

Results of Directional Survey

API number:	30-025-41513		
OGRID:		Operator:	COG OPERATING LLC
		Property:	LUSK DEEP UNIT A # 30H

surface	ULSTR:	M	20	T	19S	R	32E
				330	FSL	360	FWL

BH Loc	ULSTR:	P	20	T	19S	R	32E
13822	MD	9331.5	TVD	402	FSL	333	FEL
						4947	FWL

Top Perf/OH	ULSTR:	M	20	T	19S	R	32E
9410	MD	9278.2	TVD	334	FSL	551	FWL

Bot Perf/OH	ULSTR:	P	20	T	19S	R	32E
13765	MD	9331.8	TVD	401	FSL	390	FEL
						4890	FWL

	MD	N/S	E/W	VD
	9378	-5.30	161.85	9269.16
TOP PERFS/OH	9410	4.31	191.00	9278.17
	9410	4.31	191.00	9278.17
	13650	69.73	4414.89	9332.41
BOT PERFS/OH	13765	70.97	4529.88	9331.79
	13822	71.59	4586.87	9331.48

NEXT TO LAST	13650	69.73	4414.89	9332.41
LAST READING	13822	71.59	4586.87	9331.48
TD	13822	71.59	4586.87	9331.48

Surface Location	330	FS	360	FW
Projected BHL	402	FS	4947	FW
Location of				
Top Perfs/OH	334	FS	551	FW
Bottom Perfs/OH	401	FS	4890	FW

SUMMARY of Subsurface Locations

Surface Location	M-20-19S-32E	330	FS	360	FW	Vert. Depth
Top Perfs/OH	M-20-19S-32E	334	FS	551	FW	9278.17
Bottom Perfs/OH	P-20-19S-32E	401	FS	4890	FW	9331.79
Projected TD	P-20-19S-32E	402	FS	4947	FW	9331.48

MAY 05 2014



A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

HOBBS OCD

APR 11 2014

RECEIVED

January 23, 2014

COG Operating LLC (Concho)
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701

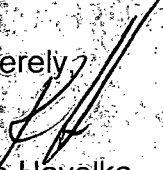
Attn: Kanicia Castillo

Re: **Lusk Deep Unit A No 030H**

Please find enclosed a copy of the survey from 0' to 8,500' 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 23rd day of January
A.D., 2014, by Keith Havelka.


Meredith Darden
Notary Public, State of Texas





Company: COG Operating-Concho
Lease/Well: Lusk Deep Unit A/No 030H

Rig Name: Patriot 6
State/County: New Mexico/Lea
Latitude: 32.64, Longitude: -103.80
GRID North is 0.29 Degrees East of True North
VS-Azi: 0.00 Degrees

HOBBS OCD

APR 11 2014

RECEIVED



Depth Reference : RKB = 17 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...eep unit a 30h_gyro survey.ut
Minimum Curvature Method
Report Date/Time: 1/23/2014 / 09:29

Vaughn Energy Services
Midland, Texas
432-563-5444
Surveyor: Gene Heiss
Lusk Deep Unit A No 030H / API 30-025-41513

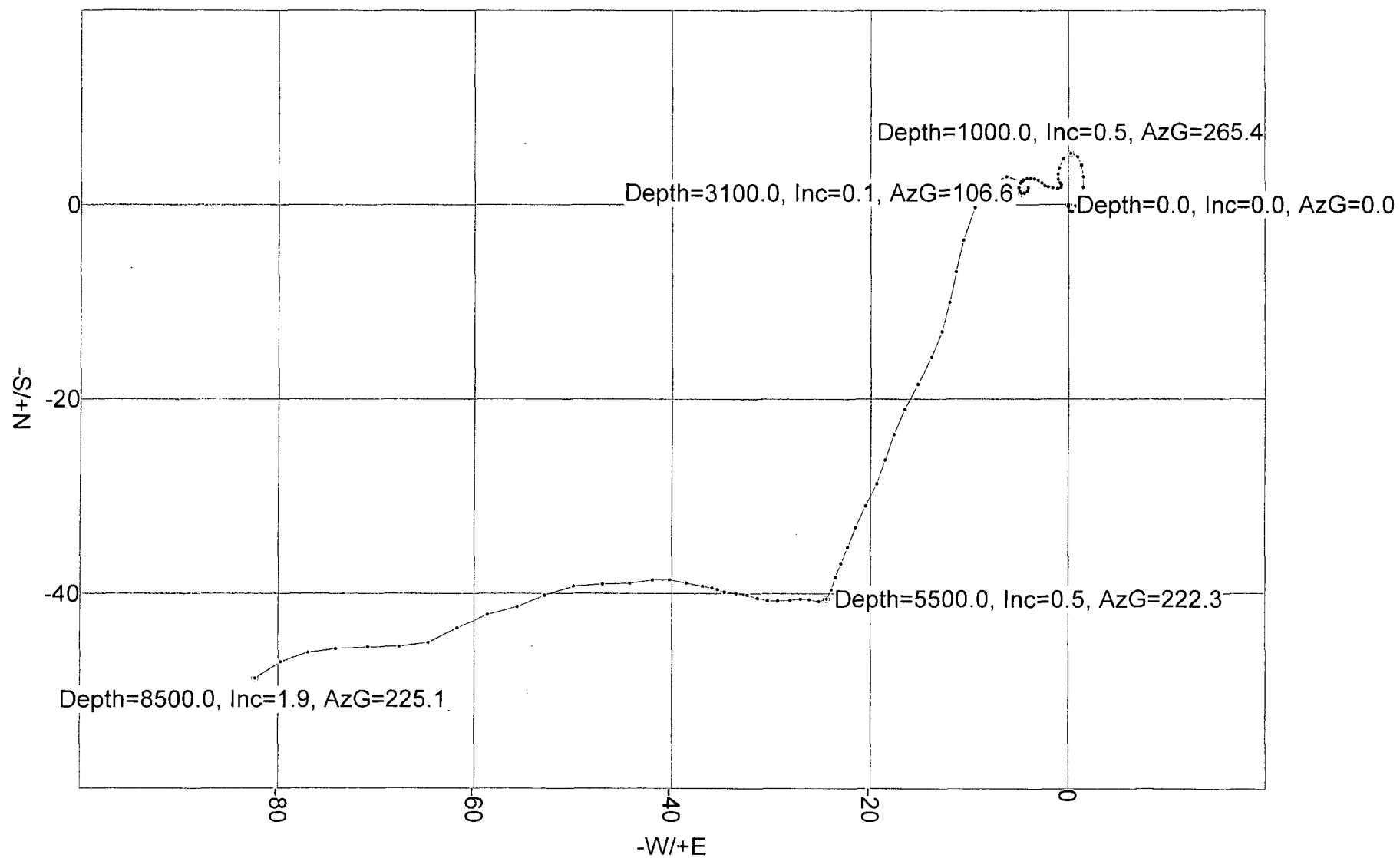
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.19	189.97	100.00	-0.17	-0.03	-0.17	0.17	189.97	0.19
200.00	0.39	155.28	200.00	-0.64	0.08	-0.64	0.65	172.49	0.26
300.00	0.32	36.76	300.00	-0.73	0.39	-0.73	0.83	151.69	0.61
400.00	0.46	24.90	400.00	-0.15	0.73	-0.15	0.74	101.47	0.16
500.00	0.76	20.35	499.99	0.83	1.12	0.83	1.40	53.45	0.30
600.00	0.40	16.61	599.98	1.79	1.45	1.79	2.30	39.10	0.36
700.00	0.84	356.84	699.98	2.86	1.51	2.86	3.23	27.89	0.48
800.00	0.55	342.55	799.97	4.05	1.33	4.05	4.27	18.12	0.33
900.00	0.53	328.10	899.97	4.91	0.94	4.91	5.00	10.83	0.14
1000.00	0.51	265.37	999.96	5.26	0.25	5.26	5.27	2.70	0.54
1100.00	0.72	210.11	1099.96	4.68	-0.52	4.68	4.71	353.71	0.60
1200.00	0.43	190.31	1199.95	3.77	-0.90	3.77	3.87	346.57	0.35
1300.00	0.29	189.48	1299.95	3.15	-1.01	3.15	3.31	342.26	0.14
1400.00	0.33	173.14	1399.95	2.61	-1.01	2.61	2.80	338.78	0.10
1500.00	0.16	130.01	1499.95	2.24	-0.87	2.24	2.40	338.68	0.24
1600.00	0.14	168.48	1599.95	2.03	-0.74	2.03	2.16	339.93	0.10
1700.00	0.15	196.34	1699.95	1.79	-0.76	1.79	1.94	337.08	0.07
1800.00	0.31	272.76	1799.95	1.67	-1.06	1.67	1.98	327.53	0.31

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	0.28	277.46	1899.95	1.72	-1.58	1.72	2.33	317.35	0.04
2000.00	0.28	285.63	1999.94	1.81	-2.06	1.81	2.75	311.36	0.04
2100.00	0.12	292.48	2099.94	1.92	-2.39	1.92	3.07	308.75	0.16
2200.00	0.36	320.78	2199.94	2.20	-2.69	2.20	3.48	309.33	0.26
2300.00	0.17	296.73	2299.94	2.52	-3.02	2.52	3.93	309.76	0.21
2400.00	0.29	287.00	2399.94	2.66	-3.40	2.66	4.31	308.02	0.12
2500.00	0.20	265.16	2499.94	2.71	-3.81	2.71	4.68	305.47	0.13
2600.00	0.19	257.18	2599.94	2.66	-4.15	2.66	4.93	302.69	0.03
2700.00	0.28	248.75	2699.94	2.54	-4.54	2.54	5.20	299.20	0.09
2800.00	0.29	205.27	2799.94	2.22	-4.87	2.22	5.35	294.48	0.21
2900.00	0.29	185.69	2899.94	1.74	-5.01	1.74	5.30	289.12	0.10
3000.00	0.18	150.92	2999.94	1.35	-4.96	1.35	5.14	285.22	0.18
3100.00	0.14	106.64	3099.94	1.18	-4.76	1.18	4.91	283.89	0.12
3200.00	0.20	75.31	3199.93	1.19	-4.48	1.19	4.63	284.83	0.10
3300.00	0.26	35.61	3299.93	1.41	-4.18	1.41	4.41	288.69	0.17
3400.00	0.16	346.34	3399.93	1.73	-4.08	1.73	4.43	293.00	0.20
3500.00	0.89	312.46	3499.93	2.39	-4.69	2.39	5.26	297.02	0.77
3600.00	1.11	266.77	3599.92	2.86	-6.23	2.86	6.85	294.67	0.80
3700.00	1.22	223.69	3699.90	2.04	-7.93	2.04	8.19	284.39	0.86
3800.00	1.98	206.21	3799.86	-0.28	-9.43	-0.28	9.44	268.27	0.89
3900.00	2.10	192.36	3899.79	-3.62	-10.59	-3.62	11.19	251.13	0.50
4000.00	1.74	193.04	3999.74	-6.88	-11.32	-6.88	13.25	238.71	0.36
4100.00	2.00	191.09	4099.69	-10.06	-12.00	-10.06	15.66	230.00	0.27
4200.00	1.57	198.35	4199.64	-13.07	-12.76	-13.07	18.27	224.31	0.48
4300.00	1.68	204.05	4299.60	-15.71	-13.79	-15.71	20.90	221.28	0.20
4400.00	1.92	210.28	4399.55	-18.49	-15.23	-18.49	23.95	219.48	0.31
4500.00	1.37	203.87	4499.51	-21.03	-16.56	-21.03	26.77	218.21	0.58
4600.00	1.84	201.75	4599.47	-23.62	-17.64	-23.62	29.48	216.75	0.47
4700.00	1.36	194.42	4699.43	-26.26	-18.53	-26.26	32.14	215.21	0.53
4800.00	1.59	202.58	4799.39	-28.69	-19.36	-28.69	34.61	214.01	0.31
4900.00	1.37	210.39	4899.36	-31.00	-20.49	-31.00	37.16	213.47	0.30
5000.00	1.41	198.85	4999.33	-33.19	-21.50	-33.19	39.54	212.93	0.28
5100.00	1.11	204.72	5099.31	-35.24	-22.30	-35.24	41.70	212.33	0.33
5200.00	0.96	202.70	5199.29	-36.89	-23.03	-36.89	43.48	211.97	0.16
5300.00	0.82	198.66	5299.28	-38.33	-23.58	-38.33	45.00	211.59	0.15
5400.00	0.72	195.48	5399.27	-39.61	-23.97	-39.61	46.30	211.18	0.11
5500.00	0.53	222.28	5499.26	-40.56	-24.45	-40.56	47.36	211.08	0.34
5600.00	0.55	276.95	5599.26	-40.84	-25.24	-40.84	48.01	211.71	0.50
5700.00	0.56	287.81	5699.26	-40.63	-26.18	-40.63	48.34	212.79	0.11

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	0.48	256.29	5799.25	-40.58	-27.05	-40.58	48.77	213.69	0.29
5900.00	0.74	268.09	5899.25	-40.70	-28.10	-40.70	49.46	214.62	0.28
6000.00	0.73	266.74	5999.24	-40.76	-29.38	-40.76	50.25	215.78	0.02
6100.00	0.43	275.55	6099.23	-40.76	-30.39	-40.76	50.85	216.71	0.32
6200.00	0.76	291.54	6199.23	-40.48	-31.39	-40.48	51.22	217.79	0.37
6300.00	0.47	279.72	6299.22	-40.17	-32.41	-40.17	51.61	218.90	0.32
6400.00	0.86	277.87	6399.21	-40.00	-33.55	-40.00	52.21	219.99	0.39
6500.00	0.49	279.42	6499.21	-39.82	-34.71	-39.82	52.83	221.08	0.37
6600.00	0.37	302.82	6599.20	-39.58	-35.40	-39.58	53.10	221.81	0.21
6700.00	0.32	268.38	6699.20	-39.41	-35.95	-39.41	53.35	222.37	0.21
6800.00	0.81	284.44	6799.20	-39.24	-36.91	-39.24	53.88	223.25	0.52
6900.00	1.05	279.10	6899.18	-38.92	-38.50	-38.92	54.75	224.69	0.25
7000.00	0.96	283.20	6999.17	-38.59	-40.23	-38.59	55.74	226.19	0.11
7100.00	1.09	257.00	7099.15	-38.61	-41.97	-38.61	57.03	227.39	0.48
7200.00	1.60	265.44	7199.13	-38.93	-44.29	-38.93	58.97	228.68	0.55
7300.00	1.58	271.46	7299.09	-39.01	-47.06	-39.01	61.13	230.34	0.17
7400.00	1.79	259.31	7399.04	-39.26	-49.98	-39.26	63.55	231.85	0.41
7500.00	1.77	244.78	7499.00	-40.21	-52.91	-40.21	66.45	232.76	0.45
7600.00	1.65	249.94	7598.95	-41.36	-55.66	-41.36	69.34	233.38	0.19
7700.00	1.93	258.64	7698.90	-42.19	-58.66	-42.19	72.26	234.28	0.39
7800.00	2.00	233.54	7798.85	-43.56	-61.72	-43.56	75.54	234.79	0.86
7900.00	1.79	251.97	7898.79	-45.08	-64.60	-45.08	78.77	235.09	0.64
8000.00	1.66	273.18	7998.75	-45.48	-67.54	-45.48	81.42	236.04	0.65
8100.00	2.07	265.46	8098.70	-45.54	-70.79	-45.54	84.18	237.25	0.48
8200.00	1.70	268.89	8198.64	-45.71	-74.08	-45.71	87.05	238.32	0.39
8300.00	1.64	254.51	8298.60	-46.12	-76.94	-46.12	89.71	239.06	0.42
8400.00	1.78	248.97	8398.55	-47.06	-79.77	-47.06	92.62	239.46	0.21
8500.00	1.86	225.15	8498.51	-48.77	-82.37	-48.77	95.72	239.37	0.76



Vaughn Energy Services
Midland, Texas
432-563-5444
Surveyor: Gene Heiss
Lusk Deep Unit A No 030H / API 30-025-41513



VES Survey Date: 01/07/2014

PathFinder – a Schlumberger company

BHL Report

Page 01/01
Tie-in Date: 01/07/2014
Date Completed: 01/13/2014

COG OPERATING LLC.
LUSK DEEP UNIT A 30H
LEA COUNTY, NM
API#: 30-025-41513 Rig: PATRIOT 6
PathFinder Office Supervisor: JOSEPH HOGAN
PathFinder Field Engineers: EDWARD LEE
TIMOTHY CRAMER

Survey Horiz. Reference: WELLHEAD
Ref Coordinates: LAT: 32.38.22.1658 N LON: 103.47.42.9826 W
GRID Reference: NAD27 new mexico east Transverse Mercator
Ref GRID Coord: X: 665628.9000 Y: 596777.4000
North Aligned To: GRID NORTH
Total Magnetic Correction: 7.11° EAST TO GRID
Vertical Section Plane: 89.21
Survey Vert. Reference: 18.00' Rotary Table To Ground
Altitude: 3563.30' Ground To MSL

Measured Depth	13822.00	(feet)
Inclination	90.31	(deg)
Azimuth	89.38	(deg)
True Vertical Depth	9331.48	(feet)
Vertical Section	4587.42	(feet)
Survey X cord	670215.77	(feet)
Survey Y cord	596848.99	(feet)
Survey Lat	32.63962253 N	(deg)
Survey Lon	103.78037145 W	(deg)
Rectangular Corr. N/S	71.59 N	(feet)
Rectangular Corr. E/W	4586.87 E	(feet)
Closure Distance	4587.43	(feet)
Direction of Closure	89.11	(deg)
Dogleg Severity	0.00	(deg/100ft)

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.

LUSK DEEP UNIT A 30H

LEA COUNTY, NM

API#: 30-025-41513 Rig: PATRIOT 6

PathFinder Office Supervisor: JOSEPH HOGAN

PathFinder Field Engineers: EDWARD LEE

TIMOTHY CRAMER

Survey Horiz. Reference: WELLHEAD

Ref Coordinates: LAT: 32.38.22.1658 N LON: 103.47.42.9826 W

GRID Reference: NAD27 new mexico east Transverse Mercator

Ref GRID Coord: X: 665628.9000 Y: 596777.4000

North Aligned To: GRID NORTH

Total Magnetic Correction: 7.41° EAST TO GRID

Vertical Section Plane: 89.21

Survey Vert. Reference: 18.00' Rotary Table To Ground

Altitude: 3563.30' Ground To MSL

Survey Calculations by RX5 V6.05A using Minimum Curvature

Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
0.00	0.00	0.00	0.00	0.00	-0.04	0.00 N	0.04 W	0.04@	272.84	0.00
THE FOLLOWING ARE VES ENERGY SERVICES GYRO SURVEYS.										
100.00	0.19	189.97	100.00	100.00	-0.07	0.16 S	0.07 W	0.18@	203.05	0.19
200.00	0.39	155.28	200.00	100.00	0.04	0.63 S	0.04 E	0.64@	175.94	0.26
300.00	0.32	36.76	300.00	100.00	0.34	0.72 S	0.35 E	0.80@	153.77	0.61
400.00	0.46	24.90	400.00	100.00	0.69	0.13 S	0.69 E	0.70@	100.77	0.16
500.00	0.76	20.35	499.99	100.00	1.10	0.85 N	1.09 E	1.39@	51.91	0.30
600.00	0.40	16.61	599.99	100.00	1.45	1.81 N	1.42 E	2.30@	38.11	0.36
700.00	0.84	356.84	699.98	100.00	1.52	2.88 N	1.48 E	3.24@	27.22	0.48
800.00	0.55	342.55	799.98	100.00	1.35	4.07 N	1.30 E	4.27@	17.67	0.34
900.00	0.53	328.10	899.97	100.00	0.98	4.92 N	0.91 E	5.00@	10.45	0.14
1000.00	0.51	265.37	999.97	100.00	0.29	5.27 N	0.22 E	5.28@	2.38	0.54
1100.00	0.72	210.11	1099.96	100.00	-0.47	4.69 N	0.54 W	4.73@	353.45	0.60
1200.00	0.43	190.31	1199.96	100.00	-0.87	3.78 N	0.92 W	3.89@	346.30	0.35
1300.00	0.29	189.48	1299.96	100.00	-0.99	3.16 N	1.03 W	3.33@	341.96	0.14
1400.00	0.33	173.14	1399.95	100.00	-1.00	2.63 N	1.04 W	2.83@	338.45	0.10
1500.00	0.16	130.01	1499.95	100.00	-0.87	2.25 N	0.90 W	2.42@	338.29	0.24
1600.00	0.14	168.48	1599.95	100.00	-0.74	2.04 N	0.77 W	2.18@	339.47	0.10
1700.00	0.15	196.34	1699.95	100.00	-0.75	1.80 N	0.78 W	1.96@	336.61	0.07
1800.00	0.31	272.76	1799.95	100.00	-1.06	1.68 N	1.08 W	2.00@	327.23	0.31
1900.00	0.28	277.46	1899.95	100.00	-1.57	1.73 N	1.60 W	2.35@	317.28	0.04
2000.00	0.28	285.63	1999.95	100.00	-2.05	1.83 N	2.07 W	2.76@	311.37	0.04
2100.00	0.12	292.48	2099.95	100.00	-2.38	1.93 N	2.41 W	3.09@	308.77	0.16
2200.00	0.36	320.78	2199.95	100.00	-2.67	2.22 N	2.70 W	3.49@	309.36	0.26
2300.00	0.17	296.73	2299.95	100.00	-3.00	2.53 N	3.03 W	3.95@	309.79	0.22
2400.00	0.29	287.00	2399.95	100.00	-3.37	2.67 N	3.41 W	4.33@	308.05	0.13

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A 30H
LEA COUNTY, NM
API#: 30-025-41513 Rig: PATRIOT 6

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Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
2500.00	0.20	265.16	2499.95	100.00	-3.79	2.73 N	3.82 W	4.70@	305.49	0.13
2600.00	0.19	257.18	2599.94	100.00	-4.12	2.67 N	4.16 W	4.95@	302.75	0.03
2700.00	0.28	248.75	2699.94	100.00	-4.51	2.55 N	4.55 W	5.21@	299.27	0.10
2800.00	0.29	205.27	2799.94	100.00	-4.85	2.23 N	4.88 W	5.37@	294.56	0.21
2900.00	0.29	185.69	2899.94	100.00	-4.99	1.75 N	5.02 W	5.31@	289.24	0.10
3000.00	0.18	150.92	2999.94	100.00	-4.95	1.36 N	4.97 W	5.15@	285.34	0.17
3100.00	0.14	106.64	3099.94	100.00	-4.76	1.19 N	4.77 W	4.92@	284.00	0.13
3200.00	0.20	75.31	3199.94	100.00	-4.47	1.20 N	4.49 W	4.64@	284.97	0.11
3300.00	0.26	35.61	3299.94	100.00	-4.17	1.43 N	4.19 W	4.42@	288.84	0.17
3400.00	0.16	346.34	3399.94	100.00	-4.06	1.75 N	4.09 W	4.45@	293.16	0.20
3500.00	0.89	312.46	3499.93	100.00	-4.66	2.41 N	4.69 W	5.27@	297.17	0.76
3600.00	1.11	266.77	3599.92	100.00	-6.19	2.88 N	6.23 W	6.87@	294.79	0.80
3700.00	1.22	223.69	3699.90	100.00	-7.91	2.05 N	7.94 W	8.20@	284.51	0.86
3800.00	1.98	206.21	3799.86	100.00	-9.44	0.27 S	9.43 W	9.44@	268.38	0.89
3900.00	2.10	192.36	3899.80	100.00	-10.64	3.61 S	10.59 W	11.19@	251.20	0.51
4000.00	1.74	193.04	3999.74	100.00	-11.42	6.87 S	11.32 W	13.25@	238.74	0.36
4100.00	2.00	191.09	4099.69	100.00	-12.14	10.07 S	12.00 W	15.66@	230.01	0.27
4200.00	1.57	198.35	4199.64	100.00	-12.95	13.08 S	12.77 W	18.28@	224.31	0.49
4300.00	1.68	204.05	4299.60	100.00	-14.01	15.72 S	13.80 W	20.91@	221.28	0.20
4400.00	1.92	210.28	4399.55	100.00	-15.49	18.50 S	15.24 W	23.97@	219.48	0.31
4500.00	1.37	203.87	4499.51	100.00	-16.86	21.04 S	16.57 W	26.78@	218.22	0.58
4600.00	1.84	201.75	4599.47	100.00	-17.97	23.63 S	17.65 W	29.49@	216.76	0.47
4700.00	1.36	194.42	4699.43	100.00	-18.90	26.27 S	18.54 W	32.15@	215.21	0.52
4800.00	1.59	202.58	4799.40	100.00	-19.76	28.70 S	19.37 W	34.62@	214.01	0.31
4900.00	1.37	210.39	4899.37	100.00	-20.93	31.01 S	20.50 W	37.18@	213.47	0.30
5000.00	1.41	198.85	4999.34	100.00	-21.96	33.21 S	21.51 W	39.56@	212.93	0.28
5100.00	1.11	204.72	5099.31	100.00	-22.79	35.25 S	22.31 W	41.72@	212.33	0.33
5200.00	0.96	202.70	5199.29	100.00	-23.54	36.90 S	23.04 W	43.50@	211.97	0.15

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A 30H
LEA COUNTY, NM
API#: 30-025-41513

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Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
5300.00	0.82	198.66	5299.28	100.00	-24.11	38.35 S	23.59 W	45.03@	211.59	0.15
5400.00	0.72	195.48	5399.27	100.00	-24.53	39.64 S	23.98 W	46.33@	211.18	0.11
5500.00	0.53	222.28	5499.27	100.00	-25.02	40.58 S	24.46 W	47.39@	211.08	0.34
5600.00	0.55	276.95	5599.26	100.00	-25.81	40.87 S	25.25 W	48.04@	211.71	0.50
5700.00	0.56	287.81	5699.26	100.00	-26.75	40.66 S	26.19 W	48.37@	212.79	0.10
5800.00	0.48	256.29	5799.26	100.00	-27.62	40.61 S	27.07 W	48.80@	213.68	0.29
5900.00	0.74	268.09	5899.25	100.00	-28.68	40.73 S	28.12 W	49.49@	214.62	0.29
6000.00	0.73	266.74	5999.24	100.00	-29.96	40.79 S	29.40 W	50.28@	215.78	0.02
6100.00	0.43	277.55	6099.24	100.00	-30.97	40.78 S	30.41 W	50.87@	216.71	0.32
6200.00	0.76	291.54	6199.23	100.00	-31.95	40.48 S	31.40 W	51.23@	217.79	0.36
6300.00	0.47	279.72	6299.23	100.00	-32.97	40.17 S	32.42 W	51.62@	218.90	0.31
6400.00	0.86	277.87	6399.22	100.00	-34.11	40.00 S	33.56 W	52.22@	220.00	0.39
6500.00	0.49	279.42	6499.21	100.00	-35.28	39.83 S	34.73 W	52.84@	221.09	0.37
6600.00	0.37	302.82	6599.21	100.00	-35.97	39.58 S	35.42 W	53.12@	221.83	0.21
6700.00	0.32	268.38	6699.21	100.00	-36.51	39.41 S	35.97 W	53.36@	222.39	0.21
6800.00	0.81	284.44	6799.20	100.00	-37.47	39.25 S	36.94 W	53.89@	223.26	0.51
6900.00	1.05	279.10	6899.19	100.00	-39.06	38.92 S	38.53 W	54.77@	224.71	0.25
7000.00	0.96	283.20	6999.17	100.00	-40.77	38.59 S	40.25 W	55.76@	226.21	0.12
7100.00	1.09	257.00	7099.16	100.00	-42.52	38.61 S	41.99 W	57.04@	227.40	0.48
7200.00	1.60	265.44	7199.13	100.00	-44.84	38.94 S	44.31 W	58.98@	228.69	0.55
7300.00	1.58	271.46	7299.09	100.00	-47.61	39.01 S	47.08 W	61.14@	230.35	0.17
7400.00	1.79	259.31	7399.05	100.00	-50.53	39.27 S	49.99 W	63.57@	231.85	0.41
7500.00	1.77	244.78	7499.00	100.00	-53.47	40.21 S	52.92 W	66.47@	232.77	0.45
7600.00	1.65	249.94	7598.96	100.00	-56.24	41.37 S	55.67 W	69.36@	233.39	0.20
7700.00	1.93	258.64	7698.91	100.00	-59.25	42.19 S	58.67 W	72.27@	234.28	0.39
7800.00	2.00	233.54	7798.85	100.00	-62.32	43.56 S	61.73 W	75.55@	234.79	0.86
7900.00	1.79	251.97	7898.80	100.00	-65.23	45.08 S	64.62 W	78.79@	235.10	0.64
8000.00	1.66	273.18	7998.75	100.00	-68.17	45.48 S	67.55 W	81.43@	236.05	0.65

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A 30H
LEA COUNTY, NM
API#: 30-025-41513

Rig: PATRIOT 6

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Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
8100.00	2.07	265.46	8098.70	100.00	-71.42	45.55 S	70.80 W	84.18@	237.25	0.48
8200.00	1.70	268.89	8198.64	100.00	-74.70	45.72 S	74.08 W	87.05@	238.32	0.39
8300.00	1.64	254.51	8298.60	100.00	-77.57	46.13 S	76.94 W	89.71@	239.06	0.42
8400.00	1.78	248.97	8398.56	100.00	-80.41	47.07 S	79.77 W	92.62@	239.46	0.22
** TIED INTO VES ENERGY SERVICES GYRO SURVEY AT 8500' MD.										
8500.00	1.86	225.15	8498.51	100.00	-83.03	48.77 S	82.37 W	95.73@	239.37	0.76
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.										
8650.00	2.37	233.78	8648.41	150.00	-87.31	52.32 S	86.60 W	101.18@	238.86	0.40
8755.00	2.90	222.88	8753.30	105.00	-90.91	55.55 S	90.16 W	105.90@	238.36	0.69
8787.00	2.81	220.17	8785.26	32.00	-91.99	56.74 S	91.21 W	107.42@	238.12	0.51
8819.00	2.11	200.18	8817.23	32.00	-92.71	57.89 S	91.92 W	108.63@	237.80	3.43
8850.00	2.37	152.95	8848.21	31.00	-92.63	59.00 S	91.83 W	109.15@	237.28	5.84
8882.00	4.48	111.41	8880.15	32.00	-91.18	60.05 S	90.36 W	108.49@	236.40	9.78
8914.00	7.47	92.81	8911.98	32.00	-87.95	60.60 S	87.12 W	106.13@	235.18	11.02
8945.00	10.73	89.48	8942.58	31.00	-83.05	60.68 S	82.22 W	102.19@	233.57	10.65
8977.00	14.16	90.19	8973.83	32.00	-76.16	60.66 S	75.33 W	96.72@	231.15	10.73
9009.00	17.41	89.08	9004.62	32.00	-67.45	60.60 S	66.62 W	90.06@	227.71	10.20
9041.00	20.75	86.74	9034.85	32.00	-57.00	60.20 S	56.17 W	82.34@	223.02	10.71
9072.00	24.45	83.75	9063.47	31.00	-45.12	59.19 S	44.31 W	73.94@	216.82	12.49
9104.00	28.05	80.85	9092.17	32.00	-31.08	57.27 S	30.29 W	64.79@	207.88	11.94
9136.00	31.66	78.21	9119.92	32.00	-15.39	54.36 S	14.64 W	56.29@	195.07	12.00
9168.00	35.17	75.84	9146.62	32.00	1.83	50.38 S	2.52 E	50.45@	177.13	11.70
9200.00	40.10	74.26	9171.96	32.00	20.76	45.33 S	21.39 E	50.13@	154.74	15.70
9232.00	44.85	73.82	9195.55	32.00	41.61	39.39 S	42.16 E	57.70@	133.05	14.87
9264.00	51.18	73.99	9216.95	32.00	64.55	32.80 S	65.00 E	72.81@	116.77	19.78
9283.00	55.66	74.52	9228.27	19.00	79.28	28.66 S	79.69 E	84.68@	109.78	23.68
9315.00	62.43	74.87	9244.72	32.00	105.83	21.43 S	106.14 E	108.28@	101.41	21.18
9346.00	67.27	73.91	9257.89	31.00	132.95	13.87 S	133.16 E	133.88@	95.95	15.86

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A 30H

LEA COUNTY, NM

API#: 30-025-41513 Rig: PATRIOT 6

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Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
9378.00	71.49	72.85	9269.16	32.00	161.76	5.30 S	161.85 E	161.93@	91.88	13.55
9410.00	75.80	70.65	9278.17	32.00	191.04	4.31 N	191.00 E	191.04@	88.71	15.00
9441.00	80.20	69.95	9284.61	31.00	219.72	14.54 N	219.54 E	220.02@	86.21	14.36
9473.00	82.13	71.97	9289.52	32.00	249.74	24.85 N	249.42 E	250.66@	84.31	8.68
9505.00	83.45	74.96	9293.54	32.00	280.30	33.88 N	279.85 E	281.90@	83.10	10.15
9536.00	85.38	76.54	9296.56	31.00	310.30	41.47 N	309.76 E	312.52@	82.37	8.03
9568.00	87.49	75.84	9298.55	32.00	341.41	49.10 N	340.77 E	344.29@	81.80	6.95
9600.00	88.81	76.54	9299.58	32.00	372.57	56.73 N	371.83 E	376.13@	81.32	4.67
9631.00	89.43	78.65	9300.06	31.00	402.93	63.39 N	402.10 E	407.06@	81.04	7.09
9726.00	89.43	79.27	9301.00	95.00	496.41	81.58 N	495.33 E	502.01@	80.65	0.65
9821.00	89.69	82.08	9301.73	95.00	590.35	96.97 N	589.07 E	596.99@	80.65	2.97
9916.00	90.22	84.37	9301.81	95.00	684.82	108.18 N	683.40 E	691.91@	81.00	2.47
10011.00	91.36	87.53	9300.50	95.00	779.65	114.89 N	778.14 E	786.57@	81.60	3.54
10106.00	89.78	88.15	9299.55	95.00	874.61	118.47 N	873.06 E	881.06@	82.27	1.79
10201.00	89.60	88.67	9300.07	95.00	969.60	121.10 N	968.02 E	975.57@	82.87	0.58
10296.00	88.72	88.85	9301.46	95.00	1064.59	123.16 N	1062.99 E	1070.10@	83.39	0.94
10391.00	88.20	88.85	9304.01	95.00	1159.55	125.06 N	1157.94 E	1164.67@	83.84	0.55
10486.00	87.85	88.76	9307.29	95.00	1254.49	127.04 N	1252.86 E	1259.28@	84.21	0.38
10581.00	90.92	89.29	9308.31	95.00	1349.47	128.66 N	1347.83 E	1353.95@	84.55	3.28
10676.00	90.48	89.55	9307.14	95.00	1444.46	129.62 N	1442.81 E	1448.63@	84.87	0.54
10771.00	89.78	89.38	9306.93	95.00	1539.46	130.51 N	1537.81 E	1543.34@	85.15	0.76
10866.00	89.25	89.46	9307.73	95.00	1634.46	131.47 N	1632.80 E	1638.09@	85.40	0.56
10960.00	90.48	91.57	9307.96	94.00	1728.43	130.63 N	1726.79 E	1731.72@	85.67	2.60
11055.00	90.92	91.57	9306.79	95.00	1823.34	128.02 N	1821.75 E	1826.24@	85.98	0.46
11150.00	91.19	91.84	9305.05	95.00	1918.23	125.20 N	1916.69 E	1920.77@	86.26	0.40
11245.00	90.31	92.98	9303.80	95.00	2013.07	121.20 N	2011.59 E	2015.24@	86.55	1.52
11340.00	90.66	93.95	9303.00	95.00	2107.81	115.46 N	2106.42 E	2109.58@	86.86	1.09
11435.00	88.11	94.39	9304.02	95.00	2202.44	108.56 N	2201.15 E	2203.83@	87.18	2.72

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A 30H
LEA COUNTY, NM
API#: 30-025-41513

Rig: PATRIOT 6

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Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
11530.00	88.72	91.57	9306.65	95.00	2297.19	103.62 N	2295.98 E	2298.31@	87.42	3.04
11625.00	88.37	92.63	9309.06	95.00	2392.03	100.14 N	2390.88 E	2392.98@	87.60	1.18
11720.00	87.93	91.13	9312.12	95.00	2486.88	97.02 N	2485.78 E	2487.67@	87.76	1.65
11815.00	88.20	91.75	9315.33	95.00	2581.75	94.64 N	2580.69 E	2582.43@	87.90	0.71
11910.00	87.93	90.17	9318.54	95.00	2676.65	93.05 N	2675.62 E	2677.24@	88.01	1.69
12005.00	87.23	90.08	9322.55	95.00	2771.55	92.84 N	2770.54 E	2772.09@	88.08	0.74
12100.00	87.49	89.73	9326.93	95.00	2866.44	93.00 N	2865.43 E	2866.94@	88.14	0.46
12195.00	90.13	90.08	9328.90	95.00	2961.41	93.15 N	2960.41 E	2961.87@	88.20	2.80
12290.00	90.13	90.69	9328.68	95.00	3056.39	92.52 N	3055.40 E	3056.80@	88.27	0.64
12385.00	89.87	91.57	9328.68	95.00	3151.33	90.64 N	3150.38 E	3151.69@	88.35	0.97
12480.00	90.04	91.84	9328.76	95.00	3246.24	87.82 N	3245.34 E	3246.53@	88.45	0.34
12575.00	89.60	92.45	9329.06	95.00	3341.12	84.26 N	3340.27 E	3341.34@	88.55	0.79
12670.00	90.84	90.78	9328.69	95.00	3436.03	81.58 N	3435.23 E	3436.20@	88.64	2.19
12764.00	90.92	91.40	9327.25	94.00	3529.97	79.80 N	3529.20 E	3530.10@	88.70	0.67
12891.00	89.34	91.40	9326.96	127.00	3656.87	76.69 N	3656.16 E	3656.96@	88.80	1.24
12986.00	89.16	91.84	9328.21	95.00	3751.78	74.01 N	3751.11 E	3751.84@	88.87	0.50
13081.00	89.34	91.84	9329.45	95.00	3846.67	70.96 N	3846.06 E	3846.71@	88.94	0.19
13176.00	88.55	91.66	9331.20	95.00	3941.56	68.06 N	3940.99 E	3941.58@	89.01	0.85
13271.00	87.93	90.17	9334.12	95.00	4036.47	66.54 N	4035.93 E	4036.48@	89.06	1.70
13365.00	90.75	89.46	9335.20	94.00	4130.45	66.84 N	4129.92 E	4130.46@	89.07	3.09
13460.00	90.84	89.73	9333.88	95.00	4225.43	67.52 N	4224.91 E	4225.44@	89.08	0.30
13555.00	90.31	89.11	9332.93	95.00	4320.43	68.48 N	4319.90 E	4320.44@	89.09	0.86
13650.00	90.31	89.38	9332.41	95.00	4415.43	69.73 N	4414.89 E	4415.44@	89.10	0.28
STRAIGHT LINE PROJECTION TO BIT AT 13822'MD										
13822.00	90.31	89.38	9331.48	172.00	4587.42	71.59 N	4586.87 E	4587.43@	89.11	0.00

** The survey data at tie-in point was furnished by a recognized survey company and entered as submitted. Survey stations above the tie-in point represent recalculated data by PathFinder – a Schlumberger company and may reflect minor changes due to rounding differences between survey programs. Only survey stations taken by qualified PathFinder personnel are subject to certification.