

PATRIOT DRILLING, LLC

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 21 2016

RECEIVED

OPERATOR:
WELL/LEASE:
COUNTY:

COG Operating, LLC
Horned Owl Fed #4H
Eddy Co., New Mexico
Sec. 24, T 26S, R 26E

30-015-42486

STATE OF NEW MEXICO
DEVIATION REPORT

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
536	3/4	4,003	1/2
1,089	1/2	4,439	3/4
1,561	3 1/4	4,912	1 1/4
1,992	2	5,658	1 1/2
2,341	1	6,128	2 3/4
2,827	3/4	6,379	2
3,273	1		
3,667	3/4		

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 21 2016

RECEIVED

Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-President

The foregoing instrument was acknowledged before me on this 17th day of August, 2015
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



August 12, 2015

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

NM OIL CONSERVATION
ARTESIA DISTRICT
MAR 21 2016
RECEIVED

Attn: Kanicia Castillo

RE: **Horned Owl Federal No 004H**

Please find enclosed a copy of the survey from 0' to 6750' ran on the above referenced well.

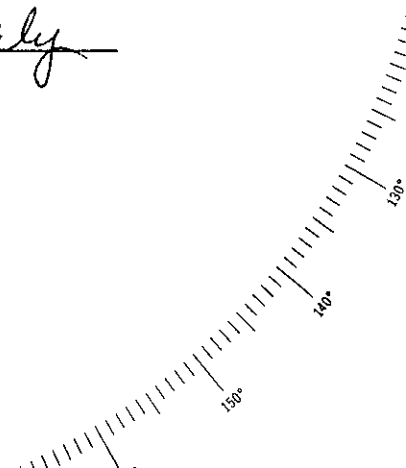
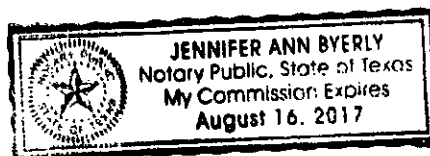
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 12 day of August,
A.D., 2015, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: Cog Operating LLC
Lease/Well: Horned Owl Federal No/004H



Rig Name: Patriot 2
State/County: New Mexico /Eddy
VS-Azi: 176.96 Degrees
Latitude: 32.02148, Longitude: -104.23913
Grid North = True North -0.05 degs (NAD 27)

Depth Reference : R.K.B = 20 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: horned owl fed 4h -de_01.ut
Minimum Curvature Method
Report Date/Time: 8/12/2015 / 14:39

VES Survey International
Midland, Texas
432-563-5444

Surveyor: Javier Estrada
Horned Owl Federal No 004H / API 30-015-42486

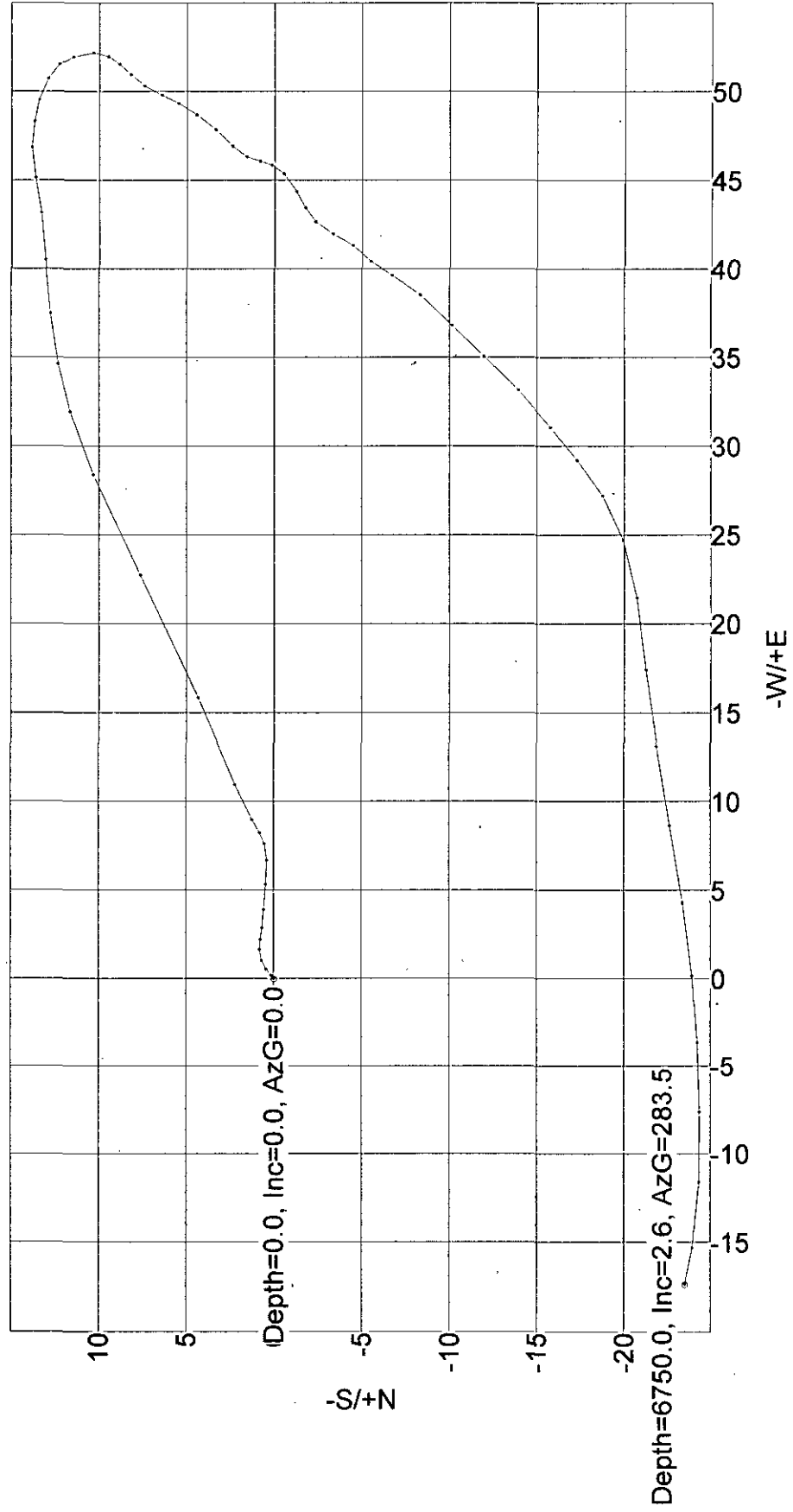
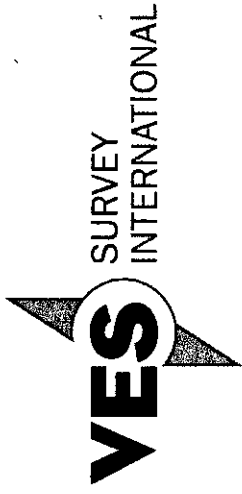
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N-S FT	+E-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.26	51.23	100.00	0.14	0.18	-0.13	0.23	51.23	0.26
200.00	0.26	52.85	200.00	0.42	0.54	-0.40	0.69	51.76	0.01
300.00	0.37	67.54	300.00	0.68	1.02	-0.63	1.23	56.07	0.14
400.00	0.38	91.58	400.00	0.80	1.64	-0.71	1.83	64.09	0.16
500.00	0.28	95.50	499.99	0.77	2.22	-0.65	2.35	70.97	0.09
600.00	0.45	100.84	599.99	0.67	2.85	-0.52	2.93	76.81	0.17
700.00	0.75	91.53	699.99	0.58	3.89	-0.37	3.94	81.57	0.32
800.00	0.88	98.21	799.98	0.45	5.31	-0.17	5.33	85.16	0.16
900.00	0.69	85.43	899.97	0.39	6.68	-0.03	6.69	86.67	0.26
1000.00	0.41	73.99	999.96	0.53	7.62	-0.13	7.64	85.99	0.30
1100.00	0.37	58.63	1099.96	0.80	8.24	-0.36	8.28	84.45	0.11
1200.00	0.61	60.55	1199.96	1.23	8.98	-0.75	9.07	82.18	0.24
1300.00	1.89	65.09	1299.93	2.19	10.95	-1.61	11.16	78.67	1.28
1400.00	4.25	66.88	1399.78	4.34	15.85	-3.49	16.43	74.68	2.36
1500.00	4.50	62.33	1499.49	7.62	22.73	-6.40	23.97	71.47	0.43
1600.00	2.70	68.21	1599.29	10.32	28.40	-8.80	30.21	70.03	1.84
1700.00	1.63	72.13	1699.21	11.63	31.94	-9.92	33.99	70.00	1.08
1800.00	1.57	79.15	1799.17	12.32	34.64	-10.47	36.77	70.42	0.20

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	1.72	83.37	1899.13	12.75	37.48	-10.75	39.59	71.21	0.19
2000.00	1.78	85.02	1999.09	13.06	40.52	-10.89	42.57	72.13	0.08
2100.00	1.25	84.45	2099.05	13.30	43.15	-11.00	45.15	72.87	0.53
2200.00	1.06	75.94	2199.03	13.63	46.13	-11.22	47.15	73.19	0.25
2300.00	0.93	91.27	2299.02	13.84	46.84	-11.34	48.85	73.54	0.30
2400.00	0.75	101.36	2399.01	13.69	48.30	-11.11	50.20	74.17	0.23
2500.00	0.67	102.25	2499.00	13.44	49.52	-10.79	51.31	74.82	0.08
2600.00	0.85	122.52	2598.99	12.92	50.72	-10.21	52.34	75.71	0.32
2700.00	0.33	145.39	2698.98	12.28	51.50	-9.54	52.95	76.59	0.56
2800.00	0.73	157.25	2798.98	11.46	51.91	-8.69	53.16	77.55	0.42
2900.00	0.62	180.28	2898.97	10.34	52.16	-7.55	53.17	78.79	0.29
3000.00	0.43	214.24	2998.97	9.49	51.94	-6.72	52.80	79.65	0.36
3100.00	0.47	212.50	3098.97	8.84	51.52	-6.09	52.27	80.27	0.04
3200.00	0.52	231.65	3198.96	8.21	50.94	-5.50	51.60	80.84	0.17
3300.00	0.66	208.80	3298.96	7.43	50.31	-4.75	50.85	81.60	0.27
3400.00	0.61	206.53	3398.95	6.44	49.79	-3.79	50.21	82.63	0.05
3500.00	0.63	206.01	3498.94	5.48	49.31	-2.85	49.62	83.66	0.02
3600.00	0.76	216.26	3598.94	4.45	48.68	-1.86	48.88	84.78	0.18
3700.00	0.82	218.52	3698.93	3.35	47.84	-0.81	47.96	85.99	0.07
3800.00	0.74	231.25	3798.92	2.39	46.89	0.10	46.95	87.08	0.19
3900.00	0.46	190.10	3898.91	1.59	46.32	0.87	46.35	88.03	0.50
4000.00	0.46	206.20	3998.91	0.84	46.07	1.61	46.08	88.96	0.13
4100.00	0.35	189.09	4098.91	0.18	45.84	2.26	45.85	89.78	0.16
4200.00	0.69	228.47	4198.90	-0.52	45.35	2.93	45.35	90.66	0.47
4300.00	0.73	239.71	4298.90	-1.24	44.35	3.59	44.37	91.61	0.15
4400.00	0.45	243.59	4398.89	-1.74	43.44	4.04	43.48	92.30	0.28
4500.00	0.69	227.18	4498.89	-2.33	42.64	4.59	42.71	93.13	0.29
4600.00	0.71	201.69	4598.88	-3.32	41.97	5.54	42.10	94.52	0.31
4700.00	0.78	217.78	4698.87	-4.44	41.32	6.62	41.56	96.13	0.22
4800.00	0.80	224.05	4798.86	-5.48	40.42	7.61	40.79	97.72	0.09
4900.00	0.93	202.01	4898.85	-6.73	39.63	8.82	40.20	99.63	0.35
5000.00	1.35	223.14	4998.83	-8.33	38.52	10.37	39.41	102.21	0.59
5100.00	1.51	223.92	5098.80	-10.14	36.80	12.08	38.18	105.41	0.16
5200.00	1.40	224.16	5198.77	-11.97	35.04	13.81	37.03	108.86	0.11
5300.00	1.71	223.71	5298.73	-13.93	33.15	15.67	35.96	112.79	0.31
5400.00	1.49	234.93	5398.69	-15.76	31.05	17.38	34.82	116.91	0.38
5500.00	1.29	224.24	5498.66	-17.31	29.20	18.84	33.95	120.66	0.33
5600.00	1.58	241.72	5598.63	-18.77	27.21	20.18	33.05	124.60	0.52
5700.00	1.61	247.69	5698.59	-19.95	24.70	21.23	31.75	128.93	0.17

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	2.24	262.82	5798.54	-20.73	21.46	21.84	29.84	134.00	0.80
5900.00	2.46	261.45	5898.45	-21.29	17.41	22.18	27.50	140.73	0.22
6000.00	2.52	262.11	5998.36	-21.91	13.11	22.58	25.53	149.11	0.07
6100.00	2.65	259.05	6098.26	-22.65	8.66	23.08	24.25	159.09	0.19
6200.00	2.44	261.65	6198.16	-23.40	4.27	23.60	23.79	169.65	0.24
6300.00	2.31	263.68	6298.07	-23.94	0.16	23.91	23.94	179.62	0.16
6400.00	2.12	267.21	6398.00	-24.25	-3.70	24.02	24.53	188.67	0.23
6500.00	2.39	269.05	6497.92	-24.37	-7.63	23.93	25.54	197.39	0.28
6600.00	2.17	271.71	6597.84	-24.35	-11.61	23.70	26.98	205.49	0.24
6700.00	2.11	280.35	6697.77	-23.96	-15.32	23.12	28.44	212.59	0.33
6750.00	2.64	283.47	6747.73	-23.53	-17.35	22.57	29.23	216.40	1.09



VES Survey International
Midland, Texas
432-563-5444
Surveyor: Javier Estrada
Horned Owl Federal No 004H / API 30-015-42486





I JAVIER ESTRADA certify that I am employed by Vaughn Energy Services. That I did on the day(s) of 08/05/15 through 08/05/15 conduct or supervise the taking of a RATE GYRO survey from a depth of 0 feet to a depth of 6750 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 VES for the HORNED OWL FEDERAL Well # N_o 004H API # 30-015-42486 in EDDY County / Parish NEW MEXCIO; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services



JAVIER ESTRADA
Service Technician
Vaughn Energy Services



COG Operating LLC.

Eddy County, NM
Horned Owl Federal
#4H

OH

Survey: MWD #1

Survey Report - Geographic

12 August, 2015



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3414.3usft (Original Well Elev)
Site:	Horned Owl Federal	MD Reference:	WELL @ 3414.3usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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		
Site Position:		Northing:	370,965.80 usft
From:	Map	Easting:	526,339.80 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 1' 11.534 N
		Longitude:	104° 14' 54.047 W
		Grid Convergence:	0.05 °

Well	#4H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 1' 17.344 N
		Longitude:	104° 14' 20.843 W
		Ground Level:	3,394.3 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	7/21/2015	7.37
			Dip Angle
			(°)
			59.78
			Field Strength
			(nT)
			48,013

Design	OH		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			176.95

Survey Program	Date 8/12/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
100.0	12,676.0	MWD #1 (OH)	MWD
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting		
(usft)			(usft)			(usft)	(usft)		
0.0	0.00	0.00	0.0	0.0	0.0	371,555.20	529,197.90	32° 1' 17.344 N	104° 14' 20.843 W
100.0	0.26	51.23	100.0	0.1	0.2	371,555.34	529,198.08	32° 1' 17.345 N	104° 14' 20.841 W
200.0	0.26	52.85	200.0	0.4	0.5	371,555.62	529,198.44	32° 1' 17.348 N	104° 14' 20.837 W
300.0	0.37	67.54	300.0	0.7	1.0	371,555.88	529,198.92	32° 1' 17.351 N	104° 14' 20.831 W
400.0	0.38	91.58	400.0	0.8	1.6	371,555.99	529,199.55	32° 1' 17.352 N	104° 14' 20.824 W
500.0	0.28	95.50	500.0	0.8	2.2	371,555.96	529,200.12	32° 1' 17.351 N	104° 14' 20.817 W
600.0	0.45	100.84	600.0	0.7	2.8	371,555.86	529,200.75	32° 1' 17.350 N	104° 14' 20.810 W
700.0	0.75	91.53	700.0	0.6	3.9	371,555.77	529,201.79	32° 1' 17.349 N	104° 14' 20.798 W
800.0	0.88	98.21	800.0	0.4	5.3	371,555.65	529,203.20	32° 1' 17.348 N	104° 14' 20.781 W
900.0	0.69	85.43	900.0	0.4	6.7	371,555.58	529,204.56	32° 1' 17.348 N	104° 14' 20.765 W
1,000.0	0.41	73.99	1,000.0	0.5	7.6	371,555.73	529,205.51	32° 1' 17.349 N	104° 14' 20.754 W
1,100.0	0.37	58.63	1,100.0	0.8	8.2	371,556.00	529,206.13	32° 1' 17.352 N	104° 14' 20.747 W



Wellplanning Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3414.3usft (Original Well Elev)
Site:	Horned Owl Federal	MD Reference:	WELL @ 3414.3usft (Original Well Elev)
Well:	#4H.	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,200.0	0.61	60.55	1,200.0	1.2	9.0	371,556.43	529,206.87	32° 1' 17.356 N	104° 14' 20.739 W
1,300.0	1.89	65.09	1,299.9	2.2	10.9	371,557.38	529,208.83	32° 1' 17.365 N	104° 14' 20.716 W
1,400.0	4.25	66.88	1,399.8	4.3	15.8	371,559.53	529,213.73	32° 1' 17.387 N	104° 14' 20.659 W
1,500.0	4.50	62.33	1,499.5	7.6	22.7	371,562.81	529,220.61	32° 1' 17.419 N	104° 14' 20.579 W
1,600.0	2.70	68.21	1,599.3	10.3	28.4	371,565.51	529,226.27	32° 1' 17.446 N	104° 14' 20.513 W
1,700.0	1.63	72.13	1,699.2	11.6	31.9	371,566.82	529,229.81	32° 1' 17.459 N	104° 14' 20.472 W
1,800.0	1.57	79.15	1,799.2	12.3	34.6	371,567.51	529,232.51	32° 1' 17.465 N	104° 14' 20.441 W
1,900.0	1.72	83.37	1,899.1	12.7	37.4	371,567.94	529,235.35	32° 1' 17.470 N	104° 14' 20.408 W
2,000.0	1.78	85.02	1,999.1	13.1	40.5	371,568.25	529,238.39	32° 1' 17.473 N	104° 14' 20.372 W
2,100.0	1.25	84.45	2,099.1	13.3	43.1	371,568.49	529,241.02	32° 1' 17.475 N	104° 14' 20.342 W
2,200.0	1.06	75.94	2,199.0	13.6	45.1	371,568.82	529,243.00	32° 1' 17.478 N	104° 14' 20.319 W
2,300.0	0.93	91.27	2,299.0	13.8	46.8	371,569.03	529,244.71	32° 1' 17.480 N	104° 14' 20.299 W
2,400.0	0.75	101.36	2,399.0	13.7	48.3	371,568.88	529,246.17	32° 1' 17.479 N	104° 14' 20.282 W
2,500.0	0.67	102.25	2,499.0	13.4	49.5	371,568.63	529,247.38	32° 1' 17.476 N	104° 14' 20.268 W
2,600.0	0.85	122.52	2,599.0	12.9	50.7	371,568.11	529,248.58	32° 1' 17.471 N	104° 14' 20.254 W
2,700.0	0.33	145.39	2,699.0	12.3	51.5	371,567.47	529,249.36	32° 1' 17.465 N	104° 14' 20.245 W
2,800.0	0.73	157.25	2,799.0	11.4	51.9	371,566.65	529,249.77	32° 1' 17.457 N	104° 14' 20.240 W
2,900.0	0.62	180.28	2,899.0	10.3	52.1	371,565.52	529,250.02	32° 1' 17.446 N	104° 14' 20.237 W
3,000.0	0.43	214.24	2,999.0	9.5	51.9	371,564.67	529,249.80	32° 1' 17.437 N	104° 14' 20.240 W
3,100.0	0.47	212.50	3,099.0	8.8	51.5	371,564.01	529,249.37	32° 1' 17.431 N	104° 14' 20.245 W
3,200.0	0.52	231.65	3,199.0	8.2	50.9	371,563.38	529,248.80	32° 1' 17.424 N	104° 14' 20.251 W
3,300.0	0.66	208.80	3,299.0	7.4	50.3	371,562.60	529,248.16	32° 1' 17.417 N	104° 14' 20.259 W
3,400.0	0.61	206.53	3,399.0	6.4	49.7	371,561.61	529,247.65	32° 1' 17.407 N	104° 14' 20.265 W
3,500.0	0.63	206.01	3,498.9	5.4	49.3	371,560.64	529,247.17	32° 1' 17.397 N	104° 14' 20.270 W
3,600.0	0.76	216.26	3,598.9	4.4	48.6	371,559.62	529,246.54	32° 1' 17.387 N	104° 14' 20.278 W
3,700.0	0.82	218.52	3,698.9	3.3	47.8	371,558.52	529,245.70	32° 1' 17.376 N	104° 14' 20.288 W
3,800.0	0.74	231.25	3,798.9	2.4	46.8	371,557.56	529,244.75	32° 1' 17.367 N	104° 14' 20.299 W
3,900.0	0.46	190.10	3,898.9	1.6	46.3	371,556.76	529,244.17	32° 1' 17.359 N	104° 14' 20.305 W
4,000.0	0.46	206.20	3,998.9	0.8	46.0	371,556.00	529,243.93	32° 1' 17.351 N	104° 14' 20.308 W
4,100.0	0.35	189.09	4,098.9	0.1	45.8	371,555.34	529,243.70	32° 1' 17.345 N	104° 14' 20.311 W
4,200.0	0.69	228.47	4,198.9	-0.6	45.3	371,554.64	529,243.20	32° 1' 17.338 N	104° 14' 20.317 W
4,300.0	0.73	239.71	4,298.9	-1.3	44.3	371,553.92	529,242.20	32° 1' 17.331 N	104° 14' 20.328 W
4,400.0	0.45	243.59	4,398.9	-1.8	43.4	371,553.42	529,241.30	32° 1' 17.326 N	104° 14' 20.339 W
4,500.0	0.69	227.18	4,498.9	-2.4	42.6	371,552.84	529,240.51	32° 1' 17.320 N	104° 14' 20.348 W
4,600.0	0.71	201.69	4,598.9	-3.3	41.9	371,551.85	529,239.84	32° 1' 17.310 N	104° 14' 20.356 W
4,700.0	0.78	217.78	4,698.9	-4.5	41.3	371,550.74	529,239.19	32° 1' 17.299 N	104° 14' 20.363 W
4,800.0	0.80	224.05	4,798.9	-5.5	40.4	371,549.70	529,238.29	32° 1' 17.289 N	104° 14' 20.374 W
4,900.0	0.93	202.01	4,898.8	-6.8	39.6	371,548.45	529,237.50	32° 1' 17.277 N	104° 14' 20.383 W
5,000.0	1.35	223.14	4,998.8	-8.4	38.5	371,546.83	529,236.39	32° 1' 17.261 N	104° 14' 20.396 W
5,100.0	1.51	223.92	5,098.8	-10.2	36.8	371,545.03	529,234.67	32° 1' 17.243 N	104° 14' 20.416 W
5,200.0	1.40	224.16	5,198.8	-12.0	35.0	371,543.20	529,232.90	32° 1' 17.225 N	104° 14' 20.436 W
5,300.0	1.71	223.71	5,298.7	-14.0	33.1	371,541.25	529,231.02	32° 1' 17.205 N	104° 14' 20.458 W
5,400.0	1.49	234.93	5,398.7	-15.8	31.0	371,539.42	529,228.93	32° 1' 17.187 N	104° 14' 20.483 W
5,500.0	1.29	224.24	5,498.7	-17.3	29.2	371,537.87	529,227.08	32° 1' 17.172 N	104° 14' 20.504 W
5,600.0	1.58	241.72	5,598.6	-18.8	27.2	371,536.41	529,225.08	32° 1' 17.158 N	104° 14' 20.527 W
5,700.0	1.61	247.69	5,698.6	-20.0	24.7	371,535.22	529,222.56	32° 1' 17.146 N	104° 14' 20.556 W
5,800.0	2.24	262.82	5,798.5	-20.8	21.4	371,534.44	529,219.33	32° 1' 17.138 N	104° 14' 20.594 W
5,900.0	2.46	261.45	5,898.5	-21.3	17.4	371,533.88	529,215.26	32° 1' 17.133 N	104° 14' 20.641 W
6,000.0	2.52	262.11	5,998.4	-21.9	13.1	371,533.26	529,210.96	32° 1' 17.127 N	104° 14' 20.691 W
6,100.0	2.65	259.05	6,098.3	-22.7	8.6	371,532.52	529,206.52	32° 1' 17.119 N	104° 14' 20.743 W
6,200.0	2.44	261.65	6,198.2	-23.4	4.2	371,531.77	529,202.14	32° 1' 17.112 N	104° 14' 20.794 W
6,300.0	2.31	263.68	6,298.1	-24.0	0.1	371,531.24	529,198.03	32° 1' 17.107 N	104° 14' 20.841 W
6,400.0	2.12	267.21	6,398.0	-24.3	-3.7	371,530.93	529,194.18	32° 1' 17.104 N	104° 14' 20.886 W
6,500.0	2.39	269.05	6,497.9	-24.4	-7.7	371,530.80	529,190.25	32° 1' 17.102 N	104° 14' 20.932 W
6,600.0	2.17	271.71	6,597.8	-24.4	-11.6	371,530.82	529,186.27	32° 1' 17.103 N	104° 14' 20.978 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3414.3usft (Original Well Elev)
Site:	Horned Owl Federal	MD Reference:	WELL @ 3414.3usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,700.0	2.11	280.35	6,697.8	-24.0	-15.3	371,531.21	529,182.57	32° 1' 17.107 N	104° 14' 21.021 W
6,750.0	2.64	283.47	6,747.7	-23.6	-17.4	371,531.64	529,180.54	32° 1' 17.111 N	104° 14' 21.045 W
6,845.0	3.90	294.50	6,842.6	-21.7	-22.4	371,533.49	529,175.48	32° 1' 17.129 N	104° 14' 21.103 W
6,876.0	4.10	296.70	6,873.5	-20.8	-24.4	371,534.43	529,173.53	32° 1' 17.139 N	104° 14' 21.126 W
6,908.0	4.00	273.30	6,905.4	-20.2	-26.5	371,535.01	529,171.39	32° 1' 17.144 N	104° 14' 21.151 W
6,940.0	6.60	240.10	6,937.3	-21.0	-29.2	371,534.15	529,168.68	32° 1' 17.136 N	104° 14' 21.182 W
6,972.0	7.30	226.10	6,969.1	-23.4	-32.3	371,531.83	529,165.62	32° 1' 17.113 N	104° 14' 21.218 W
7,003.0	8.60	211.80	6,999.8	-26.7	-34.9	371,528.49	529,162.98	32° 1' 17.080 N	104° 14' 21.249 W
7,035.0	11.60	199.00	7,031.3	-31.8	-37.2	371,523.42	529,160.67	32° 1' 17.030 N	104° 14' 21.276 W
7,067.0	14.90	190.00	7,062.4	-38.9	-39.0	371,516.32	529,158.91	32° 1' 16.959 N	104° 14' 21.296 W
7,098.0	18.00	184.70	7,092.1	-47.6	-40.1	371,507.62	529,157.82	32° 1' 16.873 N	104° 14' 21.309 W
7,130.0	20.00	183.70	7,122.4	-58.0	-40.8	371,497.23	529,157.07	32° 1' 16.770 N	104° 14' 21.318 W
7,162.0	19.60	180.60	7,152.5	-68.8	-41.2	371,486.40	529,156.66	32° 1' 16.663 N	104° 14' 21.323 W
7,193.0	19.20	182.00	7,181.7	-79.1	-41.5	371,476.11	529,156.42	32° 1' 16.561 N	104° 14' 21.325 W
7,225.0	21.40	180.80	7,211.8	-90.2	-41.7	371,465.01	529,156.16	32° 1' 16.452 N	104° 14' 21.329 W
7,256.0	25.30	181.00	7,240.2	-102.5	-41.9	371,452.73	529,155.96	32° 1' 16.330 N	104° 14' 21.331 W
7,288.0	29.40	180.10	7,268.6	-117.2	-42.1	371,438.03	529,155.83	32° 1' 16.185 N	104° 14' 21.333 W
7,320.0	33.60	180.00	7,295.9	-133.9	-42.1	371,421.31	529,155.82	32° 1' 16.019 N	104° 14' 21.333 W
7,352.0	37.80	179.80	7,321.9	-152.6	-42.1	371,402.64	529,155.85	32° 1' 15.834 N	104° 14' 21.333 W
7,383.0	42.10	178.00	7,345.6	-172.5	-41.7	371,382.75	529,156.25	32° 1' 15.638 N	104° 14' 21.328 W
7,415.0	45.90	176.90	7,368.7	-194.7	-40.7	371,360.55	529,157.24	32° 1' 15.418 N	104° 14' 21.317 W
7,447.0	50.00	174.90	7,390.1	-218.3	-38.9	371,336.85	529,158.96	32° 1' 15.183 N	104° 14' 21.297 W
7,478.0	54.50	174.80	7,409.1	-242.8	-36.7	371,312.45	529,161.16	32° 1' 14.942 N	104° 14' 21.272 W
7,510.0	59.20	174.40	7,426.6	-269.4	-34.2	371,285.78	529,163.68	32° 1' 14.678 N	104° 14' 21.243 W
7,542.0	64.00	173.50	7,441.8	-297.4	-31.3	371,257.80	529,166.65	32° 1' 14.401 N	104° 14' 21.209 W
7,573.0	68.90	172.60	7,454.2	-325.6	-27.8	371,229.60	529,170.09	32° 1' 14.122 N	104° 14' 21.169 W
7,605.0	73.60	171.50	7,464.4	-355.6	-23.6	371,199.60	529,174.28	32° 1' 13.825 N	104° 14' 21.121 W
7,637.0	78.50	172.70	7,472.2	-386.4	-19.4	371,168.85	529,178.55	32° 1' 13.520 N	104° 14' 21.071 W
7,668.0	83.10	172.70	7,477.1	-416.7	-15.5	371,138.50	529,182.44	32° 1' 13.220 N	104° 14' 21.027 W
7,702.0	87.70	174.30	7,479.8	-450.4	-11.6	371,104.84	529,186.27	32° 1' 12.887 N	104° 14' 20.982 W
7,734.0	89.50	175.10	7,480.6	-482.2	-8.7	371,072.99	529,189.22	32° 1' 12.572 N	104° 14' 20.948 W
7,797.0	89.40	175.70	7,481.2	-545.0	-3.6	371,010.19	529,194.28	32° 1' 11.950 N	104° 14' 20.890 W
7,892.0	90.80	175.70	7,481.1	-639.7	3.5	370,915.46	529,201.40	32° 1' 11.013 N	104° 14' 20.809 W
7,987.0	91.60	177.30	7,479.1	-734.5	9.3	370,820.66	529,207.20	32° 1' 10.074 N	104° 14' 20.742 W
8,082.0	89.80	178.00	7,477.9	-829.4	13.2	370,725.76	529,211.09	32° 1' 9.135 N	104° 14' 20.698 W
8,177.0	90.10	178.80	7,478.0	-924.4	15.8	370,630.79	529,213.75	32° 1' 8.195 N	104° 14' 20.668 W
8,272.0	90.30	180.00	7,477.7	-1,019.4	16.8	370,535.80	529,214.74	32° 1' 7.255 N	104° 14' 20.657 W
8,367.0	90.50	180.30	7,477.0	-1,114.4	16.6	370,440.80	529,214.49	32° 1' 6.315 N	104° 14' 20.661 W
8,463.0	91.10	179.70	7,475.6	-1,210.4	16.6	370,344.81	529,214.49	32° 1' 5.365 N	104° 14' 20.662 W
8,558.0	89.60	178.40	7,475.1	-1,305.4	18.2	370,249.83	529,216.07	32° 1' 4.425 N	104° 14' 20.645 W
8,653.0	89.80	179.70	7,475.6	-1,400.3	19.7	370,154.85	529,217.64	32° 1' 3.485 N	104° 14' 20.628 W
8,748.0	89.70	179.20	7,476.0	-1,495.3	20.7	370,059.86	529,218.55	32° 1' 2.545 N	104° 14' 20.618 W
8,843.0	89.60	179.10	7,476.6	-1,590.3	22.1	369,964.87	529,219.96	32° 1' 1.605 N	104° 14' 20.603 W
8,939.0	90.90	179.30	7,476.1	-1,686.3	23.4	369,868.88	529,221.30	32° 1' 0.655 N	104° 14' 20.588 W
9,034.0	91.50	179.60	7,474.2	-1,781.3	24.3	369,773.91	529,222.21	32° 0' 59.715 N	104° 14' 20.578 W
9,129.0	90.80	178.20	7,472.2	-1,876.3	26.1	369,678.95	529,224.04	32° 0' 58.775 N	104° 14' 20.558 W
9,224.0	90.50	177.90	7,471.2	-1,971.2	29.4	369,584.01	529,227.27	32° 0' 57.835 N	104° 14' 20.522 W
9,319.0	89.80	177.80	7,470.9	-2,066.1	32.9	369,489.07	529,230.83	32° 0' 56.896 N	104° 14' 20.481 W
9,414.0	90.90	177.20	7,470.3	-2,161.0	37.1	369,394.17	529,234.98	32° 0' 55.956 N	104° 14' 20.434 W
9,508.0	91.00	176.10	7,468.8	-2,254.9	42.6	369,300.34	529,240.47	32° 0' 55.028 N	104° 14' 20.371 W
9,603.0	91.20	175.80	7,467.0	-2,349.6	49.3	369,205.60	529,247.18	32° 0' 54.090 N	104° 14' 20.294 W
9,698.0	88.50	176.40	7,467.2	-2,444.4	55.7	369,110.83	529,253.64	32° 0' 53.152 N	104° 14' 20.220 W
9,794.0	88.60	176.90	7,469.6	-2,540.2	61.3	369,015.02	529,259.25	32° 0' 52.204 N	104° 14' 20.156 W
9,889.0	89.80	176.30	7,471.0	-2,635.0	67.0	368,920.20	529,264.88	32° 0' 51.266 N	104° 14' 20.091 W
9,984.0	91.30	176.50	7,470.1	-2,729.8	72.9	368,825.40	529,270.85	32° 0' 50.327 N	104° 14' 20.023 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3414.3usft (Original Well Elev)
Site:	Horned Owl Federal	MD Reference:	WELL @ 3414.3usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,079.0	90.30	176.40	7,468.7	-2,824.6	78.8	368,730.59	529,276.73	32° 0' 49.389 N	104° 14' 19.956 W
10,174.0	90.10	176.90	7,468.4	-2,919.4	84.4	368,635.75	529,282.28	32° 0' 48.450 N	104° 14' 19.892 W
10,269.0	90.60	177.40	7,467.8	-3,014.3	89.1	368,540.87	529,287.00	32° 0' 47.511 N	104° 14' 19.838 W
10,364.0	92.40	176.90	7,465.3	-3,109.2	93.8	368,446.03	529,291.72	32° 0' 46.573 N	104° 14' 19.785 W
10,459.0	92.30	175.20	7,461.4	-3,203.9	100.4	368,351.34	529,298.26	32° 0' 45.635 N	104° 14' 19.710 W
10,554.0	90.00	174.10	7,459.5	-3,298.4	109.2	368,256.78	529,307.12	32° 0' 44.699 N	104° 14' 19.608 W
10,649.0	90.40	174.90	7,459.2	-3,393.0	118.3	368,162.22	529,316.22	32° 0' 43.763 N	104° 14' 19.503 W
10,744.0	90.90	174.00	7,458.1	-3,487.5	127.5	368,067.67	529,325.41	32° 0' 42.828 N	104° 14' 19.397 W
10,839.0	93.00	175.10	7,454.9	-3,582.0	136.5	367,973.16	529,334.43	32° 0' 41.892 N	104° 14' 19.293 W
10,935.0	90.90	174.30	7,451.6	-3,677.6	145.4	367,877.63	529,343.29	32° 0' 40.947 N	104° 14' 19.191 W
11,030.0	89.40	174.80	7,451.4	-3,772.1	154.4	367,783.06	529,352.31	32° 0' 40.011 N	104° 14' 19.088 W
11,125.0	90.60	176.10	7,451.4	-3,866.8	161.9	367,688.37	529,359.85	32° 0' 39.074 N	104° 14' 19.001 W
11,219.0	92.00	176.40	7,449.2	-3,960.6	168.1	367,594.59	529,365.99	32° 0' 38.145 N	104° 14' 18.931 W
11,314.0	90.50	175.90	7,447.2	-4,055.4	174.5	367,499.83	529,372.37	32° 0' 37.208 N	104° 14' 18.857 W
11,409.0	88.20	174.60	7,448.2	-4,150.0	182.3	367,405.18	529,380.24	32° 0' 36.271 N	104° 14' 18.767 W
11,505.0	88.70	175.00	7,450.8	-4,245.6	191.0	367,309.61	529,388.93	32° 0' 35.325 N	104° 14' 18.667 W
11,600.0	89.00	175.20	7,452.7	-4,340.2	199.1	367,214.97	529,397.05	32° 0' 34.388 N	104° 14' 18.574 W
11,695.0	89.20	176.60	7,454.2	-4,435.0	205.9	367,120.23	529,403.84	32° 0' 33.451 N	104° 14' 18.496 W
11,790.0	89.60	176.90	7,455.2	-4,529.8	211.3	367,025.39	529,409.22	32° 0' 32.512 N	104° 14' 18.434 W
11,885.0	90.00	177.00	7,455.6	-4,624.7	216.4	366,930.52	529,414.28	32° 0' 31.573 N	104° 14' 18.377 W
11,980.0	90.70	177.70	7,455.0	-4,719.6	220.8	366,835.63	529,418.67	32° 0' 30.634 N	104° 14' 18.326 W
12,076.0	88.90	178.00	7,455.3	-4,815.5	224.4	366,739.70	529,422.27	32° 0' 29.684 N	104° 14' 18.286 W
12,171.0	88.40	177.60	7,457.6	-4,910.4	228.0	366,644.80	529,425.92	32° 0' 28.745 N	104° 14' 18.244 W
12,266.0	88.30	177.70	7,460.3	-5,005.3	231.9	366,549.92	529,429.81	32° 0' 27.806 N	104° 14' 18.200 W
12,361.0	88.70	177.90	7,462.8	-5,100.2	235.6	366,455.02	529,433.46	32° 0' 26.867 N	104° 14' 18.159 W
12,456.0	89.20	178.20	7,464.5	-5,195.1	238.8	366,360.09	529,436.69	32° 0' 25.927 N	104° 14' 18.122 W
12,552.0	90.60	178.00	7,464.7	-5,291.1	242.0	366,264.15	529,439.87	32° 0' 24.978 N	104° 14' 18.086 W
12,618.0	91.00	179.20	7,463.8	-5,357.0	243.6	366,198.17	529,441.48	32° 0' 24.325 N	104° 14' 18.068 W
12,676.0	91.00	179.20	7,462.8	-5,415.0	244.4	366,140.19	529,442.29	32° 0' 23.751 N	104° 14' 18.059 W
PBL(HOF#4H)									

Checked By: _____ Approved By: _____ Date: _____