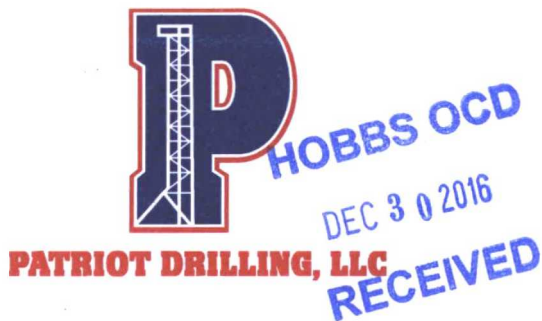




OPERATOR: COG Operating, LLC
WELL/LEASE: Lusk Deep Unit A 31H
COUNTY: Lea Co., New Mexico
Sec. 20, T 19S, R 32E

STATE OF NEW MEXICO
DEVIATION REPORT

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
574	1/2	5,462	1/2
1,087	1	5,839	3/4
1,464	1 1/4	6,217	1
1,841	1 1/4	6,596	1
2,218	2	6,973	1 1/4
2,538	3/4	7,537	1 1/2
3,009	1 1/4	7,916	1 1/4
3,573	1 1/2	8,394	1
3,949	1 1/2	8,583	1
4,519	1/4	8,770	1/2
5,085	1/4		

Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-President

The foregoing instrument was acknowledged before me on this 21st day of July 2016 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



SURVEY CERTIFICATION FORM

3610 Elkins Road Midland, TX 79705 t:432-684-0057 f: 432-686-7964



PHOENIX
TECHNOLOGY SERVICES

Company: COG

Job #: 1610305

Well Name: Lusk Deep Unit A31H

County/State: Lea / NM

Survey Instrument Type: North Seek Rate Gyro

API #: 30-025-43124

TIE-IN DATA

Measure Depth (ft)	Vertical Depth (ft)	Inclination (°)	Azimuth (°)	N-S Coordinates	E-W Coordinates	Data Source
0	0	0	0	0	0	Surface

First Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2016-07-04	0	0	0

Last Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2016-07-04	845	0.62	246.23

Projected TD Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
0	0	0	0

Grid Correction
-0.3

Gyro Operator: Phoenix Technology Services USA Ltd.

Gyro Supervisor: Jaime Stephenson

To the best of my knowledge I certify this survey data to be correct and true

Date:

07-04-16

Print Name: Noe Garza

Signature:



Company: COG
 Well: Lusk Deep Unit A31H
 Location: Lea Co., NM
 Rig: Patriot 2

Job Number: 160305
 Grid Corr.: -0.30
 Lat: 32.65
 Long: -103.78

Date: 07-04-16
 Calculation Method: Minimum Curvature
 Proposed Azimuth:
 RKB - MSL in feet: 20 Feet
 Tie Into: Surface

Survey Tool Type	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Angle (deg)			
Enter Tie-In Survey on Line 10													
FIELD COPY, NON-DEFINITIVE													
TIE IN	0			0	0	0	0	0					
Gyro	100.00	0.44	352.38	100	100.00	0.38	0.38 N	0.05 W	0.38	352.38	0.44	0.44	352.38
	200.00	0.52	358.48	100	200.00	1.21	1.21 N	0.11 W	1.22	354.65	0.09	0.08	6.10
	300.00	0.48	350.26	100	299.99	2.08	2.08 N	0.20 W	2.09	354.60	0.08	-0.04	-8.22
	400.00	0.40	351.23	100	399.99	2.84	2.84 N	0.32 W	2.86	353.55	0.08	-0.08	0.97
	500.00	0.18	261.88	100	499.99	3.16	3.16 N	0.53 W	3.21	350.49	0.44	-0.22	-89.35
	600.00	0.40	245.88	100	599.99	3.00	3.00 N	1.00 W	3.16	341.48	0.23	0.22	-16.00
	700.00	0.54	260.68	100	699.98	2.78	2.78 N	1.79 W	3.30	327.24	0.18	0.14	14.80
	800.00	0.59	250.06	100	799.98	2.53	2.53 N	2.74 W	3.72	312.71	0.12	0.05	-10.62
	845.00	0.62	246.23	45	844.98	2.35	2.35 N	3.18 W	3.95	306.48	0.11	0.07	-8.51



COG Operating L L C

Lea County, NM (NAD27 NME)

Sec. 20, T 19 S. , R 32 E

Lusk Deep Unit A 31H

Wellbore #1

Design: Wellbore #1

Standard Survey Report

18 July, 2016

HOBBS OCD

DEC 30 2016

RECEIVED





Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Lusk Deep Unit A 31H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3609.81ft (Patriot 2)
Site:	Sec. 20, T 19 S. , R 32 E	MD Reference:	KB=20' @ 3609.81ft (Patriot 2)
Well:	Lusk Deep Unit A 31H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Project	Lea County, NM (NAD27 NME)		
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	Sec. 20, T 19 S. , R 32 E		
Site Position:		Northing:	601,134.10 usft
From:	Map	Easting:	670,337.90 usft
Position Uncertainty:	5.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 39' 5.037 N
		Longitude:	103° 46' 47.648 W
		Grid Convergence:	0.30 °

Well	Lusk Deep Unit A 31H		
Well Position	+N/-S	0.00 ft	Northing: 601,244.00 usft
	+E/-W	0.00 ft	Easting: 670,337.20 usft
Position Uncertainty	5.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 39' 6.125 N
		Longitude:	103° 46' 47.649 W
		Ground Level:	3,589.81 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	5/4/2016	7.20	60.44	48,284

Design	Wellbore #1			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	271.72°

Survey Program	Date 7/18/2016			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100.00	845.00	Gyros (Wellbore #1)	NS-GYRO-MS	North sensing gyrocompassing m/s
929.00	14,127.00	IDS MWD Surveys (Wellbore #1)	MWD	MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.44	352.38	100.00	0.38	-0.05	0.06	0.44	0.44	0.00	
200.00	0.52	358.48	200.00	1.21	-0.11	0.15	0.09	0.08	6.10	
300.00	0.48	350.26	299.99	2.08	-0.20	0.26	0.08	-0.04	-8.22	
400.00	0.40	351.23	399.99	2.84	-0.32	0.41	0.08	-0.08	0.97	
500.00	0.18	261.88	499.99	3.16	-0.53	0.62	0.44	-0.22	-89.35	
600.00	0.40	245.88	599.99	3.00	-1.00	1.09	0.23	0.22	-16.00	
700.00	0.54	260.68	699.98	2.78	-1.79	1.87	0.18	0.14	14.80	
800.00	0.59	250.06	799.98	2.53	-2.74	2.81	0.12	0.05	-10.62	
845.00	0.62	246.23	844.98	2.35	-3.18	3.25	0.11	0.07	-8.51	



Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Lusk Deep Unit A 31H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3609.81ft (Patriot 2)
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Well:	Lusk Deep Unit A 31H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
929.00	1.10	248.80	928.97	1.87	-4.34	4.40	0.57	0.57	3.06
First IDS MWD Survey									
1,087.00	1.00	230.40	1,086.94	0.45	-6.82	6.83	0.22	-0.06	-11.65
1,275.00	1.00	231.60	1,274.91	-1.62	-9.37	9.32	0.01	0.00	0.64
1,463.00	1.10	228.30	1,462.88	-3.84	-12.00	11.88	0.06	0.05	-1.76
1,652.00	1.10	208.50	1,651.85	-6.64	-14.22	14.02	0.20	0.00	-10.48
1,841.00	1.10	171.90	1,840.81	-10.03	-14.83	14.53	0.37	0.00	-19.37
2,029.00	1.60	123.60	2,028.77	-13.27	-12.39	11.99	0.64	0.27	-25.69
2,218.00	1.80	120.90	2,217.68	-16.25	-7.65	7.16	0.11	0.11	-1.43
2,349.00	1.40	40.10	2,348.65	-16.08	-4.85	4.37	1.60	-0.31	-61.68
2,443.00	0.10	126.30	2,442.64	-15.26	-4.05	3.59	1.49	-1.38	91.70
2,538.00	0.70	186.00	2,537.63	-15.88	-4.04	3.56	0.69	0.63	62.84
2,632.00	0.60	194.50	2,631.63	-16.93	-4.22	3.71	0.15	-0.11	9.04
2,821.00	0.90	194.90	2,820.61	-19.32	-4.85	4.27	0.16	0.16	0.21
3,009.00	1.10	197.40	3,008.58	-22.47	-5.77	5.10	0.11	0.11	1.33
3,197.00	1.40	193.50	3,196.54	-26.43	-6.85	6.05	0.17	0.16	-2.07
3,385.00	1.20	196.40	3,384.49	-30.55	-7.94	7.02	0.11	-0.11	1.54
3,573.00	1.30	206.00	3,572.44	-34.35	-9.43	8.40	0.12	0.05	5.11
3,761.00	1.20	214.90	3,760.40	-37.88	-11.49	10.35	0.12	-0.05	4.73
3,949.00	1.30	209.20	3,948.36	-41.36	-13.66	12.41	0.08	0.05	-3.03
4,137.00	0.90	206.90	4,136.32	-44.54	-15.37	14.02	0.21	-0.21	-1.22
4,260.00	0.40	238.70	4,259.31	-45.62	-16.17	14.79	0.49	-0.41	25.85
4,361.00	0.20	222.20	4,360.31	-45.94	-16.59	15.20	0.21	-0.20	-16.34
4,519.00	0.10	233.60	4,518.31	-46.22	-16.89	15.49	0.07	-0.06	7.22
4,707.00	0.30	316.40	4,706.31	-45.96	-17.36	15.97	0.16	0.11	44.04
4,896.00	0.20	305.20	4,895.31	-45.41	-17.97	16.60	0.06	-0.05	-5.93
5,085.00	0.20	273.60	5,084.31	-45.20	-18.57	17.20	0.06	0.00	-16.72
5,273.00	0.40	244.90	5,272.30	-45.46	-19.49	18.12	0.13	0.11	-15.27
5,462.00	0.50	279.60	5,461.30	-45.60	-20.90	19.52	0.15	0.05	18.36
5,650.00	1.00	264.70	5,649.28	-45.62	-23.34	21.96	0.28	0.27	-7.93
5,839.00	0.70	270.00	5,838.26	-45.77	-26.14	24.75	0.16	-0.16	2.80
6,028.00	1.00	263.40	6,027.24	-45.96	-28.93	27.54	0.17	0.16	-3.49
6,217.00	0.90	211.70	6,216.22	-47.41	-31.35	29.91	0.44	-0.05	-27.35
6,406.00	0.70	215.30	6,405.20	-49.62	-32.80	31.29	0.11	-0.11	1.90
6,595.00	0.80	221.40	6,594.18	-51.55	-34.34	32.77	0.07	0.05	3.23
6,784.00	0.90	239.50	6,783.16	-53.29	-36.49	34.87	0.15	0.05	9.58
6,973.00	1.10	233.40	6,972.13	-55.13	-39.22	37.55	0.12	0.11	-3.23
7,161.00	1.10	230.30	7,160.10	-57.36	-42.06	40.32	0.03	0.00	-1.65
7,349.00	1.80	259.00	7,348.04	-59.07	-46.35	44.55	0.53	0.37	15.27
7,537.00	1.50	135.30	7,536.00	-61.39	-47.52	45.65	1.55	-0.16	-65.80
7,727.00	1.40	93.00	7,725.95	-63.28	-43.45	41.53	0.55	-0.05	-22.26
7,916.00	1.20	87.10	7,914.90	-63.30	-39.17	37.25	0.13	-0.11	-3.12
8,111.00	1.00	58.60	8,109.86	-62.31	-35.67	33.79	0.29	-0.10	-14.62



Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Lusk Deep Unit A 31H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3609.81ft (Patriot 2)
Site:	Sec. 20, T 19 S. , R 32 E	MD Reference:	KB=20' @ 3609.81ft (Patriot 2)
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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,205.00	1.00	41.40	8,203.85	-61.26	-34.43	32.58	0.32	0.00	-18.30
8,300.00	1.10	52.20	8,298.83	-60.08	-33.16	31.35	0.23	0.11	11.37
8,394.00	1.00	93.30	8,392.82	-59.58	-31.63	29.83	0.79	-0.11	43.72
8,489.00	0.80	112.50	8,487.81	-59.88	-30.19	28.38	0.38	-0.21	20.21
8,583.00	0.80	126.30	8,581.80	-60.52	-29.06	27.23	0.20	0.00	14.68
8,678.00	0.60	128.80	8,676.79	-61.22	-28.13	26.28	0.21	-0.21	2.63
8,770.00	0.50	123.70	8,768.79	-61.75	-27.42	25.56	0.12	-0.11	-5.54
8,787.00	0.30	150.80	8,785.79	-61.83	-27.34	25.47	1.59	-1.18	159.41
8,819.00	1.20	246.80	8,817.78	-62.03	-27.61	25.73	3.96	2.81	300.00
8,850.00	4.40	264.10	8,848.74	-62.28	-29.09	27.21	10.56	10.32	55.81
8,882.00	8.00	270.00	8,880.55	-62.41	-32.54	30.65	11.41	11.25	18.44
8,913.00	11.50	272.70	8,911.10	-62.26	-37.78	35.90	11.38	11.29	8.71
8,945.00	14.50	277.00	8,942.27	-61.62	-44.95	43.08	9.84	9.38	13.44
8,976.00	17.30	277.90	8,972.09	-60.52	-53.37	51.53	9.07	9.03	2.90
9,008.00	20.70	276.10	9,002.34	-59.26	-63.71	61.90	10.78	10.63	-5.63
9,039.00	24.40	274.90	9,030.96	-58.13	-75.54	73.76	12.03	11.94	-3.87
9,071.00	28.30	273.40	9,059.63	-57.12	-89.70	87.95	12.36	12.19	-4.69
9,102.00	31.90	272.90	9,086.45	-56.27	-105.22	103.49	11.64	11.61	-1.61
9,134.00	35.20	271.40	9,113.11	-55.61	-122.89	121.17	10.63	10.31	-4.69
9,163.00	38.90	270.40	9,136.26	-55.35	-140.36	138.64	12.93	12.76	-3.45
9,195.00	42.90	270.00	9,160.44	-55.28	-161.31	159.58	12.53	12.50	-1.25
9,226.00	46.80	270.30	9,182.41	-55.22	-183.17	181.43	12.60	12.58	0.97
9,258.00	50.50	271.60	9,203.55	-54.81	-207.18	205.44	11.96	11.56	4.06
9,289.00	54.20	272.30	9,222.48	-53.97	-231.70	229.98	12.07	11.94	2.26
9,321.00	57.50	272.30	9,240.44	-52.91	-258.16	256.46	10.31	10.31	0.00
9,352.00	60.40	272.90	9,256.43	-51.70	-284.69	283.01	9.50	9.35	1.94
9,384.00	63.00	273.20	9,271.60	-50.20	-312.82	311.17	8.17	8.13	0.94
9,415.00	66.30	272.30	9,284.87	-48.86	-340.80	339.18	10.96	10.65	-2.90
9,447.00	69.70	271.60	9,296.86	-47.85	-370.45	368.85	10.82	10.63	-2.19
9,478.00	73.10	271.00	9,306.74	-47.19	-399.82	398.22	11.12	10.97	-1.94
9,510.00	75.70	270.50	9,315.35	-46.79	-430.63	429.04	8.26	8.13	-1.56
9,541.00	78.90	271.50	9,322.16	-46.26	-460.87	459.27	10.79	10.32	3.23
9,573.00	80.90	272.10	9,327.77	-45.27	-492.35	490.77	6.52	6.25	1.88
9,604.00	82.90	272.40	9,332.14	-44.06	-523.02	521.46	6.52	6.45	0.97
9,638.00	85.10	271.80	9,335.70	-42.82	-556.81	555.27	6.70	6.47	-1.76
9,670.00	87.00	271.70	9,337.90	-41.85	-588.72	587.19	5.95	5.94	-0.31
9,764.00	88.60	272.70	9,341.51	-38.24	-682.57	681.12	2.01	1.70	1.06
9,859.00	89.30	273.40	9,343.25	-33.19	-777.42	776.07	1.04	0.74	0.74
9,953.00	89.50	274.30	9,344.23	-26.88	-871.20	870.00	0.98	0.21	0.96
10,048.00	90.60	274.40	9,344.15	-19.67	-965.93	964.90	1.16	1.16	0.11
10,142.00	91.60	275.30	9,342.35	-11.73	-1,059.57	1,058.74	1.43	1.06	0.96
10,237.00	91.00	275.50	9,340.19	-2.79	-1,154.13	1,153.52	0.67	-0.63	0.21
10,331.00	91.20	275.10	9,338.39	5.89	-1,247.71	1,247.32	0.48	0.21	-0.43



Integrity Directional Services, LLC
Survey Report



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Well:	Lusk Deep Unit A 31H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,426.00	91.40	274.40	9,336.23	13.76	-1,342.35	1,342.16	0.77	0.21	-0.74
10,520.00	90.70	273.30	9,334.51	20.07	-1,436.12	1,436.08	1.39	-0.74	-1.17
10,615.00	89.90	271.20	9,334.01	23.80	-1,531.04	1,531.07	2.37	-0.84	-2.21
10,709.00	89.70	271.00	9,334.34	25.60	-1,625.03	1,625.06	0.30	-0.21	-0.21
10,804.00	90.80	272.00	9,333.92	28.09	-1,719.99	1,720.06	1.56	1.16	1.05
10,898.00	91.00	272.70	9,332.45	31.94	-1,813.90	1,814.04	0.77	0.21	0.74
10,993.00	90.50	274.00	9,331.20	37.49	-1,908.73	1,908.99	1.47	-0.53	1.37
11,087.00	90.50	273.30	9,330.38	43.48	-2,002.53	2,002.93	0.74	0.00	-0.74
11,182.00	90.70	272.20	9,329.39	48.03	-2,097.41	2,097.91	1.18	0.21	-1.16
11,276.00	91.80	270.80	9,327.34	50.49	-2,191.36	2,191.88	1.89	1.17	-1.49
11,371.00	92.90	271.10	9,323.44	52.07	-2,286.26	2,286.79	1.20	1.16	0.32
11,465.00	91.80	271.20	9,319.59	53.95	-2,380.16	2,380.71	1.18	-1.17	0.11
11,560.00	91.90	271.60	9,316.52	56.27	-2,475.08	2,475.66	0.43	0.11	0.42
11,654.00	91.30	272.20	9,313.90	59.39	-2,569.00	2,569.62	0.90	-0.64	0.64
11,748.00	91.90	273.30	9,311.27	63.90	-2,662.85	2,663.57	1.33	0.64	1.17
11,843.00	91.90	272.60	9,308.12	68.78	-2,757.67	2,758.49	0.74	0.00	-0.74
11,937.00	91.90	271.60	9,305.01	72.23	-2,851.55	2,852.44	1.06	0.00	-1.06
12,032.00	90.60	271.00	9,302.93	74.38	-2,946.50	2,947.41	1.51	-1.37	-0.63
12,126.00	90.20	271.20	9,302.28	76.18	-3,040.48	3,041.40	0.48	-0.43	0.21
12,221.00	91.10	272.40	9,301.20	79.17	-3,135.43	3,136.39	1.58	0.95	1.26
12,316.00	91.60	272.10	9,298.96	82.90	-3,230.33	3,231.36	0.61	-0.53	-0.32
12,410.00	91.40	271.50	9,296.50	85.85	-3,324.25	3,325.33	0.67	-0.21	-0.64
12,505.00	90.90	270.10	9,294.59	87.17	-3,419.22	3,420.29	1.56	-0.53	-1.47
12,599.00	91.50	270.80	9,292.63	87.91	-3,513.19	3,514.25	0.98	0.64	0.74
12,694.00	92.00	272.10	9,289.72	90.31	-3,608.12	3,609.20	1.47	0.53	1.37
12,788.00	91.10	272.60	9,287.18	94.17	-3,702.00	3,703.16	1.10	-0.96	0.53
12,883.00	90.70	272.10	9,285.69	98.06	-3,796.91	3,798.14	0.67	-0.42	-0.53
12,977.00	90.90	271.80	9,284.38	101.26	-3,890.85	3,892.13	0.38	0.21	-0.32
13,072.00	90.10	271.80	9,283.55	104.24	-3,985.80	3,987.13	0.84	-0.84	0.00
13,167.00	90.10	271.30	9,283.38	106.81	-4,080.76	4,082.13	0.53	0.00	-0.53
13,261.00	90.10	270.90	9,283.22	108.62	-4,174.74	4,176.12	0.43	0.00	-0.43
13,355.00	91.00	271.50	9,282.32	110.59	-4,268.72	4,270.11	1.15	0.96	0.64
13,450.00	92.00	273.00	9,279.83	114.32	-4,363.61	4,365.07	1.90	1.05	1.58
13,544.00	91.60	272.50	9,276.88	118.82	-4,457.45	4,459.01	0.68	-0.43	-0.53
13,639.00	91.70	271.40	9,274.14	122.05	-4,552.36	4,553.97	1.16	0.11	-1.16
13,733.00	92.30	270.50	9,270.86	123.61	-4,646.28	4,647.90	1.15	0.64	-0.96
13,828.00	92.20	270.30	9,267.13	124.27	-4,741.21	4,742.80	0.24	-0.11	-0.21
13,922.00	91.10	270.10	9,264.42	124.60	-4,835.17	4,836.73	1.19	-1.17	-0.21
14,053.00	91.80	271.20	9,261.11	126.09	-4,966.11	4,967.66	1.00	0.53	0.84
Final IDS MWD Survey									
14,127.00	91.80	271.20	9,258.79	127.64	-5,040.06	5,041.62	0.00	0.00	0.00
Projection to TD									



Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Lusk Deep Unit A 31H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3609.81ft (Patriot 2)
Site:	Sec. 20, T 19 S. , R 32 E	MD Reference:	KB=20' @ 3609.81ft (Patriot 2)
Well:	Lusk Deep Unit A 31H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
929.00	928.97	1.87	-4.34	First IDS MWD Survey
14,053.00	9,261.11	126.09	-4,966.11	Final IDS MWD Survey
14,127.00	9,258.79	127.64	-5,040.06	Projection to TD

Checked By: _____ Approved By: _____ Date: _____