



A GYRO TECHNOLOGIES INC. COMPANY

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

February 13, 2014

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

Attn: Kanicia Castillo

Re: **Lusk Deep Unit A No 029H**

Please find enclosed a copy of the survey from 0' to 8,000' ran on the above referenced well.

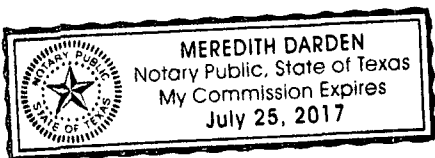
If I can be of any further service, please do not hesitate to call me at 800-606-4976.

Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 13th day of February A.D., 2014, by Keith Havelka.



Meredith Darden
Notary Public, State of Texas

AUG 25 2014



A Schlumberger Company

DIRECTIONAL SURVEY REPORT

Lower Lateral

COG OPERATING, LLC

LUSK DEEP UNIT A 29H

LEA COUNTY, NEW MEXICO

PREPARED BY: NICHOLAS DUFF



A Schlumberger Company

March 4, 2014

COG OPERATING
550 West Texas Avenue, Suite 1300
Midland, TX 79701

RE: COG OPERATING, LLC
LUSK DEEP UNIT A 29H
LEA COUNTY, NEW MEXICO
API No: 30-025-41563
Rig: PATRIOT 6
PES File No.: 13MLD0566

Dear Sir or Madam:

To whom it may concern:

We hereby certify that the enclosed Original Field Survey Data contained in this report represents to the best of our knowledge, a true and accurate survey of the well at the time the survey was run.

DIRECTIONAL SURVEY DATA
1 – Original survey report
1 – Survey report copies

We appreciate the opportunity to work with you and we look forward to your business support. If you have any questions, I can be reached at (432) 687-1647

Sincerely,

NICHOLAS DUFF
M/LWD Field Service Manager
Schlumberger Technology Corp.

PathFinder – a Schlumberger company

BHL Report

Page 01/01
Tie-in Date: 01/27/2014
Date Completed: 02/05/2014

COG OPERATING LLC.
LUSK DEEP UNIT A29H
LEA COUNTY, NM

API#: 30-025-41563 Rig: PATRIOT 6
PathFinder Office Supervisor: HAMISH SNELL
PathFinder Field Engineers: ALLAN ABRAHAM
ADAM HINOJOS

Survey Horiz. Reference: WELLHEAD
Ref Coordinates: LAT: 32.39.59.8957 N LON: 103.47.39.6972 W
GRID Reference: NAD27 new mexico east Transverse Mercator
Ref GRID Coord: X: 665859.7000 Y: 606655.0000
North Aligned To: GRID NORTH
Total Magnetic Correction: 7.11° EAST TO GRID
Vertical Section Plane: 179.61
Survey Vert. Reference: 18.00' Rotary Table To Ground
Altitude: 3609.20' Ground To MSL

Measured Depth	13698.00	(feet)
Inclination	89.87	(deg)
Azimuth	178.76	(deg)
True Vertical Depth	9243.68	(feet)
Vertical Section	4595.22	(feet)
Survey X cord	665922.05	(feet)
Survey Y cord	602060.09	(feet)
Survey Lat	32.65400689 N	(deg)
Survey Lon	103.79423356 W	(deg)
Rectangular Corr. N/S	4594.91 S	(feet)
Rectangular Corr. E/W	62.35 E	(feet)
Closure Distance	4595.33	(feet)
Direction of Closure	179.22	(deg)
Dogleg Severity	0.00	(deg/100ft)



Company: COG Operating-Concho
 Lease/Well: Lusk Deep Unit A/No 029H
 Location: S17 T19s R32e
 Rig Name: Patriot #6
 State/County: New Mexico/Lea
 Latitude: 32.67, Longitude: -103.79
 GRID North is 0.29 Degrees East of True North
 VS-Azi: 0.00 Degrees



RKB : 18 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...ep unit a #29h gyro survey.ut

Minimum Curvature Method

Report Date/Time: 2/13/2014 / 10:26

Vaughn Energy Services

(432) 563-5444

Gardendale, TX

Surveyor: Dustin Wedel

Lusk Deep Unit A No 029H / API 30-025-41563

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W 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	****
100.00	1.18	11.55	99.99	1.01	0.21	1.03	11.55	1.18
200.00	1.70	8.73	199.96	3.49	0.64	3.55	10.37	0.52
300.00	1.67	6.07	299.92	6.41	1.02	6.49	9.03	0.08
400.00	1.64	20.59	399.88	9.19	1.67	9.34	10.33	0.42
500.00	1.71	17.47	499.83	11.95	2.62	12.24	12.39	0.11
600.00	1.32	29.76	599.80	14.37	3.64	14.82	14.23	0.50
700.00	1.12	25.87	699.78	16.25	4.64	16.90	15.94	0.21
800.00	0.28	36.62	799.77	17.33	5.22	18.10	16.75	0.85
900.00	0.17	27.05	899.77	17.66	5.43	18.48	17.09	0.12
1000.00	0.14	92.27	999.77	17.79	5.62	18.65	17.53	0.17
1100.00	0.10	165.19	1099.77	17.70	5.76	18.62	18.02	0.14
1200.00	0.34	207.96	1199.77	17.36	5.64	18.25	18.00	0.28
1300.00	0.47	194.96	1299.76	16.70	5.39	17.55	17.90	0.16
1400.00	0.35	195.23	1399.76	16.00	5.21	16.83	18.02	0.12
1500.00	0.36	196.21	1499.76	15.41	5.04	16.21	18.11	0.01
1600.00	0.24	155.84	1599.76	14.91	5.04	15.74	18.66	0.24
1700.00	0.95	62.78	1699.75	15.10	5.86	16.20	21.21	0.99
1800.00	2.42	55.53	1799.71	16.67	8.34	18.64	26.56	1.48



A Schlumberger Company

DIRECTIONAL SURVEY REPORT

Upper Lateral

COG OPERATING, LLC

LUSK DEEP UNIT A 29H ST1

LEA COUNTY, NEW MEXICO

PREPARED BY: NICHOLAS DUFF

Page 1 of 1

COG OPERATING, LLC
550 West Texas Avenue, Suite 1300
Midland, TX 79701
Tel: (432) 687-1647
Fax: (432) 687-1648



A Schlumberger Company

March 4, 2014

COG OPERATING
550 West Texas Avenue, Suite 1300
Midland, TX 79701

RE: COG OPERATING, LLC
LUSK DEEP UNIT A 29H ST1
LEA COUNTY, NEW MEXICO
API No: 30-025-41563-02
Rig: PATRIOT 6
PES File No.: 13MLD0566

Dear Sir or Madam:

To whom it may concern:

We hereby certify that the enclosed Original Field Survey Data contained in this report represents to the best of our knowledge, a true and accurate survey of the well at the time the survey was run.

DIRECTIONAL SURVEY DATA
1 – Original survey report
1 – Survey report copies

We appreciate the opportunity to work with you and we look forward to your business support. If you have any questions, I can be reached at (432) 687-1647

Sincerely,

A handwritten signature in cursive script, reading "Nicholas Duff", written over a horizontal line.

NICHOLAS DUFF
M/LWD Field Service Manager
Schlumberger Technology Corp.

PathFinder

6213 W. P. 117
Midland, TX 79706-0717
TEL: 409.687.1617
FAX: 409.687.1111



A Schlumberger Company

**STATE OF TEXAS
MIDLAND COUNTY**

I, **ALLAN ABRAHAM** certify that; I am employed by PathFinder, a Schlumberger company.; that I did on the day(s) of **01/27/14** through **02/19/14** conduct or supervise the taking of a **Measurement While Drilling** survey from a depth of **8037 feet** to a depth of **12712 feet**; that the data is true, correct, complete and within the limitations of the tool as set forth by PathFinder, a Schlumberger company.; that I am authorized and qualified to make this report; that this survey was conducted at the request of **COG OPERATING, LLC** for the **LUSK DEEP UNIT A 29H ST1** Well API No. **30-025-41563-02** 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 PathFinder, a Schlumberger company.

A handwritten signature in black ink, appearing to read "Allan Abraham". The signature is written in a cursive, flowing style.

ALLAN ABRAHAM
Field Engineer



A Schlumberger Company

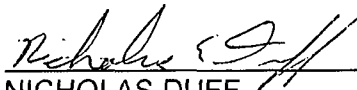
DIRECTIONAL SURVEY COMPANY REPORT:

1. NAME OF SURVEYING COMPANY: SCHLUMBERGER TECHNOLOGY CORP.
2. NAME OF PERSON(S) PERFORMING SURVEY:
A) ALLAN ABRAHAM
B) ADAM HINOJOS
3. POSITION OF SAID PERSON(S): (A) SURVEYORS (FIELD ENGINEER)
4. DATE(S) ON WHICH SURVEY WAS PERFORMED: 01/27/14 TO 02/19/14
5. STATE IN WHICH SURVEY WAS PERFORMED: NEW MEXICO
6. LOCATION OF WELL: LEA COUNTY
7. TYPE OF SURVEY(S) PERFORMED: MWD
8. COMPLETE IDENTIFICATION OF WELL:

COG OPERATING, LLC
LUSK DEEP UNIT A 29H ST1
LEA COUNTY, NEW MEXICO
API NO.: 30-025-41563-02
RIG: PATRIOT 6

9. SURVEY CERTIFIED FROM: 8037 TO 12712 FEET MEASURED DEPTH.

THIS IS TO VERIFY THAT ATTACHED DOCUMENTS SHOWING THE WELL TO BE DISPLACED AT 4595.50 FEET ON A BEARING OF 179.94 DEGREES FROM THE CENTER OF THE ROTARY TABLE AT A PROJECTED DEPTH OF 12864.00 FEET ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.


NICHOLAS DUFF
M/LWD Field Service Manager

PathFinder – a Schlumberger company

BHL Report

Page 01/01
Tie-in Date: 01/27/2014
Date Completed: 02/19/2014

COG OPERATING LLC.
LUSK DEEP UNIT A29H ST1
LEA COUNTY, NM
API#: 30-025-41563-02 Rig: PATRIOT 6
PathFinder Office Supervisor: HAMISH SNELL
PathFinder Field Engineers: ALLAN ABRAHAM
ADAM HINOJOS

Survey Horiz. Reference: WELLHEAD
Ref Coordinates: LAT: 32.39.59.8957 N LON: 103.47.39.6972 W
GRID Reference: NAD27 new mexico east Transverse Mercator
Ref GRID Coord: X: 665859.7000 Y: 606655.0000
North Aligned To: GRID NORTH
Total Magnetic Correction: 7.11° EAST TO GRID
Vertical Section Plane: 179.61
Survey Vert. Reference: 18.00' Rotary Table To Ground
Altitude: 3609.20' Ground To MSL

Measured Depth	12864.00	(feet)
Inclination	88.11	(deg)
Azimuth	175.60	(deg)
True Vertical Depth	8414.93	(feet)
Vertical Section	4595.42	(feet)
Survey X cord	665864.18	(feet)
Survey Y cord	602059.50	(feet)
Survey Lat	32.65400606 N	(deg)
Survey Lon	103.79442157 W	(deg)
Rectangular Corr. N/S	4595.50 S	(feet)
Rectangular Corr. E/W	4.48 E	(feet)
Closure Distance	4595.50	(feet)
Direction of Closure	179.94	(deg)
Dogleg Severity	0.00	(deg/100ft)

PathFinder – a Schlumberger company**Survey Report**

COG OPERATING LLC.

LUSK DEEP UNIT A29H ST1

LEA COUNTY, NM

API#: 30-025-41563-02 Rig: PATRIOT 6

PathFinder Office Supervisor: HAMISH SNELL

PathFinder Field Engineers: ALLAN ABRAHAM

ADAM HINOJOS

Survey Horiz. Reference: WELLHEAD

Ref Coordinates: LAT:32.39.59.8957 N LON:103.47.39.6972 W

GRID Reference: NAD27 new mexico east Transverse Mercator

Ref GRID Coord: X: 665859.7000 Y: 606655.0000

North Aligned To: GRID NORTH

Total Magnetic Correction: 7.11° EAST TO GRID

Vertical Section Plane: 179.61

Survey Vert. Reference: 18.00' Rotary Table To Ground

Altitude: 3609.20' 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)
THE FOLLOWING ARE VAUGHN ENERGY SERVICES GYRO SURVEYS.										
100.00	1.18	11.55	100.00	0.00	-0.99	0.99 N	0.24 E	1.02@	13.38	0.00
200.00	1.70	8.73	199.96	100.00	-3.46	3.47 N	0.67 E	3.53@	10.90	0.52
300.00	1.67	6.07	299.92	100.00	-6.38	6.38 N	1.05 E	6.47@	9.31	0.08
400.00	1.64	20.59	399.88	100.00	-9.16	9.17 N	1.70 E	9.33@	10.53	0.42
500.00	1.71	17.47	499.84	100.00	-11.92	11.94 N	2.66 E	12.23@	12.54	0.12
600.00	1.32	29.76	599.80	100.00	-14.33	14.36 N	3.68 E	14.82@	14.36	0.50
700.00	1.12	25.87	699.78	100.00	-16.21	16.24 N	4.67 E	16.90@	16.06	0.22
800.00	0.28	36.62	799.77	100.00	-17.28	17.31 N	5.25 E	18.09@	16.86	0.85
900.00	0.17	27.05	899.77	100.00	-17.60	17.64 N	5.46 E	18.47@	17.19	0.12
1000.00	0.14	92.27	999.77	100.00	-17.73	17.77 N	5.65 E	18.65@	17.63	0.17
1100.00	0.10	165.19	1099.77	100.00	-17.64	17.68 N	5.79 E	18.60@	18.14	0.15
1200.00	0.34	207.96	1199.77	100.00	-17.29	17.33 N	5.68 E	18.24@	18.13	0.28
1300.00	0.47	194.96	1299.77	100.00	-16.64	16.68 N	5.43 E	17.54@	18.04	0.16
1400.00	0.35	195.23	1399.76	100.00	-15.95	15.98 N	5.24 E	16.82@	18.17	0.12
1500.00	0.36	196.21	1499.76	100.00	-15.35	15.39 N	5.08 E	16.20@	18.26	0.01
1600.00	0.24	155.84	1599.76	100.00	-14.86	14.90 N	5.07 E	15.74@	18.81	0.24
1700.00	0.95	62.78	1699.76	100.00	-15.04	15.08 N	5.90 E	16.20@	21.36	0.99
1800.00	2.42	55.53	1799.71	100.00	-16.60	16.66 N	8.38 E	18.64@	26.69	1.48
1900.00	3.22	53.34	1899.59	100.00	-19.44	19.53 N	12.37 E	23.12@	32.35	0.81
2000.00	3.28	53.52	1999.43	100.00	-22.79	22.91 N	16.92 E	28.48@	36.46	0.06
2100.00	2.63	46.17	2099.29	100.00	-26.05	26.20 N	20.88 E	33.50@	38.55	0.75
2200.00	2.09	34.74	2199.21	100.00	-29.12	29.28 N	23.57 E	37.59@	38.83	0.71
2300.00	2.03	41.38	2299.15	100.00	-31.94	32.11 N	25.78 E	41.18@	38.76	0.25
2400.00	1.45	60.89	2399.10	100.00	-33.86	34.06 N	28.06 E	44.13@	39.48	0.82
2500.00	1.19	66.68	2499.07	100.00	-34.88	35.08 N	30.12 E	46.24@	40.65	0.29

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H ST1
LEA COUNTY, NM
API#: 30-025-41563-02 Rig: PATRIOT 6

Page 02/06

Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
2600.00	0.61	108.03	2599.06	100.00	-35.11	35.33 N	31.58 E	47.38@	41.79	0.83
2700.00	0.53	121.73	2699.06	100.00	-34.70	34.92 N	32.48 E	47.69@	42.92	0.16
2800.00	0.19	165.98	2799.05	100.00	-34.29	34.52 N	32.91 E	47.69@	43.64	0.42
2900.00	0.51	251.67	2899.05	100.00	-33.99	34.22 N	32.53 E	47.21@	43.55	0.53
3000.00	0.54	279.64	2999.05	100.00	-33.94	34.15 N	31.64 E	46.56@	42.81	0.25
3100.00	0.72	293.50	3099.04	100.00	-34.28	34.48 N	30.60 E	46.10@	41.58	0.23
3200.00	0.61	305.07	3199.04	100.00	-34.84	35.04 N	29.59 E	45.86@	40.18	0.17
3300.00	0.85	328.37	3299.03	100.00	-35.78	35.98 N	28.76 E	46.06@	38.64	0.38
3400.00	0.94	333.83	3399.02	100.00	-37.15	37.35 N	28.01 E	46.68@	36.87	0.12
3500.00	0.99	333.73	3499.00	100.00	-38.67	38.86 N	27.27 E	47.47@	35.06	0.05
3600.00	1.19	343.98	3598.98	100.00	-40.45	40.63 N	26.60 E	48.56@	33.21	0.28
3700.00	1.18	344.54	3698.96	100.00	-42.44	42.62 N	26.04 E	49.94@	31.42	0.02
3800.00	1.08	349.25	3798.94	100.00	-44.36	44.54 N	25.59 E	51.37@	29.88	0.14
3900.00	0.89	342.23	3898.93	100.00	-46.03	46.20 N	25.18 E	52.62@	28.59	0.23
4000.00	0.91	334.39	3998.92	100.00	-47.49	47.66 N	24.60 E	53.63@	27.30	0.12
4100.00	0.87	334.39	4098.90	100.00	-48.90	49.06 N	23.92 E	54.58@	26.00	0.04
4200.00	1.08	330.90	4198.89	100.00	-50.41	50.57 N	23.14 E	55.61@	24.59	0.22
4300.00	1.41	0.34	4298.87	100.00	-52.47	52.62 N	22.69 E	57.30@	23.32	0.71
4400.00	1.40	359.56	4398.84	100.00	-54.92	55.07 N	22.68 E	59.56@	22.39	0.02
4500.00	1.75	0.90	4498.80	100.00	-57.67	57.82 N	22.70 E	62.12@	21.43	0.35
4600.00	2.32	2.42	4598.73	100.00	-61.21	61.37 N	22.81 E	65.47@	20.39	0.57
4700.00	2.72	3.34	4698.64	100.00	-65.60	65.76 N	23.03 E	69.68@	19.30	0.40
4800.00	3.03	2.64	4798.51	100.00	-70.61	70.77 N	23.29 E	74.51@	18.22	0.31
4900.00	3.02	356.29	4898.37	100.00	-75.88	76.04 N	23.24 E	79.51@	17.00	0.34
5000.00	3.12	2.96	4998.23	100.00	-81.23	81.39 N	23.21 E	84.63@	15.92	0.37
5100.00	3.46	2.37	5098.06	100.00	-86.96	87.12 N	23.48 E	90.23@	15.08	0.34
5200.00	3.61	2.83	5197.87	100.00	-93.11	93.28 N	23.76 E	96.26@	14.29	0.15
5300.00	2.09	325.47	5297.76	100.00	-97.77	97.93 N	22.88 E	100.56@	13.15	2.32

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H ST1
LEA COUNTY, NM
API#: 30-025-41563-02 Rig: PATRIOT 6

Page 03/06

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)
5400.00	1.98	324.11	5397.69	100.00	-100.68	100.83 N	20.83 E	102.96@	11.67	0.12
5500.00	0.52	348.66	5497.67	100.00	-102.54	102.67 N	19.73 E	104.55@	10.88	1.52
5600.00	0.61	324.91	5597.66	100.00	-103.42	103.55 N	19.34 E	105.34@	10.58	0.25
5700.00	0.63	321.10	5697.66	100.00	-104.29	104.42 N	18.69 E	106.07@	10.15	0.05
5800.00	0.50	334.43	5797.65	100.00	-105.11	105.24 N	18.15 E	106.79@	9.79	0.18
5900.00	0.49	311.25	5897.65	100.00	-105.79	105.91 N	17.64 E	107.37@	9.46	0.20
6000.00	0.58	319.29	5997.64	100.00	-106.46	106.58 N	16.99 E	107.92@	9.06	0.12
6100.00	0.55	313.48	6097.64	100.00	-107.18	107.29 N	16.31 E	108.53@	8.64	0.06
6200.00	0.53	330.45	6197.63	100.00	-107.92	108.02 N	15.74 E	109.16@	8.29	0.16
6300.00	0.60	323.34	6297.63	100.00	-108.74	108.85 N	15.20 E	109.90@	7.95	0.10
6400.00	0.57	334.56	6397.62	100.00	-109.61	109.72 N	14.67 E	110.69@	7.62	0.12
6500.00	0.67	336.45	6497.62	100.00	-110.60	110.70 N	14.22 E	111.61@	7.32	0.10
6700.00	0.73	325.93	6697.60	200.00	-112.74	112.83 N	13.04 E	113.58@	6.59	0.07
6800.00	0.69	324.70	6797.60	100.00	-113.76	113.85 N	12.34 E	114.51@	6.18	0.04
6900.00	0.61	312.99	6897.59	100.00	-114.62	114.70 N	11.60 E	115.29@	5.77	0.16
7000.00	0.67	300.77	6997.58	100.00	-115.29	115.36 N	10.71 E	115.86@	5.30	0.15
7100.00	0.44	271.76	7097.58	100.00	-115.61	115.68 N	9.82 E	116.09@	4.85	0.36
7200.00	0.76	259.09	7197.57	100.00	-115.50	115.56 N	8.79 E	115.90@	4.35	0.34
7300.00	1.18	270.34	7297.56	100.00	-115.39	115.44 N	7.10 E	115.66@	3.52	0.46
7400.00	2.18	253.65	7397.51	100.00	-114.88	114.91 N	4.25 E	114.99@	2.12	1.10
7500.00	2.80	248.67	7497.42	100.00	-113.49	113.49 N	0.15 E	113.49@	0.08	0.66
7600.00	1.57	159.59	7597.37	100.00	-111.32	111.32 N	1.65 W	111.33@	359.15	3.19
7700.00	1.38	157.14	7697.33	100.00	-108.92	108.92 N	0.70 W	108.92@	359.63	0.20
THE FOLLOWING ARE SCIENTIFIC DRILLING GRYO SURVEYS.										
7770.00	3.26	189.11	7767.28	70.00	-106.18	106.18 N	0.69 W	106.18@	359.63	3.16
7801.00	3.34	195.79	7798.23	31.00	-104.45	104.44 N	1.08 W	104.45@	359.41	1.27
7833.00	3.43	199.31	7830.17	32.00	-102.65	102.64 N	1.65 W	102.65@	359.08	0.71
7863.00	3.61	198.78	7860.11	30.00	-100.91	100.90 N	2.25 W	100.92@	358.72	0.61
7895.00	7.30	190.34	7891.96	32.00	-97.96	97.94 N	2.94 W	97.99@	358.28	11.77

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H ST1
LEA COUNTY, NM
API#: 30-025-41563-02 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)
7926.00	10.12	189.38	7922.60	31.00	-93.34	93.32 N	3.73 W	93.39@	357.71	9.11
7958.00	13.64	191.14	7953.91	32.00	-86.87	86.84 N	4.92 W	86.98@	356.76	11.06
7990.00	14.96	189.91	7984.92	32.00	-79.11	79.07 N	6.36 W	79.33@	355.40	4.23
** TIED INTO SCIENTIFIC DRILLING GYRO SURVEY AT 8022'MD.										
8022.00	14.60	188.24	8015.86	32.00	-71.06	71.01 N	7.65 W	71.42@	353.85	1.74
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.										
8037.00	14.95	185.18	8030.36	15.00	-67.27	67.21 N	8.10 W	67.70@	353.13	5.70
8069.00	19.43	181.31	8060.93	32.00	-57.83	57.77 N	8.59 W	58.41@	351.54	14.44
8101.00	25.50	179.46	8090.49	32.00	-45.61	45.55 N	8.65 W	46.37@	349.25	19.09
8133.00	30.60	179.02	8118.72	32.00	-30.57	30.51 N	8.44 W	31.66@	344.53	15.95
8164.00	33.77	180.17	8144.95	31.00	-14.06	14.00 N	8.33 W	16.30@	329.24	10.42
8196.00	36.49	182.54	8171.12	32.00	4.34	4.40 S	8.78 W	9.82@	243.39	9.51
8227.00	39.31	182.54	8195.58	31.00	23.36	23.42 S	9.63 W	25.32@	202.34	9.10
8259.00	43.35	182.10	8219.61	32.00	44.46	44.53 S	10.48 W	45.75@	193.24	12.66
8291.00	47.13	181.49	8242.13	32.00	67.16	67.24 S	11.18 W	68.16@	189.44	11.89
8322.00	50.21	180.52	8262.60	31.00	90.43	90.51 S	11.59 W	91.25@	187.30	10.21
8338.00	51.18	179.82	8272.74	16.00	102.81	102.89 S	11.62 W	103.55@	186.45	6.94
8369.00	53.20	178.23	8291.74	31.00	127.30	127.38 S	11.20 W	127.87@	185.03	7.67
8401.00	55.22	179.02	8310.46	32.00	153.25	153.32 S	10.58 W	153.69@	183.95	6.62
8433.00	57.95	179.46	8328.08	32.00	179.96	180.03 S	10.23 W	180.32@	183.25	8.61
8450.00	59.27	179.20	8336.93	17.00	194.47	194.54 S	10.06 W	194.80@	182.96	7.87
8481.00	63.75	179.73	8351.72	31.00	221.71	221.78 S	9.81 W	222.00@	182.53	14.53
8513.00	70.17	180.78	8364.23	32.00	251.14	251.21 S	9.95 W	251.41@	182.27	20.29
8559.00	78.70	181.66	8376.57	46.00	295.39	295.47 S	10.90 W	295.67@	182.11	18.63
8590.00	82.31	181.40	8381.68	31.00	325.94	326.03 S	11.71 W	326.24@	182.06	11.67
8622.00	86.00	182.28	8384.94	32.00	357.75	357.84 S	12.73 W	358.07@	182.04	11.85
8654.00	87.67	181.75	8386.70	32.00	389.67	389.77 S	13.86 W	390.02@	182.04	5.47
8717.00	88.90	181.22	8388.59	63.00	452.61	452.72 S	15.49 W	452.99@	181.96	2.13
8812.00	89.34	182.72	8390.05	95.00	547.51	547.65 S	18.75 W	547.97@	181.96	1.65

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H ST1
LEA COUNTY, NM
API#: 30-025-41563-02 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)
8908.00	88.11	179.46	8392.18	96.00	643.44	643.60 S	20.58 W	643.92@	181.83	3.63
9003.00	89.08	178.23	8394.51	95.00	738.40	738.54 S	18.67 W	738.78@	181.45	1.65
9099.00	88.81	179.11	8396.28	96.00	834.37	834.50 S	16.44 W	834.66@	181.13	0.96
9194.00	89.25	177.62	8397.89	95.00	929.33	929.45 S	13.73 W	929.55@	180.85	1.63
9289.00	91.80	176.30	8397.02	95.00	1024.22	1024.30 S	8.69 W	1024.33@	180.49	3.02
9353.00	91.36	177.79	8395.25	64.00	1088.13	1088.19 S	5.39 W	1088.20@	180.28	2.43
9416.00	89.96	177.88	8394.53	63.00	1151.09	1151.14 S	3.01 W	1151.14@	180.15	2.23
9480.00	89.16	178.32	8395.02	64.00	1215.06	1215.10 S	0.89 W	1215.10@	180.04	1.43
9544.00	91.54	180.87	8394.63	64.00	1279.05	1279.09 S	0.44 W	1279.09@	180.02	5.45
9607.00	92.86	184.21	8392.21	63.00	1341.91	1341.97 S	3.23 W	1341.97@	180.14	5.70
9702.00	88.46	180.69	8391.12	95.00	1436.75	1436.84 S	7.29 W	1436.85@	180.29	5.93
9797.00	87.58	179.46	8394.40	95.00	1531.69	1531.78 S	7.41 W	1531.79@	180.28	1.59
9861.00	90.04	179.38	8395.73	64.00	1595.67	1595.75 S	6.76 W	1595.77@	180.24	3.85
9924.00	88.55	180.52	8396.50	63.00	1658.66	1658.75 S	6.71 W	1658.76@	180.23	2.98
10019.00	89.25	177.71	8398.33	95.00	1753.63	1753.71 S	5.24 W	1753.72@	180.17	3.05
10082.00	88.37	175.95	8399.64	63.00	1816.54	1816.59 S	1.76 W	1816.60@	180.06	3.12
10177.00	90.84	181.40	8400.29	95.00	1911.48	1911.52 S	0.44 E	1911.52@	179.99	6.30
10241.00	90.31	181.40	8399.65	64.00	1975.45	1975.50 S	1.13 W	1975.50@	180.03	0.83
10304.00	89.34	180.96	8399.84	63.00	2038.42	2038.49 S	2.42 W	2038.49@	180.07	1.69
10367.00	90.57	181.22	8399.89	63.00	2101.40	2101.47 S	3.62 W	2101.48@	180.10	2.00
10431.00	91.63	180.17	8398.66	64.00	2165.38	2165.46 S	4.40 W	2165.46@	180.12	2.33
10525.00	91.01	179.11	8396.50	94.00	2259.35	2259.43 S	3.81 W	2259.43@	180.10	1.31
10589.00	89.96	180.43	8395.95	64.00	2323.34	2323.42 S	3.55 W	2323.42@	180.09	2.64
10653.00	88.29	178.58	8396.93	64.00	2387.33	2387.41 S	3.00 W	2387.41@	180.07	3.89
10716.00	89.25	177.18	8398.28	63.00	2450.29	2450.35 S	0.67 W	2450.35@	180.02	2.69
10779.00	89.96	177.79	8398.72	63.00	2513.24	2513.28 S	2.10 E	2513.29@	179.95	1.49
10842.00	90.48	179.38	8398.48	63.00	2576.23	2576.26 S	3.65 E	2576.27@	179.92	2.65
10906.00	91.10	180.34	8397.59	64.00	2640.22	2640.25 S	3.81 E	2640.26@	179.92	1.78

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H ST1
LEA COUNTY, NM
API#: 30-025-41563-02 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)
10969.00	91.71	181.92	8396.05	63.00	2703.18	2703.22 S	2.57 E	2703.22@	179.95	2.69
11032.00	90.31	182.01	8394.94	63.00	2766.11	2766.17 S	0.41 E	2766.17@	179.99	2.23
11095.00	89.52	181.75	8395.03	63.00	2829.06	2829.14 S	1.66 W	2829.14@	180.03	1.32
11190.00	89.34	182.01	8395.98	95.00	2923.98	2924.08 S	4.78 W	2924.09@	180.09	0.33
11285.00	89.52	181.22	8396.92	95.00	3018.92	3019.04 S	7.45 W	3019.05@	180.14	0.85
11379.00	90.22	179.73	8397.14	94.00	3112.90	3113.03 S	8.23 W	3113.04@	180.15	1.75
11475.00	88.64	179.20	8398.09	96.00	3208.90	3209.02 S	7.34 W	3209.03@	180.13	1.74
11570.00	88.81	179.55	8400.20	95.00	3303.87	3303.99 S	6.30 W	3304.00@	180.11	0.41
11666.00	87.32	178.50	8403.45	96.00	3399.81	3399.92 S	4.67 W	3399.92@	180.08	1.90
11760.81	90.92	181.22	8404.90	94.81	3494.58	3494.69 S	4.44 W	3494.70@	180.07	4.76
11856.00	91.89	182.63	8402.57	95.19	3589.66	3589.80 S	7.63 W	3589.80@	180.12	1.80
11951.00	94.18	186.23	8397.54	95.00	3684.17	3684.36 S	14.96 W	3684.39@	180.23	4.49
12045.00	90.22	184.12	8393.93	94.00	3777.64	3777.88 S	23.42 W	3777.96@	180.36	4.77
12140.00	88.64	180.87	8394.87	95.00	3872.49	3872.77 S	27.56 W	3872.87@	180.41	3.80
12236.00	88.02	179.38	8397.67	96.00	3968.45	3968.73 S	27.77 W	3968.82@	180.40	1.68
12331.00	89.08	178.58	8400.08	95.00	4063.41	4063.68 S	26.08 W	4063.76@	180.37	1.40
12426.00	87.85	177.62	8402.62	95.00	4158.34	4158.59 S	22.93 W	4158.65@	180.32	1.64
12521.00	88.11	177.53	8405.97	95.00	4253.22	4253.45 S	18.91 W	4253.49@	180.25	0.29
12616.00	89.52	176.39	8407.93	95.00	4348.09	4348.29 S	13.88 W	4348.31@	180.18	1.91
12712.00	88.11	175.60	8409.92	96.00	4443.88	4444.03 S	7.17 W	4444.04@	180.09	1.68
STRAIGHT LINE PROJECTION TO BIT AT 12864'MD.										
12864.00	88.11	175.60	8414.93	152.00	4595.42	4595.50 S	4.48 E	4595.50@	179.94	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.

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H
LEA COUNTY, NM

API#: 30-025-41563 Rig: PATRIOT 6

PathFinder Office Supervisor: HAMISH SNELL

PathFinder Field Engineers: ALLAN ABRAHAM
ADAM HINOJOS

Survey Horiz. Reference: WELLHEAD

Ref Coordinates: LAT: 32.39.59.8957 N LON: 103.47.39.6972 W

GRID Reference: NAD27 new mexico east Transverse Mercator

Ref GRID Coord: X: 665859.7000 Y: 606655.0000

North Aligned To: GRID NORTH

Total Magnetic Correction: 7.11° EAST TO GRID

Vertical Section Plane: 179.61

Survey Vert. Reference: 18.00' Rotary Table To Ground

Altitude: 3609.20' 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)	
THE FOLLOWING ARE VAUGHN ENERGY SERVICES GYRO SURVEYS.										
100.00	1.18	11.55	100.00	0.00	-0.99	0.99 N	0.24 E	1.02@ 13.47	0.00	
200.00	1.70	8.73	199.96	100.00	-3.46	3.46 N	0.67 E	3.53@ 10.92	0.52	
300.00	1.67	6.07	299.92	100.00	-6.37	6.38 N	1.05 E	6.46@ 9.32	0.08	
400.00	1.64	20.59	399.88	100.00	-9.15	9.17 N	1.70 E	9.32@ 10.53	0.42	
500.00	1.71	17.47	499.84	100.00	-11.91	11.93 N	2.66 E	12.22@ 12.55	0.12	
600.00	1.32	29.76	599.80	100.00	-14.33	14.35 N	3.68 E	14.82@ 14.36	0.50	
700.00	1.12	25.87	699.78	100.00	-16.20	16.23 N	4.67 E	16.89@ 16.06	0.22	
800.00	0.28	36.62	799.77	100.00	-17.27	17.31 N	5.25 E	18.08@ 16.86	0.85	
900.00	0.17	27.05	899.77	100.00	-17.60	17.64 N	5.46 E	18.46@ 17.20	0.12	
1000.00	0.14	92.27	999.77	100.00	-17.72	17.76 N	5.65 E	18.64@ 17.64	0.17	
1100.00	0.10	165.19	1099.77	100.00	-17.63	17.67 N	5.79 E	18.60@ 18.15	0.15	
1200.00	0.34	207.96	1199.77	100.00	-17.29	17.33 N	5.68 E	18.23@ 18.14	0.28	
1300.00	0.47	194.96	1299.77	100.00	-16.63	16.67 N	5.43 E	17.53@ 18.05	0.16	
1400.00	0.35	195.23	1399.76	100.00	-15.94	15.98 N	5.24 E	16.82@ 18.17	0.12	
1500.00	0.36	196.21	1499.76	100.00	-15.35	15.38 N	5.08 E	16.20@ 18.27	0.01	
1600.00	0.24	155.84	1599.76	100.00	-14.85	14.89 N	5.07 E	15.73@ 18.82	0.24	
1700.00	0.95	62.78	1699.76	100.00	-15.04	15.08 N	5.90 E	16.19@ 21.36	0.99	
1800.00	2.42	55.53	1799.71	100.00	-16.59	16.65 N	8.38 E	18.64@ 26.70	1.48	
1900.00	3.22	53.34	1899.59	100.00	-19.44	19.52 N	12.37 E	23.11@ 32.36	0.81	
2000.00	3.28	53.52	1999.43	100.00	-22.78	22.90 N	16.92 E	28.47@ 36.46	0.06	
2100.00	2.63	46.17	2099.29	100.00	-26.05	26.19 N	20.88 E	33.49@ 38.56	0.75	
2200.00	2.09	34.74	2199.21	100.00	-29.12	29.28 N	23.57 E	37.59@ 38.84	0.71	
2300.00	2.03	41.38	2299.14	100.00	-31.93	32.10 N	25.78 E	41.18@ 38.77	0.25	
2400.00	1.45	60.89	2399.10	100.00	-33.86	34.05 N	28.06 E	44.12@ 39.49	0.82	
2500.00	1.19	66.68	2499.07	100.00	-34.87	35.08 N	30.12 E	46.23@ 40.65	0.29	

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H
LEA COUNTY, NM

API#: 30-025-41563 Rlg: 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)
2600.00	0.61	108.03	2599.06	100.00	-35.11	35.32 N	31.58 E	47.38@	41.80	0.83
2700.00	0.53	121.73	2699.06	100.00	-34.69	34.91 N	32.48 E	47.68@	42.93	0.16
2800.00	0.19	165.98	2799.05	100.00	-34.29	34.51 N	32.91 E	47.69@	43.64	0.42
2900.00	0.51	251.67	2899.05	100.00	-33.99	34.21 N	32.53 E	47.21@	43.56	0.53
3000.00	0.54	279.64	2999.05	100.00	-33.93	34.15 N	31.64 E	46.55@	42.82	0.25
3100.00	0.72	293.50	3099.04	100.00	-34.27	34.48 N	30.60 E	46.10@	41.59	0.23
3200.00	0.61	305.07	3199.04	100.00	-34.83	35.03 N	29.59 E	45.86@	40.18	0.17
3300.00	0.85	328.37	3299.03	100.00	-35.77	35.97 N	28.76 E	46.06@	38.65	0.38
3400.00	0.94	333.83	3399.02	100.00	-37.15	37.34 N	28.01 E	46.68@	36.88	0.12
3500.00	0.99	333.73	3499.00	100.00	-38.66	38.85 N	27.27 E	47.46@	35.06	0.05
3600.00	1.19	343.98	3598.98	100.00	-40.44	40.62 N	26.60 E	48.56@	33.22	0.28
3700.00	1.18	344.54	3698.96	100.00	-42.44	42.61 N	26.04 E	49.94@	31.43	0.02
3800.00	1.08	349.25	3798.94	100.00	-44.36	44.53 N	25.59 E	51.36@	29.88	0.14
3900.00	0.89	342.23	3898.93	100.00	-46.02	46.20 N	25.18 E	52.61@	28.59	0.23
4000.00	0.91	334.39	3998.92	100.00	-47.48	47.65 N	24.60 E	53.63@	27.30	0.12
4100.00	0.87	334.39	4098.90	100.00	-48.89	49.05 N	23.92 E	54.58@	26.00	0.04
4200.00	1.08	330.90	4198.89	100.00	-50.40	50.56 N	23.14 E	55.60@	24.59	0.22
4300.00	1.41	0.34	4298.87	100.00	-52.46	52.62 N	22.69 E	57.30@	23.32	0.71
4400.00	1.40	359.56	4398.84	100.00	-54.91	55.07 N	22.68 E	59.56@	22.39	0.02
4500.00	1.75	0.90	4498.80	100.00	-57.66	57.82 N	22.70 E	62.11@	21.44	0.35
4600.00	2.32	2.42	4598.73	100.00	-61.21	61.36 N	22.81 E	65.47@	20.39	0.57
4700.00	2.72	3.34	4698.64	100.00	-65.60	65.76 N	23.03 E	69.67@	19.30	0.40
4800.00	3.03	2.64	4798.51	100.00	-70.60	70.76 N	23.29 E	74.50@	18.22	0.31
4900.00	3.02	356.29	4898.37	100.00	-75.87	76.03 N	23.24 E	79.51@	17.00	0.34
5000.00	3.12	2.96	4998.23	100.00	-81.22	81.38 N	23.21 E	84.63@	15.92	0.37
5100.00	3.46	2.37	5098.06	100.00	-86.95	87.11 N	23.48 E	90.22@	15.08	0.34
5200.00	3.61	2.83	5197.87	100.00	-93.11	93.27 N	23.76 E	96.25@	14.29	0.15
5300.00	2.09	325.47	5297.76	100.00	-97.76	97.92 N	22.88 E	100.56@	13.15	2.32

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H
LEA COUNTY, NM

API#: 30-025-41563 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)
5400.00	1.98	324.11	5397.69	100.00	-100.68	100.82 N 20.83 E	102.95@ 11.68	0.12
5500.00	0.52	348.66	5497.67	100.00	-102.53	102.67 N 19.73 E	104.54@ 10.88	1.52
5600.00	0.61	324.91	5597.66	100.00	-103.41	103.55 N 19.34 E	105.34@ 10.58	0.25
5700.00	0.63	321.10	5697.66	100.00	-104.28	104.41 N 18.69 E	106.07@ 10.15	0.05
5800.00	0.50	334.43	5797.65	100.00	-105.10	105.23 N 18.15 E	106.78@ 9.79	0.18
5900.00	0.49	311.25	5897.65	100.00	-105.78	105.91 N 17.64 E	107.37@ 9.46	0.20
6000.00	0.58	319.29	5997.64	100.00	-106.45	106.57 N 16.99 E	107.92@ 9.06	0.12
6100.00	0.55	313.48	6097.64	100.00	-107.17	107.29 N 16.31 E	108.52@ 8.65	0.06
6200.00	0.53	330.45	6197.63	100.00	-107.91	108.02 N 15.74 E	109.16@ 8.29	0.16
6300.00	0.60	323.34	6297.63	100.00	-108.73	108.84 N 15.20 E	109.90@ 7.95	0.10
6400.00	0.57	334.56	6397.62	100.00	-109.61	109.71 N 14.67 E	110.69@ 7.62	0.12
6500.00	0.67	336.45	6497.62	100.00	-110.60	110.70 N 14.22 E	111.60@ 7.32	0.10
6700.00	0.73	325.93	6697.60	200.00	-112.73	112.82 N 13.04 E	113.57@ 6.59	0.07
6800.00	0.69	324.70	6797.60	100.00	-113.75	113.84 N 12.34 E	114.51@ 6.18	0.04
6900.00	0.61	312.99	6897.59	100.00	-114.61	114.70 N 11.60 E	115.28@ 5.77	0.16
7000.00	0.67	300.77	6997.58	100.00	-115.28	115.36 N 10.71 E	115.85@ 5.30	0.15
7100.00	0.44	271.76	7097.58	100.00	-115.60	115.67 N 9.82 E	116.09@ 4.85	0.36
7200.00	0.76	259.09	7197.57	100.00	-115.49	115.56 N 8.79 E	115.89@ 4.35	0.34
7300.00	1.18	270.34	7297.56	100.00	-115.38	115.44 N 7.10 E	115.65@ 3.52	0.46
7400.00	2.18	253.65	7397.51	100.00	-114.87	114.91 N 4.25 E	114.99@ 2.12	1.10
7500.00	2.80	248.67	7497.42	100.00	-113.48	113.48 N 0.15 E	113.48@ 0.08	0.66
7600.00	1.57	159.59	7597.37	100.00	-111.32	111.31 N 1.65 W	111.32@ 359.15	3.19
7700.00	1.38	157.14	7697.33	100.00	-108.92	108.92 N 0.70 W	108.92@ 359.63	0.20
7800.00	0.86	180.55	7797.31	100.00	-107.06	107.06 N 0.24 W	107.06@ 359.87	0.68
7900.00	0.18	138.37	7897.31	100.00	-106.19	106.19 N 0.14 W	106.19@ 359.92	0.74
TIED INTO VAUGHN ENERGY SERVICES GYRO SURVEY AT 8000'MD.								
8000.00	1.44	28.03	7997.30	0.00	-107.17	107.18 N 0.55 E	107.18@ 0.29	0.00
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.								
8190.00	0.70	32.86	8187.27	190.00	-110.24	110.26 N 2.30 E	110.29@ 1.20	0.39

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H
LEA COUNTY, NM
API#: 30-025-41563

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)
8380.00	0.18	272.89	8377.26	190.00	-111.23	111.25 N 2.63 E	111.28@ 1.36	0.42
8569.00	0.44	220.33	8566.26	189.00	-110.70	110.71 N 1.87 E	110.73@ 0.97	0.19
8695.00	0.70	223.41	8692.25	126.00	-109.78	109.79 N 1.03 E	109.79@ 0.53	0.21
8727.00	2.99	194.58	8724.23	32.00	-108.83	108.84 N 0.68 E	108.84@ 0.36	7.50
8758.00	7.12	187.37	8755.11	31.00	-106.14	106.15 N 0.23 E	106.15@ 0.12	13.45
8790.00	11.26	188.34	8786.69	32.00	-101.09	101.09 N 0.48 W	101.09@ 359.73	12.95
8822.00	14.16	188.25	8817.90	32.00	-94.13	94.12 N 1.49 W	94.13@ 359.09	9.06
8853.00	17.94	186.58	8847.69	31.00	-85.64	85.62 N 2.58 W	85.66@ 358.27	12.28
8885.00	22.51	180.08	8877.71	32.00	-74.61	74.59 N 3.16 W	74.66@ 357.58	15.89
8917.00	26.91	176.04	8906.78	32.00	-61.25	61.24 N 2.67 W	61.29@ 357.51	14.72
8948.00	29.72	175.95	8934.06	31.00	-46.58	46.57 N 1.64 W	46.60@ 357.99	9.07
8980.00	32.18	178.85	8961.51	32.00	-30.14	30.13 N 0.91 W	30.15@ 358.28	8.99
9012.00	35.70	179.46	8988.05	32.00	-12.28	12.27 N 0.65 W	12.29@ 356.98	11.05
9043.00	40.45	179.55	9012.45	31.00	6.83	6.84 S 0.48 W	6.86@ 184.05	15.32
9075.00	44.85	178.67	9035.98	32.00	28.51	28.51 S 0.14 W	28.51@ 180.28	13.87
9107.00	47.66	179.02	9058.10	32.00	51.62	51.62 S 0.32 E	51.62@ 179.64	8.82
9138.00	50.30	179.11	9078.45	31.00	75.01	75.00 S 0.71 E	75.01@ 179.46	8.52
9172.00	53.38	178.30	9099.45	34.00	101.73	101.73 S 1.31 E	101.74@ 179.26	9.25
9204.00	55.93	178.68	9117.96	32.00	127.83	127.82 S 2.00 E	127.83@ 179.10	8.03
9235.00	58.04	179.03	9134.85	31.00	153.82	153.81 S 2.52 E	153.83@ 179.06	6.87
9267.00	60.85	179.67	9151.12	32.00	181.37	181.36 S 2.83 E	181.38@ 179.11	8.95
9299.00	62.43	180.34	9166.32	32.00	209.53	209.52 S 2.83 E	209.54@ 179.23	5.27
9330.00	64.98	179.95	9180.05	31.00	237.32	237.31 S 2.76 E	237.32@ 179.33	8.30
9362.00	68.06	179.61	9192.80	32.00	266.67	266.65 S 2.87 E	266.67@ 179.38	9.67
9393.00	70.43	180.00	9203.78	31.00	295.65	295.64 S 2.97 E	295.65@ 179.42	7.73
9425.00	73.42	180.80	9213.71	32.00	326.07	326.05 S 2.75 E	326.07@ 179.52	9.64
9457.00	76.50	179.68	9222.01	32.00	356.96	356.95 S 2.63 E	356.96@ 179.58	10.20
9489.00	79.49	179.58	9228.67	32.00	388.26	388.25 S 2.83 E	388.26@ 179.58	9.35

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H
LEA COUNTY, NM
API#: 30-025-41563 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)
9520.00	82.39	179.61	9233.55	31.00	418.87	418.86 S 3.04 E	418.87@ 179.58	9.36
9552.00	85.65	179.06	9236.88	32.00	450.69	450.68 S 3.41 E	450.69@ 179.57	10.33
9583.00	89.16	179.31	9238.29	31.00	481.65	481.64 S 3.85 E	481.65@ 179.54	11.35
9615.00	89.25	178.96	9238.73	32.00	513.65	513.63 S 4.34 E	513.65@ 179.52	1.13
9678.00	90.31	180.65	9238.97	63.00	576.65	576.63 S 4.55 E	576.65@ 179.55	3.17
9773.00	90.22	180.05	9238.53	95.00	671.64	671.62 S 3.97 E	671.64@ 179.66	0.64
9868.00	88.37	180.17	9239.70	95.00	766.62	766.61 S 3.79 E	766.62@ 179.72	1.95
9963.00	90.40	180.61	9240.72	95.00	861.60	861.60 S 3.14 E	861.61@ 179.79	2.19
10058.00	89.43	180.60	9240.86	95.00	956.59	956.59 S 2.14 E	956.60@ 179.87	1.02
10153.00	90.57	180.63	9240.86	95.00	1051.57	1051.59 S 1.12 E	1051.59@ 179.94	1.20
10248.00	90.57	180.90	9239.92	95.00	1146.55	1146.57 S 0.15 W	1146.57@ 180.01	0.28
10343.00	90.57	180.86	9238.97	95.00	1241.52	1241.56 S 1.61 W	1241.56@ 180.07	0.04
10438.00	91.10	180.83	9237.59	95.00	1336.49	1336.54 S 3.01 W	1336.54@ 180.13	0.56
10533.00	91.80	180.27	9235.18	95.00	1431.44	1431.50 S 3.92 W	1431.51@ 180.16	0.94
10628.00	86.88	179.83	9236.28	95.00	1526.40	1526.46 S 4.00 W	1526.47@ 180.15	5.20
10723.00	87.41	179.54	9241.01	95.00	1621.28	1621.35 S 3.48 W	1621.35@ 180.12	0.64
10818.00	90.66	179.10	9242.61	95.00	1716.26	1716.31 S 2.35 W	1716.31@ 180.08	3.45
10913.00	90.66	178.04	9241.51	95.00	1811.23	1811.28 S 0.02 E	1811.28@ 180.00	1.12
11008.00	90.22	177.71	9240.78	95.00	1906.19	1906.21 S 3.54 E	1906.21@ 179.89	0.58
11103.00	88.72	177.14	9241.66	95.00	2001.11	2001.10 S 7.81 E	2001.12@ 179.78	1.69
11198.00	89.52	178.63	9243.12	95.00	2096.05	2096.02 S 11.31 E	2096.05@ 179.69	1.78
11293.00	90.66	178.37	9242.97	95.00	2191.03	2190.99 S 13.80 E	2191.03@ 179.64	1.23
11388.00	89.69	177.52	9242.68	95.00	2285.99	2285.93 S 17.21 E	2285.99@ 179.57	1.36
11483.00	88.37	177.55	9244.29	95.00	2380.91	2380.82 S 21.29 E	2380.92@ 179.49	1.39
11578.00	90.13	178.22	9245.54	95.00	2475.86	2475.75 S 24.80 E	2475.87@ 179.43	1.98
11673.00	91.80	179.11	9243.93	95.00	2570.83	2570.70 S 27.01 E	2570.84@ 179.40	1.99
11767.00	91.63	177.78	9241.12	94.00	2664.76	2664.62 S 29.56 E	2664.79@ 179.36	1.43
11862.00	91.01	176.59	9238.93	95.00	2759.65	2759.48 S 34.22 E	2759.69@ 179.29	1.41

PathFinder – a Schlumberger company

Survey Report

COG OPERATING LLC.
LUSK DEEP UNIT A29H
LEA COUNTY, NM
API#: 30-025-41563

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		Closure Dist Dir		DLS
						(ft)	(ft)	(ft)	(deg)	(dg/100ft)
11957.00	90.84	177.63	9237.40	95.00	2854.55	2854.35 S	39.01 E	2854.61@	179.22	1.11
12077.00	90.84	178.23	9235.64	120.00	2974.48	2974.25 S	43.35 E	2974.57@	179.17	0.50
12172.00	90.22	180.34	9234.76	95.00	3069.47	3069.24 S	44.53 E	3069.56@	179.17	2.32
12267.00	90.31	179.99	9234.32	95.00	3164.46	3164.24 S	44.26 E	3164.55@	179.20	0.38
12362.00	89.96	179.64	9234.10	95.00	3259.46	3259.23 S	44.56 E	3259.54@	179.22	0.52
12457.00	89.60	178.41	9234.46	95.00	3354.46	3354.22 S	46.18 E	3354.54@	179.21	1.35
12552.00	88.55	177.27	9236.00	95.00	3449.39	3449.14 S	49.76 E	3449.49@	179.17	1.63
12647.00	88.90	178.85	9238.11	95.00	3544.33	3544.05 S	52.98 E	3544.45@	179.14	1.70
12742.00	89.96	179.73	9239.06	95.00	3639.32	3639.04 S	54.15 E	3639.44@	179.15	1.45
12837.00	89.52	179.20	9239.49	95.00	3734.32	3734.03 S	55.04 E	3734.44@	179.16	0.72
12932.00	90.48	179.55	9239.49	95.00	3829.32	3829.03 S	56.08 E	3829.44@	179.16	1.08
13027.00	89.25	177.88	9239.71	95.00	3924.30	3924.00 S	58.21 E	3924.43@	179.15	2.18
13122.00	89.43	179.38	9240.81	95.00	4019.28	4018.96 S	60.48 E	4019.42@	179.14	1.59
13217.00	90.22	181.13	9241.10	95.00	4114.27	4113.96 S	60.06 E	4114.39@	179.16	2.02
13312.00	89.60	180.17	9241.24	95.00	4209.25	4208.95 S	58.98 E	4209.36@	179.20	1.20
13407.00	89.34	180.08	9242.12	95.00	4304.24	4303.94 S	58.77 E	4304.35@	179.22	0.29
13503.00	89.60	179.73	9243.01	96.00	4400.24	4399.94 S	58.93 E	4400.33@	179.23	0.45
13598.00	89.87	178.76	9243.45	95.00	4495.23	4494.93 S	60.18 E	4495.33@	179.23	1.06
STRAIGHT LINE PROJECTION TO BIT AT 13698'MD.										
13698.00	89.87	178.76	9243.68	100.00	4595.22	4594.91 S	62.35 E	4595.33@	179.22	0.00