



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

15-42502

November 30, 2014

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

RE: Horned Owl Federal #3H
190' FNL & 1810' FEL
Sec. 25, T26S, R26E
Eddy County, New Mexico

Dear Sir,

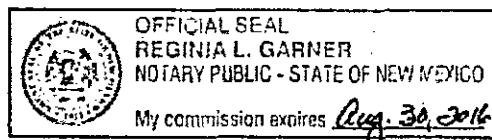
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 30th day of November, 2014.

Notary Public

HORNED OWL FEDERAL #3H

Date	Depth	Deviation	Direction	TVD
11/5/2014	200	0.80	0.00	0.00
11/5/2014	300	1.50	0.00	0.00
11/7/2014	390	0.70	0.00	0.00
11/7/2014	450	0.40	0.00	0.00
11/7/2014	779	0.30	0.00	0.00
11/8/2014	1239	0.30	0.00	0.00
11/8/2014	1697	0.30	0.00	0.00
11/8/2014	1969	0.60	0.00	0.00
11/10/2014	2307	0.40	0.00	0.00
11/10/2014	2723	0.20	0.00	0.00
11/10/2014	3169	0.40	0.00	0.00
11/10/2014	3585	0.90	0.00	0.00
11/10/2014	3967	1.20	0.00	0.00
11/10/2014	4381	1.00	0.00	0.00
11/11/2014	4604	1.10	0.00	0.00
11/11/2014	4796	0.90	0.00	0.00
11/11/2014	5211	1.60	0.00	0.00
11/11/2014	5657	1.60	0.00	0.00
11/12/2014	6070	0.80	0.00	0.00
11/12/2014	6359	2.00	0.00	0.00
11/12/2014	6519	1.20	0.00	0.00
11/12/2014	6558	0.60	0.00	0.00
11/13/2014	6740	1.10	0.00	0.00
11/13/2014	6900	1.00	0.00	0.00
11/13/2014	7317	2.50	0.00	0.00
11/13/2014	7762	3.50	0.00	0.00
11/14/2014	7987	2.60	0.00	0.00
11/14/2014	8078	3.20	0.00	0.00
11/14/2014	8239	3.20	0.00	0.00
11/14/2014	8494	2.40	0.00	0.00
11/14/2014	8687	2.10	0.00	0.00
11/14/2014	9071	1.40	0.00	0.00
11/14/2014	9324	1.20	0.00	0.00
11/15/2014	9387	1.10	0.00	0.00
11/15/2014	9543	0.90	0.00	0.00
11/15/2014	9700	1.20	0.00	0.00
11/15/2014	9983	1.20	0.00	0.00
11/15/2014	10158	2.10	0.00	0.00
11/22/2014	6845	7.70	189.00	0.00
11/23/2014	6876	13.40	191.10	6874.00
11/23/2014	6908	18.20	193.90	6905.00
11/23/2014	6940	21.50	192.90	6935.10
11/23/2014	6972	24.90	192.20	6964.50

Date	Depth	Deviation	Direction	TVD
11/23/2014	7004	27.60	190.30	6993.20
11/23/2014	7036	29.00	189.20	7021.40
11/23/2014	7068	30.20	188.80	7049.20
11/24/2014	7100	33.20	189.10	7076.00
11/24/2014	7164	38.90	191.10	7128.00
11/24/2014	7292	43.60	186.70	7224.00
11/24/2014	7323	46.60	185.30	7246.00
11/24/2014	7419	54.00	182.50	7306.00
11/24/2014	7483	57.90	181.60	7342.00
11/24/2014	7515	59.60	181.60	0.00
11/24/2014	7547	60.40	181.60	0.00
11/24/2014	7579	63.40	181.30	0.00
11/24/2014	7611	66.70	181.30	0.00
11/24/2014	7643	69.10	181.50	0.00
11/25/2014	7707	74.20	181.60	0.00
11/25/2014	7739	77.70	181.50	0.00
11/25/2014	7829	84.60	181.90	0.00
11/25/2014	7897	86.60	181.40	0.00
11/25/2014	8025	86.60	180.60	0.00
11/26/2014	8217	90.20	181.10	0.00
11/26/2014	8409	90.60	180.70	0.00
11/26/2014	8600	90.80	179.20	0.00
11/26/2014	8889	90.20	177.80	7467.00
11/26/2014	9077	88.80	177.30	7469.00
11/26/2014	9360	91.10	177.90	7468.00
11/26/2014	9454	90.80	177.90	0.00
11/26/2014	9548	90.40	177.90	0.00
11/26/2014	9784	90.40	180.10	0.00
11/26/2014	9829	90.70	180.20	0.00
11/26/2014	9922	91.80	180.10	0.00
11/26/2014	10016	90.70	180.30	0.00
11/27/2014	10110	92.40	180.70	0.00
11/27/2014	10204	91.90	180.80	0.00
11/27/2014	10487	90.60	179.80	7454.00
11/27/2014	10675	91.00	180.20	7450.00
11/27/2014	10786	90.60	179.70	7448.00
11/27/2014	10862	88.50	179.30	0.00
11/27/2014	10955	87.90	178.90	0.00
11/27/2014	11048	88.30	178.70	0.00
11/27/2014	11143	90.00	178.30	0.00
11/28/2014	11424	90.20	178.00	0.00
11/28/2014	11614	91.30	178.10	0.00
11/28/2014	11707	90.70	178.00	0.00
11/28/2014	11801	90.50	177.50	7450.00

EOF



December 2, 2014

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

Attn: Kanicia Castillo

RE: **Horned Owl Federal 3H**

Please find enclosed a copy of the survey from 0.00' to 10124.00' ran on the above referenced well.

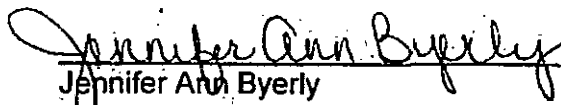
If I can be of any further service, please do not hesitate to call me at 800-606-4976.

Sincerely,


Keith Havelka
Operations

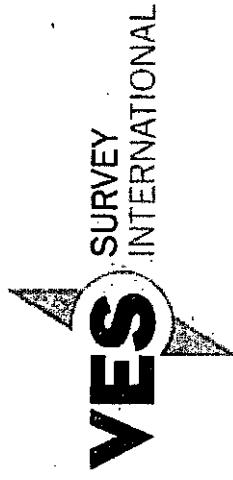
STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 2 day of December A.D., 2014, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas

VES Survey International
P.O. Box 261021 Corpus Christi, TX 78426
T (361) 767-0602 F (361) 767-0612
www.vessurvey.com





Company: COG Operating
Lease/Well: Horned Owl Federal/3H
Location: Sec 25 T26S R26E
Rig Name: Silver Oak 1
State/County: New Mexico/Eddy
Latitude: 32.02, Longitude: -104.24
GRID North is 0.05 Degrees East of True North
VS-Azi: 0.00 Degrees

Depth Reference : RKB = 17 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 12/2/2014 / 13:42

VES Survey International
West Texas
(432) 563-6444

Surveyor: Noe Garza
Horned Owl Federal 3H / API 30-015-42502

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	0.49	279.71	100.00	0.07	-0.43	0.07	0.43	279.71	0.49
200.00	0.49	330.98	200.00	0.52	-1.08	0.52	1.18	296.25	0.43
300.00	0.62	328.00	299.99	1.36	-1.65	1.36	2.06	311.12	0.13
400.00	0.34	338.84	399.99	2.08	-1.95	2.09	2.86	317.03	0.29
500.00	0.16	358.78	499.99	2.50	-2.06	2.50	3.24	320.56	0.20
600.00	0.15	83.30	599.99	2.88	-1.93	2.66	3.28	323.96	0.21
700.00	0.23	70.69	699.99	2.74	-1.61	2.74	3.18	329.57	0.09
800.00	0.27	24.20	799.98	3.02	-1.32	3.02	3.30	336.43	0.20
900.00	0.21	131.77	899.98	3.12	-1.09	3.12	3.30	340.78	0.39
1000.00	0.21	135.63	999.98	2.87	-0.82	2.87	2.98	343.98	0.01
1100.00	0.21	146.80	1099.98	2.58	-0.60	2.58	2.65	347.00	0.04
1200.00	0.25	61.05	1199.98	2.54	-0.30	2.54	2.56	353.19	0.32
1300.00	0.30	87.85	1299.98	2.66	0.15	2.66	2.66	3.33	0.14
1400.00	0.26	79.70	1399.98	2.71	0.64	2.71	2.78	13.32	0.06
1500.00	0.20	80.77	1499.98	2.78	1.04	2.78	2.96	20.50	0.08
1600.00	0.33	68.39	1599.98	2.91	1.48	2.91	3.26	26.94	0.14
1700.00	0.33	27.25	1699.98	3.27	1.88	3.27	3.77	29.84	0.23
1800.00	0.35	39.95	1799.97	3.76	2.20	3.76	4.35	30.37	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
1900.00	0.27	9.85	1899.97	4.22	2.44	4.22	4.87	29.97	0.17
2000.00	0.18	265.73	1999.97	4.45	2.32	4.45	5.02	27.53	0.36
2100.00	0.49	92.56	2099.97	4.42	2.59	4.42	5.12	30.34	0.67
2200.00	0.33	124.39	2199.97	4.24	3.24	4.24	5.34	37.45	0.27
2300.00	0.26	62.80	2299.97	4.18	3.68	4.18	5.57	41.39	0.31
2400.00	0.37	111.30	2399.97	4.17	4.19	4.17	5.91	45.17	0.28
2500.00	0.37	59.21	2499.97	4.21	4.78	4.21	6.37	48.57	0.33
2600.00	0.27	131.91	2599.96	4.23	6.23	4.23	6.72	51.05	0.39
2700.00	0.33	112.77	2699.96	3.96	5.67	3.96	6.92	55.98	0.12
2800.00	0.26	128.82	2799.96	3.70	6.12	3.70	7.15	58.80	0.11
2900.00	0.51	159.83	2899.96	3.14	6.45	3.14	7.17	64.02	0.32
3000.00	0.40	150.53	2999.96	2.42	6.77	2.42	7.19	70.36	0.13
3100.00	0.56	182.37	3099.95	1.63	6.92	1.63	7.11	76.79	0.30
3200.00	0.71	165.66	3199.95	0.53	7.06	0.53	7.08	85.57	0.24
3300.00	0.78	164.02	3299.94	-0.73	7.40	-0.73	7.44	95.50	0.07
3400.00	0.83	160.01	3399.93	-2.06	7.83	-2.06	8.10	104.72	0.07
3500.00	1.06	176.56	3499.91	-3.66	8.14	-3.66	8.92	114.19	0.35
3600.00	1.32	180.70	3599.89	-5.73	8.18	-5.73	9.88	125.01	0.28
3700.00	1.22	186.45	3699.87	-7.94	8.04	-7.94	11.30	134.52	0.16
3800.00	1.16	191.30	3799.85	-9.99	7.73	-9.99	12.63	142.29	0.12
3900.00	1.02	192.75	3899.83	-11.85	7.33	-11.85	13.94	148.26	0.14
4000.00	1.24	194.50	3999.81	-13.76	6.88	-13.76	15.38	153.50	0.22
4100.00	1.10	195.02	4099.79	-15.74	6.34	-15.74	16.97	158.05	0.13
4200.00	1.07	191.21	4199.77	-17.59	5.91	-17.59	18.55	161.42	0.08
4300.00	1.11	178.87	4299.75	-19.47	5.75	-19.47	20.30	163.55	0.24
4400.00	1.01	168.81	4399.74	-21.30	5.94	-21.30	22.11	164.42	0.21
4500.00	1.10	168.09	4499.72	-23.11	6.31	-23.11	23.95	164.73	0.09
4600.00	1.09	148.93	4599.70	-24.86	7.00	-24.86	25.83	164.28	0.36
4700.00	1.07	163.66	4699.68	-26.57	7.75	-26.57	27.67	163.74	0.28
4800.00	1.08	158.70	4799.67	-28.34	8.35	-28.34	29.55	163.58	0.09
4900.00	1.20	160.18	4899.65	-30.21	9.05	-30.21	31.54	163.32	0.12
5000.00	1.28	179.08	4999.62	-32.31	9.43	-32.31	33.66	163.74	0.42
5100.00	1.53	180.12	5099.59	-34.77	9.44	-34.77	36.03	164.81	0.25
5200.00	1.92	182.35	5199.55	-37.78	9.37	-37.78	38.93	166.07	0.39
5300.00	1.68	181.89	5299.50	-40.92	9.25	-40.92	41.95	167.26	0.24
5400.00	1.42	193.68	5399.46	-43.59	8.91	-43.59	44.49	168.44	0.41
5500.00	1.53	193.04	5499.43	-46.09	8.32	-46.09	46.83	169.77	0.11
5600.00	1.64	194.03	5599.39	-48.77	7.67	-48.77	49.37	171.06	0.12
5700.00	1.63	174.83	5699.35	-51.58	7.45	-51.58	52.12	171.78	0.55

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
5800.00	2.11	150.79	5798.30	-54.60	8.48	-54.60	55.26	171.17	0.91
5900.00	2.15	136.16	5899.23	-57.56	10.67	-57.56	58.64	169.50	0.84
6000.00	1.40	143.95	5999.18	-59.90	12.69	-59.90	61.23	168.04	0.78
6100.00	0.91	172.43	6099.16	-61.67	13.51	-61.67	63.13	167.64	0.74
6200.00	1.35	181.82	6199.14	-63.63	13.88	-63.63	65.07	167.96	0.48
6300.00	1.73	206.96	6299.11	-66.16	12.86	-66.16	67.39	168.00	0.77
6400.00	1.97	208.27	6399.05	-69.01	11.36	-69.01	69.94	170.65	0.24
6500.00	1.37	208.38	6499.01	-71.57	9.98	-71.57	72.27	172.06	0.60
6600.00	0.92	209.38	6598.99	-73.32	9.02	-73.32	73.87	172.98	0.45
6700.00	1.05	227.55	6698.98	-74.64	7.95	-74.64	75.06	173.92	0.34
6800.00	1.15	228.66	6798.96	-75.92	6.52	-75.92	76.20	175.09	0.10
6900.00	1.17	199.30	6898.94	-77.54	5.43	-77.54	77.73	175.99	0.59
7000.00	1.93	167.42	6998.90	-80.17	4.88	-80.17	80.32	176.52	0.82
7100.00	2.01	160.37	7098.85	-83.49	5.25	-83.49	83.66	176.40	0.32
7200.00	2.17	170.07	7198.78	-87.00	6.16	-87.00	87.22	175.98	0.39
7300.00	2.48	163.67	7298.70	-90.94	7.10	-90.94	91.22	175.54	0.41
7400.00	2.97	147.82	7398.58	-95.21	9.09	-95.21	95.64	174.55	0.89
7500.00	3.81	142.12	7498.41	-100.03	12.51	-100.03	100.81	172.87	0.91
7600.00	4.61	134.67	7598.14	-105.48	17.41	-105.48	106.91	170.63	0.97
7700.00	4.30	123.43	7697.84	-110.37	23.39	-110.37	112.82	168.03	0.93
7800.00	3.37	122.17	7797.61	-114.00	29.01	-114.00	117.63	165.72	0.94
7900.00	2.80	122.41	7897.47	-116.87	33.55	-116.87	121.59	163.98	0.86
8000.00	2.67	136.44	7997.35	-119.87	37.22	-119.87	125.51	162.75	0.88
8100.00	3.35	149.49	8097.22	-124.07	40.31	-124.07	130.45	162.00	0.96
8200.00	3.26	159.67	8197.05	-129.25	42.76	-129.25	136.15	161.69	0.59
8300.00	2.90	169.49	8296.91	-134.40	44.23	-134.40	141.49	161.79	0.64
8400.00	2.35	174.61	8396.80	-138.93	44.88	-138.93	145.99	162.10	0.60
8500.00	2.35	175.13	8496.72	-143.01	45.25	-143.01	150.00	162.44	0.02
8600.00	2.18	176.80	8596.64	-146.96	45.63	-146.96	153.85	162.79	0.18
8700.00	2.14	181.46	8696.57	-150.72	45.59	-150.72	157.47	163.17	0.18
8800.00	2.11	180.48	8796.50	-154.43	45.52	-154.43	161.00	163.58	0.05
8900.00	2.01	179.58	8896.44	-158.02	45.52	-158.02	164.45	163.93	0.11
9000.00	1.79	191.73	8996.38	-161.30	45.22	-161.30	167.52	164.34	0.46
9100.00	1.57	191.79	9096.34	-164.17	44.62	-164.17	170.13	164.80	0.21
9200.00	1.27	201.45	9196.31	-166.55	43.93	-166.55	172.24	165.22	0.39
9300.00	1.24	216.95	9296.29	-168.44	42.88	-168.44	173.81	165.72	0.34
9400.00	1.09	224.50	9396.27	-169.98	41.57	-169.98	174.99	166.26	0.21
9500.00	1.14	238.62	9496.25	-171.17	40.05	-171.17	175.80	166.83	0.28
9600.00	0.88	236.45	9596.23	-172.11	38.56	-172.11	176.38	167.37	0.26

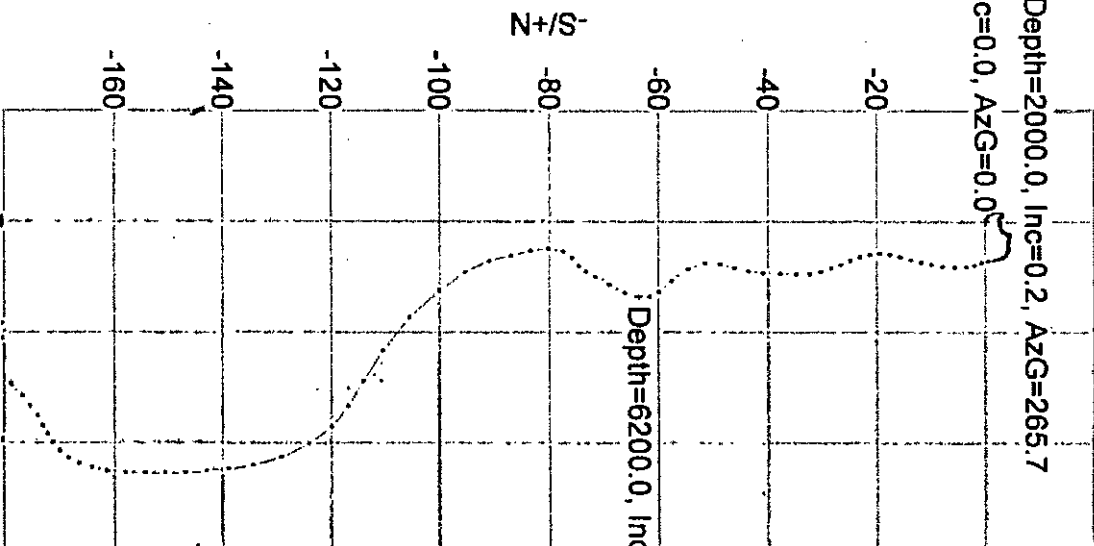
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
9700.00	1.06	240.36	8898.22	-173.00	37.12	-173.00	176.83	167.89	0.19
9800.00	1.27	242.54	9796.20	-173.96	35.33	-173.96	177.52	168.52	0.21
9900.00	1.28	228.86	9898.17	-175.21	33.51	-175.21	178.38	169.17	0.30
10000.00	1.33	231.03	9998.15	-176.67	31.77	-176.67	179.50	169.60	0.07
10124.00	1.66	223.44	10120.11	-178.80	29.50	-178.80	181.21	170.63	0.24



VES Survey International
West Texas
(432) 563-5444
Surveyor: Noe Gaiza
Horned Owl Federal 3H / API 30-015-42502



Depth=2000.0, Inc=0.2, AzG=265.7
Depth=0.0, Inc=0.0, AzG=0.0



-W/+E
VES Survey Date: 11/15/2014



COG Operating LLC

Eddy County, NM

Horned Owl Federal #3H

Surface: 190' FNL, 1810' FEL, Sec 25, T26S, R26E, Unit B

EOC: 7770.9' MD, 7470.0' TVD, -602.0' N/S, 2.7' E/W, 602.0' VS

BHL: 350' FSL, 1870' FEL, Sec 25, T26S, R26E, Unit O

Design: BHL: 350' FSL, 1870' FEL, Sec 25, T26S, R26E, Unit O

Survey Report - Geographic

28 November, 2014





TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Horned Owl Federal #3H
Project:	Eddy County, NM	TVD Reference:	KB @ 3420.2usft
Site:	Horned Owl Federal #3H	MD Reference:	KB @ 3420.2usft
Well:	Surface: 190' FNL, 1810' FEL, Sec 25, T26S, R26E, Unit B	North Reference:	Grid
Wellbore:	BHL: 350' FSL, 1870' FEL, Sec 25, T26S, R26E, Unit O	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350' FSL, 1870' FEL, Sec 25, T26S, R26E, Unit O	Database:	EDM 5000.1 Single User Db

Project:	Eddy County, NM		
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:		Horned Owl Federal #3H			
Site Position:		Northing:	370,971.49 usft	Latitude:	32° 1' 11.577 N
From:	Map	Easting:	527,984.80 usft	Longitude:	104° 14' 34.940 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.05 "

Well	Surface: 190' FNL, 1810' FEL, Sec 25, T26S, R26E, Unit B					
Well Position	+N-S	0.0 usft	Northing:	370,971.49 usft	Latitude:	32° 1' 11.577 N
	+E-W	0.0 usft	Easting:	527,984.80 usft	Longitude:	104° 14' 34.940 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,403.2 usft

Wellbore						BHL: 350' FSL: 1870' FEL: Sec 25, T26S, R26E, Unit O					
Magnetics		Model Name		Sample Date		Declination ($^{\circ}$)		Dip Angle ($^{\circ}$)		Field Strength (nT)	
		IGRF2010		8/4/2014		7.49		59.81		48,107	

Design:	IBHL: 350' FSL, 1870' FEL, Sec 25, T26S, R28E, Unit O				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction	
	(usft)	(usft)	(usft)	($^{\circ}$)	
	0.0	0.0	0.0	179.86	

Survey Program		Date 11/28/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	6,700.0	GYRO #1 (BHL: 350' FSL, 1870' FEL, Sec	MWD	MWD - Standard
6,781.0	11,864.0	MWD #1 (BHL: 350' FSL, 1870' FEL, Sec 2	MWD	MWD - Standard

Survey	Measured Depth (usft)	Inclination ($^{\circ}$)	Azimuth ($^{\circ}$)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
	0.0	0.00	0.00	0.0	0.0	0.0	370,971.49	527,984.80	32° 1' 11.577 N	104° 14' 34.940 W
	100.0	0.49	279.71	100.0	0.1	-0.4	370,971.56	527,984.38	32° 1' 11.578 N	104° 14' 34.944 W
	200.0	0.48	330.88	200.0	0.5	-1.1	370,972.01	527,983.75	32° 1' 11.582 N	104° 14' 34.952 W
	300.0	0.62	328.00	300.0	1.4	-1.5	370,972.84	527,983.26	32° 1' 11.591 N	104° 14' 34.957 W
	400.0	0.34	338.64	400.0	2.1	-1.9	370,973.58	527,982.66	32° 1' 11.598 N	104° 14' 34.962 W
	500.0	0.16	358.78	500.0	2.5	-2.1	370,973.99	527,982.75	32° 1' 11.602 N	104° 14' 34.963 W
	600.0	0.15	83.30	600.0	2.7	-1.9	370,974.15	527,982.88	32° 1' 11.604 N	104° 14' 34.962 W
	700.0	0.23	70.69	700.0	2.7	-1.8	370,974.23	527,983.20	32° 1' 11.604 N	104° 14' 34.958 W
	800.0	0.27	24.20	800.0	3.0	-1.3	370,974.51	527,983.48	32° 1' 11.607 N	104° 14' 34.955 W



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Horned Owl Federal #3H
Project:	Eddy County NM	TVD Reference:	KB @ 3420.2usft
Site:	Horned Owl Federal #3H	MD Reference:	KB @ 3420.2usft
Well:	Surface: 180' FNL 1810' FEL Sec 25 T28S	North Reference:	Grid
Wellbore:	R26E Unit B	Survey Calculation Method:	Minimum Curvature
	BHL: 350' FSL 1870' FEL Sec 25 T28S R26E	Database:	EDM 5000.1 Single User Db
Unit O			
Design:	BHL: 350' FSL 1870' FEL Sec 25 T28S R26E		
Unit O			

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	(Map) Northing (usft)	(Map) Easting (usft)	Latitude	Longitude
900.0	0.21	131.77	900.0	3.1	-1.1	370,974.60	527,983.72	32° 1' 11.608 N	104° 14' 34.952 W
1,000.0	0.21	135.63	1,000.0	2.9	-0.8	370,974.35	527,983.98	32° 1' 11.606 N	104° 14' 34.949 W
1,100.0	0.21	146.80	1,100.0	2.8	-0.6	370,974.07	527,984.21	32° 1' 11.603 N	104° 14' 34.948 W
1,200.0	0.25	61.05	1,200.0	2.5	-0.3	370,974.02	527,984.50	32° 1' 11.602 N	104° 14' 34.943 W
1,300.0	0.30	87.85	1,300.0	2.6	0.2	370,974.13	527,984.95	32° 1' 11.603 N	104° 14' 34.938 W
1,400.0	0.26	79.70	1,400.0	2.7	0.6	370,974.18	527,985.44	32° 1' 11.604 N	104° 14' 34.932 W
1,500.0	0.20	80.77	1,500.0	2.8	1.0	370,974.25	527,985.83	32° 1' 11.605 N	104° 14' 34.928 W
1,600.0	0.33	68.39	1,600.0	2.9	1.5	370,974.39	527,986.27	32° 1' 11.606 N	104° 14' 34.922 W
1,700.0	0.33	27.25	1,700.0	3.3	1.9	370,974.75	527,986.67	32° 1' 11.610 N	104° 14' 34.918 W
1,800.0	0.35	39.95	1,800.0	3.7	2.2	370,975.24	527,987.00	32° 1' 11.614 N	104° 14' 34.914 W
1,900.0	0.27	9.85	1,900.0	4.2	2.4	370,975.71	527,987.24	32° 1' 11.619 N	104° 14' 34.911 W
2,000.0	0.18	265.73	2,000.0	4.4	2.3	370,975.93	527,987.12	32° 1' 11.621 N	104° 14' 34.913 W
2,100.0	0.49	92.56	2,100.0	4.4	2.6	370,975.89	527,987.39	32° 1' 11.621 N	104° 14' 34.909 W
2,200.0	0.33	124.39	2,200.0	4.2	3.3	370,975.71	527,988.08	32° 1' 11.619 N	104° 14' 34.902 W
2,300.0	0.26	62.80	2,300.0	4.2	3.7	370,975.65	527,988.50	32° 1' 11.618 N	104° 14' 34.897 W
2,400.0	0.37	111.30	2,400.0	4.1	4.2	370,975.64	527,989.00	32° 1' 11.618 N	104° 14' 34.891 W
2,500.0	0.37	59.21	2,500.0	4.2	4.8	370,975.69	527,989.58	32° 1' 11.619 N	104° 14' 34.884 W
2,600.0	0.27	131.91	2,600.0	4.2	5.2	370,975.70	527,990.03	32° 1' 11.619 N	104° 14' 34.876 W
2,700.0	0.33	112.77	2,700.0	3.9	5.7	370,975.43	527,990.47	32° 1' 11.618 N	104° 14' 34.874 W
2,800.0	0.26	129.62	2,800.0	3.7	6.1	370,975.17	527,990.91	32° 1' 11.614 N	104° 14' 34.869 W
2,900.0	0.51	159.83	2,900.0	3.1	6.4	370,974.81	527,991.24	32° 1' 11.608 N	104° 14' 34.865 W
3,000.0	0.40	150.53	3,000.0	2.4	6.8	370,973.89	527,991.57	32° 1' 11.601 N	104° 14' 34.861 W
3,100.0	0.58	162.37	3,100.0	1.6	6.9	370,973.10	527,991.72	32° 1' 11.593 N	104° 14' 34.859 W
3,200.0	0.71	165.68	3,199.9	0.5	7.1	370,972.01	527,991.85	32° 1' 11.582 N	104° 14' 34.858 W
3,300.0	0.78	164.02	3,299.9	-0.7	7.4	370,970.78	527,992.19	32° 1' 11.570 N	104° 14' 34.854 W
3,400.0	0.83	160.01	3,399.9	-2.1	7.8	370,969.42	527,992.83	32° 1' 11.557 N	104° 14' 34.849 W
3,500.0	1.08	178.56	3,499.9	-3.7	8.1	370,967.82	527,992.93	32° 1' 11.541 N	104° 14' 34.845 W
3,600.0	1.32	180.70	3,599.8	-5.7	8.2	370,965.74	527,992.97	32° 1' 11.520 N	104° 14' 34.845 W
3,700.0	1.22	188.45	3,699.8	-8.0	8.0	370,963.53	527,992.84	32° 1' 11.499 N	104° 14' 34.848 W
3,800.0	1.16	191.30	3,799.8	-10.0	7.7	370,961.48	527,992.52	32° 1' 11.478 N	104° 14' 34.850 W
3,900.0	1.02	192.75	3,899.8	-11.9	7.3	370,959.62	527,992.13	32° 1' 11.480 N	104° 14' 34.855 W
4,000.0	1.24	194.50	3,999.8	-13.8	6.9	370,957.71	527,991.66	32° 1' 11.441 N	104° 14' 34.860 W
4,100.0	1.10	195.02	4,099.8	-15.8	6.3	370,955.73	527,991.14	32° 1' 11.421 N	104° 14' 34.868 W
4,200.0	1.07	191.21	4,199.8	-17.6	5.9	370,953.89	527,990.71	32° 1' 11.403 N	104° 14' 34.871 W
4,300.0	1.11	178.87	4,299.8	-19.5	5.7	370,952.00	527,990.55	32° 1' 11.384 N	104° 14' 34.873 W
4,400.0	1.01	168.81	4,399.7	-21.3	5.6	370,950.17	527,990.74	32° 1' 11.366 N	104° 14' 34.871 W
4,500.0	1.10	168.09	4,499.7	-23.1	6.3	370,948.37	527,991.11	32° 1' 11.348 N	104° 14' 34.867 W
4,600.0	1.09	148.93	4,599.7	-24.9	7.0	370,946.61	527,991.80	32° 1' 11.331 N	104° 14' 34.859 W
4,700.0	1.07	163.86	4,699.7	-26.6	7.7	370,944.90	527,992.55	32° 1' 11.314 N	104° 14' 34.850 W
4,800.0	1.08	158.70	4,799.7	-28.4	8.4	370,943.13	527,993.16	32° 1' 11.297 N	104° 14' 34.843 W
4,900.0	1.20	160.18	4,899.8	-30.2	8.1	370,941.27	527,993.85	32° 1' 11.278 N	104° 14' 34.835 W
5,000.0	1.28	179.08	4,999.6	-32.3	9.4	370,939.16	527,994.23	32° 1' 11.257 N	104° 14' 34.830 W
5,100.0	1.53	180.12	5,099.6	-34.8	9.4	370,938.71	527,994.24	32° 1' 11.233 N	104° 14' 34.830 W
5,200.0	1.92	182.35	5,199.5	-37.8	9.4	370,933.70	527,994.17	32° 1' 11.203 N	104° 14' 34.831 W
5,300.0	1.68	181.89	5,299.5	-40.9	9.3	370,930.58	527,994.05	32° 1' 11.172 N	104° 14' 34.832 W
5,400.0	1.42	193.88	5,399.5	-43.8	8.9	370,927.90	527,993.71	32° 1' 11.148 N	104° 14' 34.836 W
5,500.0	1.53	193.04	5,499.4	-46.1	8.3	370,925.39	527,993.12	32° 1' 11.121 N	104° 14' 34.843 W
5,600.0	1.64	184.03	5,599.4	-48.8	7.7	370,922.70	527,992.47	32° 1' 11.094 N	104° 14' 34.851 W
5,700.0	1.63	174.83	5,699.3	-51.6	7.4	370,919.90	527,992.25	32° 1' 11.087 N	104° 14' 34.854 W
5,800.0	2.11	150.79	5,799.3	-54.6	8.5	370,916.87	527,993.28	32° 1' 11.037 N	104° 14' 34.842 W
5,900.0	2.15	136.16	5,899.2	-57.6	10.7	370,913.81	527,995.47	32° 1' 11.007 N	104° 14' 34.816 W
6,000.0	1.40	143.95	5,999.2	-59.9	12.7	370,911.57	527,997.49	32° 1' 10.984 N	104° 14' 34.793 W



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinates Reference:	Site: Horned Owl Federal #3H
Project:	Eddy County, NM	TVD Reference:	KB @ 3420.2usft
Site:	Horned Owl Federal #3H	MD Reference:	KB @ 3420.2usft
Well:	Surface: 180' FNL 1810' FEL Sec 25, T28S, R28E	North Reference:	Grid
Wellbore:	R28E Unit B	Survey Calculation Method:	Minimum Curvature
	BHL 350' FSL 1870' FEL Sec 25, T28S, R28E	Database:	EDM 5000.1 Single User Db
Design:	Unit O		
	BHL 350' FSL 1870' FEL Sec 25, T28S, R28E		
	Unit O		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,100.0	0.91	172.43	6,099.2	-81.7	13.5	370,909.80	527,998.32	32° 1' 10.867 N	104° 14' 34.783 W
6,200.0	1.35	181.82	6,199.1	-83.7	13.8	370,907.83	527,998.38	32° 1' 10.847 N	104° 14' 34.782 W
6,300.0	1.73	206.96	6,299.1	-86.2	12.9	370,905.31	527,997.68	32° 1' 10.922 N	104° 14' 34.791 W
6,400.0	1.97	208.27	6,399.1	-89.0	11.4	370,902.45	527,996.16	32° 1' 10.894 N	104° 14' 34.808 W
6,500.0	1.37	208.38	6,499.0	-71.8	10.0	370,899.89	527,994.78	32° 1' 10.869 N	104° 14' 34.824 W
6,600.0	0.82	206.38	6,599.0	-73.4	9.0	370,898.14	527,993.62	32° 1' 10.851 N	104° 14' 34.838 W
6,700.0	1.05	227.55	6,699.0	-74.7	7.9	370,896.82	527,992.75	32° 1' 10.838 N	104° 14' 34.848 W
6,781.0	1.60	221.70	6,780.0	-76.0	6.6	370,895.47	527,991.45	32° 1' 10.825 N	104° 14' 34.863 W
6,813.0	3.30	195.40	6,811.9	-77.2	6.1	370,894.25	527,990.91	32° 1' 10.813 N	104° 14' 34.869 W
6,845.0	7.70	189.00	6,843.8	-80.2	5.5	370,891.24	527,989.33	32° 1' 10.783 N	104° 14' 34.878 W
6,876.0	13.40	191.10	6,874.2	-85.8	4.5	370,885.68	527,989.31	32° 1' 10.728 N	104° 14' 34.888 W
6,908.0	18.20	193.90	6,905.0	-94.3	2.8	370,877.17	527,987.39	32° 1' 10.644 N	104° 14' 34.910 W
6,940.0	21.50	192.90	6,935.1	-104.9	0.1	370,868.60	527,984.88	32° 1' 10.539 N	104° 14' 34.940 W
6,972.0	24.90	192.20	6,964.5	-117.2	-2.7	370,854.29	527,982.15	32° 1' 10.417 N	104° 14' 34.971 W
7,004.0	27.60	190.30	6,993.2	-131.1	-5.4	370,840.41	527,979.40	32° 1' 10.280 N	104° 14' 35.004 W
7,038.0	29.00	189.20	7,021.4	-148.0	-8.0	370,825.46	527,976.83	32° 1' 10.132 N	104° 14' 35.034 W
7,068.0	30.20	188.80	7,049.2	-161.8	-10.4	370,809.65	527,974.38	32° 1' 9.978 N	104° 14' 35.082 W
7,100.0	33.20	189.00	7,078.4	-178.3	-13.0	370,793.24	527,971.76	32° 1' 9.813 N	104° 14' 35.093 W
7,132.0	38.50	190.60	7,102.7	-198.3	-16.2	370,775.23	527,968.64	32° 1' 9.635 N	104° 14' 35.129 W
7,164.0	38.90	191.10	7,128.0	-215.5	-19.8	370,756.01	527,964.95	32° 1' 9.445 N	104° 14' 35.172 W
7,196.0	40.50	190.60	7,152.6	-235.8	-23.7	370,735.94	527,961.11	32° 1' 9.246 N	104° 14' 35.217 W
7,228.0	41.40	189.40	7,178.8	-256.2	-27.3	370,715.28	527,957.47	32° 1' 9.042 N	104° 14' 35.260 W
7,260.0	42.00	187.60	7,200.7	-277.3	-30.5	370,694.24	527,954.29	32° 1' 8.834 N	104° 14' 35.297 W
7,292.0	43.60	186.70	7,224.2	-298.8	-33.3	370,672.67	527,951.54	32° 1' 8.620 N	104° 14' 35.328 W
7,323.0	48.80	185.30	7,246.1	-320.7	-35.5	370,650.83	527,949.26	32° 1' 8.404 N	104° 14' 35.358 W
7,355.0	49.50	184.30	7,267.4	-344.4	-37.5	370,627.12	527,947.27	32° 1' 8.189 N	104° 14' 35.379 W
7,387.0	52.00	183.40	7,287.7	-369.1	-39.2	370,602.40	527,945.81	32° 1' 7.925 N	104° 14' 35.398 W
7,419.0	54.00	182.50	7,308.9	-384.8	-40.5	370,576.88	527,944.30	32° 1' 7.672 N	104° 14' 35.414 W
7,451.0	55.60	182.20	7,325.4	-420.7	-41.8	370,550.75	527,943.23	32° 1' 7.414 N	104° 14' 35.427 W
7,483.0	57.90	181.60	7,342.9	-447.5	-42.5	370,524.01	527,942.34	32° 1' 7.149 N	104° 14' 35.437 W
7,515.0	59.80	181.60	7,359.5	-474.8	-43.2	370,498.66	527,941.58	32° 1' 6.878 N	104° 14' 35.448 W
7,547.0	60.40	181.60	7,375.5	-502.5	-44.0	370,468.96	527,940.80	32° 1' 6.604 N	104° 14' 35.455 W
7,579.0	63.40	181.30	7,390.6	-530.7	-44.7	370,440.74	527,940.09	32° 1' 6.325 N	104° 14' 35.464 W
7,611.0	66.70	181.30	7,404.1	-559.8	-45.4	370,411.74	527,939.43	32° 1' 6.038 N	104° 14' 35.472 W
7,643.0	68.10	181.50	7,418.1	-589.4	-46.1	370,382.10	527,938.71	32° 1' 5.745 N	104° 14' 35.481 W
7,675.0	71.10	181.60	7,427.0	-619.5	-46.9	370,352.03	527,937.89	32° 1' 5.447 N	104° 14' 35.490 W
7,707.0	74.20	181.60	7,436.6	-650.0	-47.8	370,321.50	527,937.04	32° 1' 5.145 N	104° 14' 35.501 W
7,739.0	77.70	181.50	7,444.3	-681.0	-48.6	370,290.47	527,936.20	32° 1' 4.838 N	104° 14' 35.511 W
7,771.0	79.90	181.60	7,450.6	-712.4	-49.5	370,259.10	527,935.30	32° 1' 4.527 N	104° 14' 35.521 W
7,803.0	81.60	182.00	7,455.8	-744.0	-50.8	370,227.52	527,934.25	32° 1' 4.215 N	104° 14' 35.534 W
7,833.0	84.80	181.90	7,459.1	-773.7	-51.8	370,197.75	527,933.24	32° 1' 3.920 N	104° 14' 35.546 W
7,865.0	86.70	181.60	7,461.6	-805.8	-52.5	370,165.85	527,932.26	32° 1' 3.605 N	104° 14' 35.558 W
7,897.0	86.60	181.40	7,463.4	-837.8	-53.4	370,133.92	527,931.43	32° 1' 3.289 N	104° 14' 35.568 W
7,929.0	88.80	181.30	7,465.3	-869.5	-54.1	370,101.99	527,930.67	32° 1' 2.973 N	104° 14' 35.577 W
7,961.0	88.80	181.00	7,467.2	-901.4	-54.8	370,070.04	527,930.03	32° 1' 2.656 N	104° 14' 35.584 W
8,025.0	88.60	180.80	7,470.9	-985.3	-55.7	370,008.18	527,929.14	32° 1' 2.024 N	104° 14' 35.595 W
8,121.0	89.20	181.90	7,474.4	-1,061.2	-57.8	369,910.25	527,927.05	32° 1' 1.075 N	104° 14' 35.621 W
8,217.0	90.20	181.10	7,474.8	-1,157.2	-60.3	369,814.29	527,924.53	32° 1' 0.125 N	104° 14' 35.651 W
8,313.0	90.40	180.70	7,474.4	-1,253.2	-61.8	369,718.30	527,923.03	32° 0' 59.175 N	104° 14' 35.669 W
8,409.0	90.80	180.70	7,473.5	-1,349.2	-62.9	369,622.32	527,921.85	32° 0' 58.225 N	104° 14' 35.684 W
8,505.0	91.00	180.00	7,472.2	-1,445.2	-63.5	369,526.33	527,921.27	32° 0' 57.275 N	104° 14' 35.692 W
8,600.0	80.80	179.20	7,470.7	-1,540.1	-62.8	369,431.34	527,921.93	32° 0' 56.335 N	104° 14' 35.685 W



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Horned Owl Federal #3H
Project:	Eddy County, NM	TVD Reference:	KB @ 3420.2usft
SHA:	Horned Owl Federal #3H	MD Reference:	KB @ 3420.2usft
Well:	Surface: 180° FNL: 1810° FEL: Sec 25, T26S, R26E, Unit B	North Reference:	Grid
Wellbore:	BHL: 350° FSL: 1870° FEL: Sec 25, T26S, R26E, Unit O	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 350° FSL: 1870° FEL: Sec 25, T26S, R26E, Unit O	Database:	EDM 5000.1 Single User Db

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,696.0	90.40	176.50	7,469.7	-1,836.1	-60.8	369,335.37	527,923.88	32° 0' 55.388 N	104° 14' 35.883 W
8,782.0	90.90	176.30	7,468.6	-1,732.1	-58.3	369,239.41	527,926.54	32° 0' 54.436 N	104° 14' 35.833 W
8,868.0	90.20	177.80	7,467.7	-1,829.0	-55.0	369,142.47	527,929.84	32° 0' 53.477 N	104° 14' 35.596 W
8,984.0	89.40	177.50	7,468.0	-1,923.9	-51.1	369,047.55	527,933.73	32° 0' 52.537 N	104° 14' 35.551 W
9,077.0	88.80	177.30	7,469.5	-2,016.8	-46.9	368,954.68	527,937.95	32° 0' 51.818 N	104° 14' 35.503 W
9,171.0	89.50	177.60	7,470.9	-2,110.7	-42.7	368,860.77	527,942.13	32° 0' 50.688 N	104° 14' 35.456 W
9,265.0	91.40	177.90	7,470.1	-2,204.6	-39.0	368,768.85	527,945.82	32° 0' 49.758 N	104° 14' 35.414 W
9,360.0	91.10	177.90	7,468.1	-2,299.6	-35.5	368,671.93	527,948.30	32° 0' 48.820 N	104° 14' 35.374 W
9,454.0	90.80	177.90	7,468.5	-2,393.5	-32.1	368,578.01	527,952.75	32° 0' 47.890 N	104° 14' 35.335 W
9,548.0	90.40	177.90	7,465.5	-2,487.4	-28.6	368,484.08	527,956.19	32° 0' 46.960 N	104° 14' 35.296 W
9,641.0	89.50	178.10	7,465.6	-2,580.4	-25.4	368,391.13	527,959.44	32° 0' 46.041 N	104° 14' 35.259 W
9,734.0	90.40	180.10	7,465.7	-2,673.3	-23.9	368,298.15	527,960.90	32° 0' 45.120 N	104° 14' 35.243 W
9,829.0	90.70	180.20	7,464.8	-2,768.3	-24.2	368,203.18	527,960.65	32° 0' 44.180 N	104° 14' 35.247 W
9,922.0	90.80	180.10	7,463.6	-2,861.3	-24.4	368,110.16	527,960.40	32° 0' 43.260 N	104° 14' 35.251 W
10,016.0	90.70	180.30	7,462.3	-2,955.3	-24.7	368,016.17	527,960.08	32° 0' 42.330 N	104° 14' 35.255 W
10,110.0	92.40	180.70	7,459.8	-3,049.3	-25.5	367,922.22	527,959.26	32° 0' 41.400 N	104° 14' 35.268 W
10,204.0	91.90	180.80	7,456.3	-3,143.2	-26.6	367,828.29	527,958.03	32° 0' 40.470 N	104° 14' 35.281 W
10,297.0	91.00	180.20	7,453.9	-3,236.2	-27.6	367,735.32	527,957.22	32° 0' 39.550 N	104° 14' 35.291 W
10,392.0	89.10	179.90	7,453.6	-3,331.2	-27.7	367,640.33	527,957.13	32° 0' 38.610 N	104° 14' 35.293 W
10,487.0	90.60	179.80	7,454.1	-3,426.2	-27.4	367,545.33	527,957.38	32° 0' 37.670 N	104° 14' 35.291 W
10,580.0	91.50	179.90	7,452.4	-3,519.1	-27.2	367,452.35	527,957.63	32° 0' 36.750 N	104° 14' 35.289 W
10,675.0	91.00	180.20	7,450.3	-3,614.1	-27.3	367,357.37	527,957.54	32° 0' 35.810 N	104° 14' 35.281 W
10,768.0	90.50	179.70	7,449.0	-3,707.1	-27.2	367,264.38	527,957.62	32° 0' 34.889 N	104° 14' 35.281 W
10,862.0	88.50	179.30	7,449.7	-3,801.1	-26.4	367,170.39	527,958.44	32° 0' 33.959 N	104° 14' 35.283 W
10,955.0	87.90	178.90	7,452.6	-3,894.0	-24.9	367,077.45	527,959.90	32° 0' 33.039 N	104° 14' 35.267 W
11,048.0	88.30	178.70	7,455.7	-3,987.0	-23.0	366,984.52	527,961.85	32° 0' 32.120 N	104° 14' 35.245 W
11,143.0	90.00	178.30	7,457.1	-4,081.9	-20.5	366,889.57	527,964.34	32° 0' 31.180 N	104° 14' 35.217 W
11,236.0	91.00	177.80	7,456.3	-4,174.9	-17.3	366,796.83	527,967.50	32° 0' 30.260 N	104° 14' 35.181 W
11,330.0	90.80	177.90	7,455.0	-4,268.8	-13.6	366,702.70	527,971.03	32° 0' 29.331 N	104° 14' 35.141 W
11,424.0	90.20	178.00	7,454.4	-4,362.7	-10.4	366,608.77	527,974.39	32° 0' 28.401 N	104° 14' 35.103 W
11,519.0	89.90	177.70	7,454.3	-4,457.7	-8.8	366,513.83	527,977.95	32° 0' 27.461 N	104° 14' 35.062 W
11,614.0	91.30	178.10	7,453.3	-4,552.6	-3.4	366,418.91	527,981.43	32° 0' 26.522 N	104° 14' 35.023 W
11,707.0	90.70	178.00	7,451.7	-4,645.5	-0.2	366,325.97	527,984.80	32° 0' 25.602 N	104° 14' 34.987 W
11,801.0	90.50	177.50	7,450.7	-4,739.4	3.5	366,232.05	527,988.29	32° 0' 24.672 N	104° 14' 34.945 W
Final MWD Survey									
11,884.0	90.50	177.50	7,450.1	-4,802.4	6.2	366,189.11	527,991.04	32° 0' 24.050 N	104° 14' 34.914 W
Projection to Bit									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
11,801.0	7,450.7	-4,739.4	3.5	Final MWD Survey
11,884.0	7,450.1	-4,802.4	6.2	Projection to Bit

Checked By: _____ Approved By: _____ Date: _____