10	178.80	5,849.10	-2,170.32	-83.46	2,171.12	0.15	0.11	0.11
8,061.00	90.80	179.20	5,847.51	-2,266.29	-81.78	2,267.06	0.52	-0.31	0.42
8,156.00	90.10	179.30	5,846.77	-2,361.28	-80.54	2,362.03	0.74	-0.74	0.11
8,251.00	89.90	179.70	5,846.77	-2,456.28	-79.71	2,457.01	0.47	-0.21	0.42
8,346.00	90.60	180.50	5,846.35	-2,551.27	-79.88	2,552.01	1.12	0.74	0.84
8,442.00	90.40	181.10	5,845.51	-2,647.26	-81.22	2,648.00	0.66	-0.21	0.63
8,537.00	91.10	180.40	5,844.27	-2,742.24	-82.46	2,742.99	1.04	0.74	-0.74
8,597.00	90.80	180.50	5,843.28	-2,802.23	-82.93	2,802.98	0.53	-0.50	0.17
8,660.00	90.20	180.10	5,842.73	-2,865.23	-83.26	2,865.98	1.14	-0.95	-0.63
8,755.00	89.70	179.40	5,842.81	-2,960.23	-82.85	2,960.97	0.91	-0.53	-0.74
8,851.00	89.60	180.00	5,843.40	-3,056.22	-82.34	3,056.95	0.63	-0.10	0.63
8,946.00	89.00	179.80	5,844.56	-3,151.22	-82.18	3,151.94	0.67	-0.63	-0.21
9,042.00	89.10	180.20	5,846.15	-3,247.20	-82.18	3,247.92	0.43	0.10	0.42
9,137.00	89.30	181.30	5,847.47	-3,342.18	-83.42	3,342.91	1.18	0.21	1.16
9,232.00	89.20	179.20	5,848.72	-3,437.17	-83.84	3,437.89	2.21	-0.11	-2.21
9,328.00	89.50	178.90	5,849.81	-3,533.15	-82.24	3,533.85	0.44	0.31	-0.31
9,423.00	89.30	178.90	5,850.80	-3,628.13	-80.42	3,628.80	0.21	-0.21	0.00
9,518.00	89.20	179.60	5,852.05	-3,723.11	-79.18	3,723.76	0.74	-0.11	0.74
9,613.00	89.30	178.70	5,853.29	-3,818.09	-77.77	3,818.72	0.95	0.11	-0.95
9,708.00	90.90	179.90	5,853.12	-3,913.08	-76.61	3,913.69	2.11	1.68	1.26
9,804.00	91.50	179.30	5,851.11	-4,009.05	-75.94	4,009.65	0.88	0.63	-0.63
9,899.00	91.80	179.80	5,848.38	-4,104.01	-75.19	4,104.60	0.61	0.32	0.53
9,995.00	91.10	178.40	5,845.95	-4,199.97	-73.68	4,200.53	1.63	-0.73	-1.46
10,090.00	90.30	178.10	5,844.79	-4,294.91	-70.78	4,295.44	0.90	-0.84	-0.32
10,185.00	90.50	178.50	5,844.12	-4,389.87	-67.96	4,390.36	0.47	0.21	0.42
10,280.00	89.10	178.70	5,844.46	-4,484.84	-65.64	4,485.29	1.49	-1.47	0.21
10,375.00	89.80	179.40	5,845.37	-4,579.82	-64.07	4,580.25	1.04	0.74	0.74
10,470.00	90.00	180.30	5,845.53	-4,674.82	-63.82	4,675.24	0.97	0.21	0.95
10,565.00	90.00	179.50	5,845.53	-4,769.82	-63.65	4,770.23	0.84	0.00	-0.84
10,661.00	88.20	181.30	5,847.04	-4,865.80	-64.32	4,866.21	2.65	-1.88	1.88



TDS
Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Pan Head Fee #13H
Well: SHL: 245' FNL, 1770' FWL, Sec 11, T17S,
R32E, Unit C
Wellbore: BHL: 966' FNL, 1668' FWL, Sec 14, T17S,
R32E, Unit C
Design: BHL: 966' FNL, 1668' FWL, Sec 14, T17S,
R32E, Unit C

Local Co-ordinate Reference: Site Pan Head Fee #13H
TVD Reference: KB @ 4175.00usft (Patriot 6)
MD Reference: KB @ 4175.00usft (Patriot 6)
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)
10,756.00	89.60	181.30	5,848.87	-4,960.75	-66.48	4,961.18	1.47	1.47	0.00
10,851.00	90.20	182.00	5,849.03	-5,055.71	-69.21	5,056.17	0.97	0.63	0.74
10,946.00	90.30	180.70	5,848.62	-5,150.68	-71.45	5,151.16	1.37	0.11	-1.37
11,042.00	90.00	179.40	5,848.37	-5,246.68	-71.54	5,247.15	1.39	-0.31	-1.35
11,137.00	90.40	180.40	5,848.03	-5,341.68	-71.37	5,342.14	1.13	0.42	1.05
11,232.00	89.20	179.20	5,848.37	-5,436.67	-71.04	5,437.13	1.79	-1.26	-1.26
11,327.00	89.50	179.80	5,849.44	-5,531.66	-70.21	5,532.10	0.71	0.32	0.63
11,422.00	89.50	180.20	5,850.27	-5,626.66	-70.21	5,627.09	0.42	0.00	0.42
11,517.00	89.30	179.40	5,851.27	-5,721.65	-69.88	5,722.07	0.87	-0.21	-0.84
11,613.00	89.50	180.00	5,852.27	-5,817.64	-69.38	5,818.06	0.66	0.21	0.63
11,708.00	89.60	180.60	5,853.02	-5,912.64	-69.87	5,913.05	0.64	0.11	0.63
Final MWD Survey									
11,796.00	89.60	180.60	5,853.63	-6,000.63	-70.79	6,001.05	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
2,309.00	2,308.97	-0.04	-1.10	TIE-IN to VES Gyro
2,444.00	2,443.96	0.11	0.83	First TDS MWD Survey
5,868.75	5,789.74	-85.53	-107.04	As-Drilled PP
11,708.00	5,853.02	-5,912.64	-69.87	Final MWD Survey
11,796.00	5,853.63	-6,000.63	-70.79	Projection to Bit/TD

Checked By:

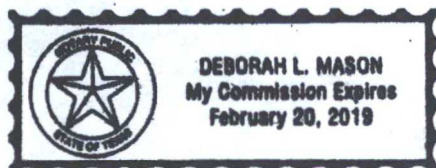
Deborah L. Mason

Approved By:

[Signature]

Date:

7/13/2016



May 20, 2016

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

Attn: Kanicia Castillo

RE: **Pan Head Fee No 013H**

Please find enclosed a copy of the survey from 0' to 2309' ran on the above referenced well.

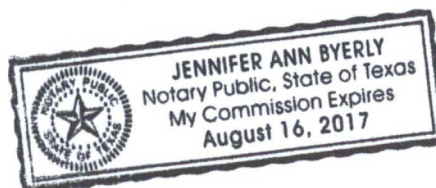
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

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


Jennifer Ann Byerly
Notary Public, State of Texas





Company: Concho

Lease/Well: Pan Head Fee No/013H

Rig Name: Patriot 6

State/County: New Mexico/Lea

VS-Azi: 0.00 Degrees

Latitude: 32.85554, Longitude: -103.73942

Grid North = True North -0.32 degs (NAD 27)

Grid Correction Applied = -0.32 degs



HOBBS OCD

AUG 15 2016

RECEIVED

Depth Reference : RKB = 18 feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut

Minimum Curvature Method

Report Date/Time: 5/20/2016 / 09:37

VES Survey International

Midland, Texas

432-563-5444

Surveyor: Adam Askew

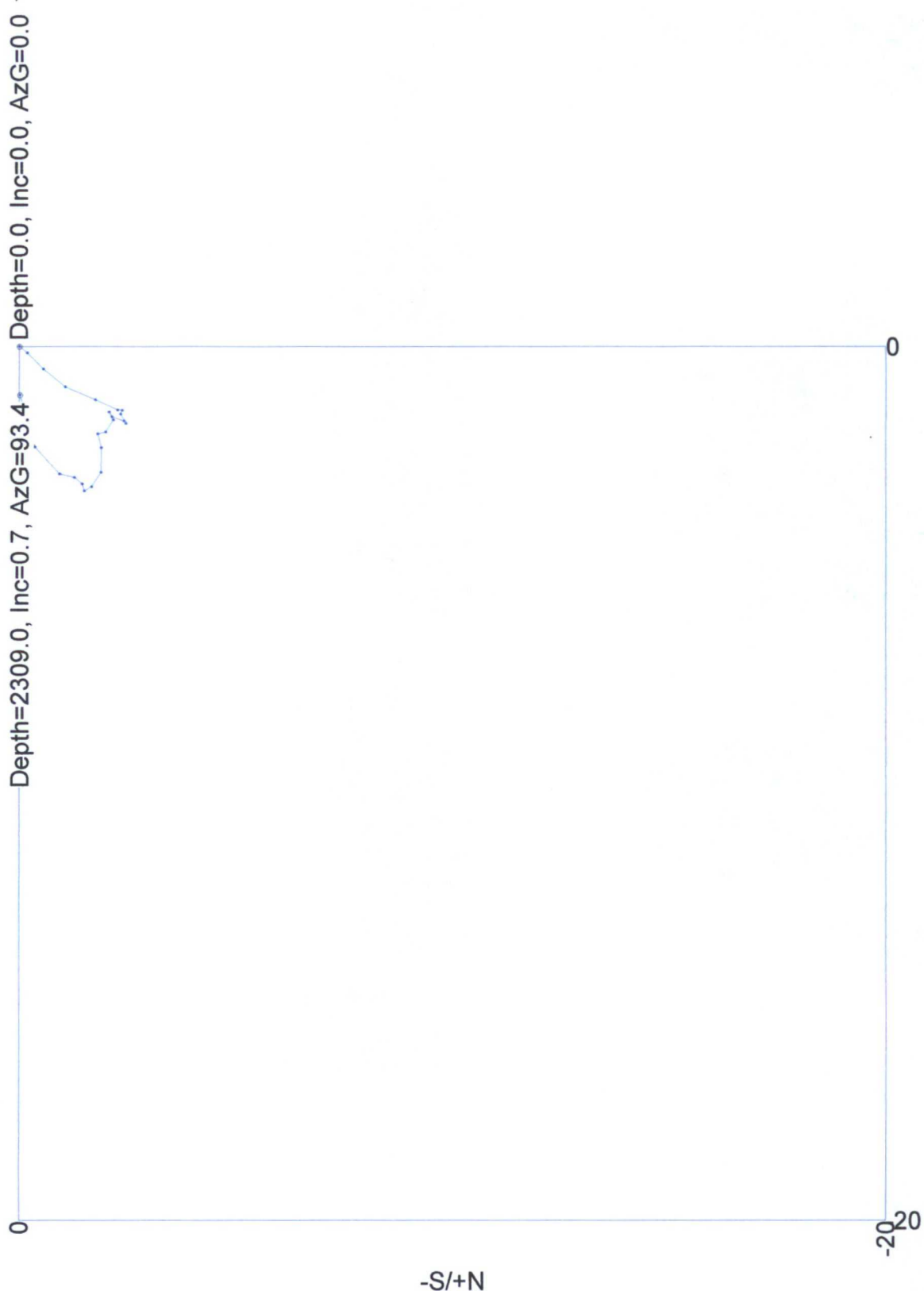
Pan Head Fee No 013H / API 30-025-42818

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	0.27	218.12	100.00	-0.19	-0.15	-0.19	0.24	218.12	0.27
200.00	0.33	230.52	200.00	-0.56	-0.51	-0.56	0.76	222.79	0.09
300.00	0.43	209.78	300.00	-1.06	-0.92	-1.06	1.40	220.95	0.17
400.00	0.45	195.97	399.99	-1.76	-1.21	-1.76	2.14	214.59	0.11
500.00	0.22	220.75	499.99	-2.28	-1.44	-2.28	2.69	212.39	0.26
600.00	0.14	70.93	599.99	-2.38	-1.45	-2.38	2.79	211.42	0.34
700.00	0.23	269.80	699.99	-2.34	-1.54	-2.34	2.80	213.37	0.36
800.00	0.14	183.51	799.99	-2.47	-1.75	-2.47	3.03	215.37	0.26
900.00	0.21	19.21	899.99	-2.42	-1.70	-2.42	2.96	215.07	0.35
1000.00	0.13	20.79	999.99	-2.14	-1.60	-2.14	2.67	216.74	0.07
1100.00	0.09	123.87	1099.99	-2.08	-1.49	-2.08	2.56	215.71	0.18
1200.00	0.28	257.68	1199.99	-2.17	-1.67	-2.17	2.74	217.55	0.35
1300.00	0.26	351.26	1299.99	-2.00	-1.95	-2.00	2.79	224.28	0.40
1400.00	0.05	188.53	1399.99	-1.82	-1.99	-1.82	2.69	227.61	0.32
1500.00	0.36	263.35	1499.99	-1.90	-2.31	-1.90	2.99	230.56	0.35
1600.00	0.29	281.24	1599.99	-1.89	-2.87	-1.89	3.43	236.63	0.12

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	0.22	332.56	1699.99	-1.67	-3.20	-1.67	3.61	242.50	0.23
1800.00	0.01	214.02	1799.99	-1.50	-3.29	-1.50	3.62	245.54	0.23
1900.00	0.20	73.06	1899.99	-1.45	-3.13	-1.45	3.45	245.10	0.20
2000.00	0.15	351.07	1999.98	-1.27	-2.99	-1.27	3.25	246.93	0.23
2100.00	0.27	25.42	2099.98	-0.93	-2.91	-0.93	3.05	252.31	0.17
2200.00	0.71	55.71	2199.98	-0.36	-2.29	-0.36	2.32	261.03	0.50
2309.00	0.66	93.42	2308.97	-0.02	-1.10	-0.02	1.10	269.16	0.41



VES Survey International
Midland, Texas
432-563-5444
Surveyor: Adam Askew
Pan Head Fee No 013H / API 30-025-42818



-W/+E
VES Survey Date: 5/14/2016



I Adam Askew certify that I am employed by VES Survey International. That I did on the day(s) of 05/14/16 through 05/14/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,309.00 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 Pan Head Fee Well # 13H API # 30-025-42818 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services

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

Adam Askew
Service Technician
Vaughn Energy Services