



January 13, 2015

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

HOBBS OCD

MAR 19 2015

RECEIVED

Attn: Kanicia Castillo

RE: **Lusk Deep Unit A No 032H**

Please find enclosed a copy of the survey from 0.00' to 8600.00' ran on the above referenced well.

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

Sincerely,

Keith Havelka
Operations

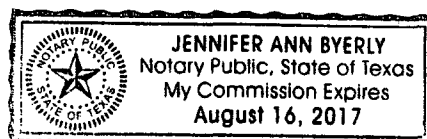
STATE OF TEXAS §

§

COUNTY OF NUECES §

This instrument was acknowledged before me on the 13 day of January, A.D., 2015, by Keith Havelka.

Jennifer Ann Byerly
Notary Public, State of Texas



MAR 26 2015

1m



Company: COG Operating
Lease/Well: LUSK DEEP UNIT A/No 032H

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



Depth Reference : RKB= 17.5 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 1/13/2015 / 14:45

VES Survey International
West Texas
(432) 563-5444

Surveyor: Jordan Shelleby
Lusk Deep Unit A No 032H / API 30-025-42210

HOBBS OGD

MAR 19 2015

RECEIVED

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	0.44	94.66	100.00	-0.03	0.39	-0.03	0.39	94.66	0.44
200.00	0.12	308.55	200.00	0.00	0.69	0.00	0.69	89.97	0.54
300.00	0.50	86.05	300.00	0.09	1.05	0.09	1.05	84.90	0.59
400.00	0.72	28.53	399.99	0.68	1.79	0.68	1.92	69.23	0.62
500.00	0.42	6.34	499.99	1.60	2.13	1.60	2.67	53.16	0.37
600.00	0.43	303.63	599.98	2.17	1.86	2.17	2.86	40.53	0.44
700.00	0.26	272.18	699.98	2.39	1.32	2.39	2.73	28.87	0.25
800.00	0.28	253.25	799.98	2.33	0.86	2.33	2.48	20.24	0.09
900.00	0.25	153.37	899.98	2.06	0.72	2.06	2.18	19.29	0.41
1000.00	0.75	97.92	999.98	1.77	1.46	1.77	2.30	39.58	0.64
1100.00	1.08	107.29	1099.96	1.40	3.00	1.40	3.32	64.97	0.36
1200.00	0.95	90.53	1199.95	1.12	4.73	1.12	4.86	76.72	0.32
1300.00	1.48	93.27	1299.93	1.04	6.85	1.04	6.93	81.40	0.53
1400.00	1.70	104.07	1399.89	0.60	9.57	0.60	9.59	86.40	0.37
1500.00	1.41	115.09	1499.85	-0.28	12.12	-0.28	12.13	91.32	0.42
1600.00	0.29	118.65	1599.84	-0.92	13.46	-0.92	13.49	93.92	1.11
1700.00	0.31	110.37	1699.84	-1.14	13.94	-1.14	13.99	94.68	0.05
1800.00	1.39	59.41	1799.83	-0.62	15.24	-0.62	15.25	92.32	1.22

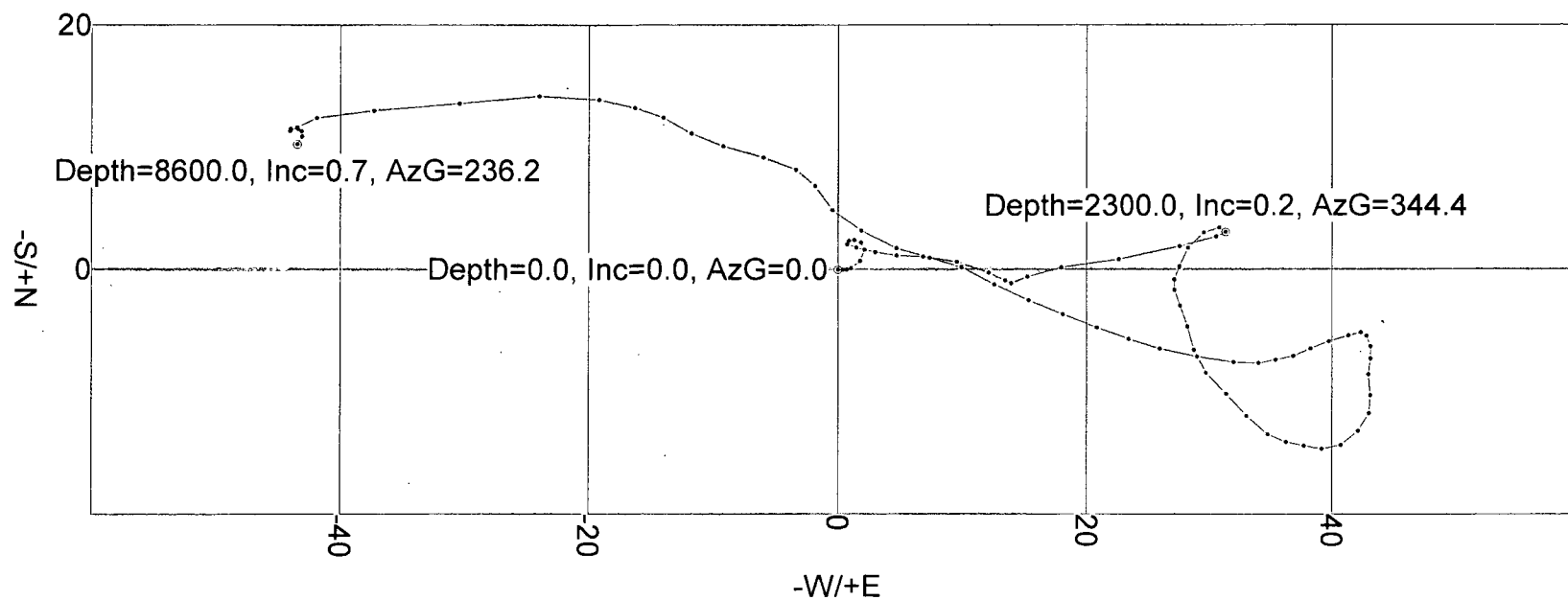
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	1.94	85.17	1899.78	0.15	17.98	0.15	17.98	89.53	0.92
2000.00	3.35	79.94	1999.68	0.80	22.54	0.80	22.56	87.97	1.42
2100.00	2.57	75.15	2099.54	1.88	27.58	1.88	27.65	86.09	0.81
2200.00	0.96	75.82	2199.49	2.66	30.57	2.66	30.68	85.02	1.61
2300.00	0.21	344.42	2299.49	3.05	31.33	3.05	31.47	84.44	0.99
2400.00	0.58	288.50	2399.48	3.39	30.80	3.39	30.98	83.72	0.49
2500.00	1.08	234.77	2499.47	3.01	29.55	3.01	29.70	84.19	0.87
2600.00	1.02	214.90	2599.46	1.73	28.27	1.73	28.32	86.49	0.37
2700.00	0.92	194.53	2699.44	0.23	27.56	0.23	27.56	89.51	0.36
2800.00	0.43	214.65	2799.44	-0.85	27.15	-0.85	27.16	91.78	0.54
2900.00	0.68	157.03	2899.43	-1.70	27.17	-1.70	27.22	93.57	0.58
3000.00	0.88	164.70	2999.42	-2.98	27.60	-2.98	27.76	96.16	0.23
3100.00	1.21	157.46	3099.41	-4.70	28.21	-4.70	28.60	99.45	0.36
3200.00	1.07	172.35	3199.39	-6.60	28.74	-6.60	29.49	102.94	0.33
3300.00	1.46	137.71	3299.36	-8.48	29.72	-8.48	30.91	105.92	0.84
3400.00	1.27	134.25	3399.34	-10.19	31.38	-10.19	32.99	108.00	0.21
3500.00	1.53	139.47	3499.31	-11.98	33.04	-11.98	35.14	109.93	0.29
3600.00	1.15	120.82	3599.28	-13.51	34.77	-13.51	37.30	111.24	0.57
3700.00	0.75	96.97	3699.26	-14.11	36.28	-14.11	38.93	111.25	0.56
3800.00	0.95	106.69	3799.25	-14.43	37.72	-14.43	40.38	110.93	0.25
3900.00	0.76	91.75	3899.24	-14.68	39.18	-14.68	41.84	110.54	0.29
4000.00	1.09	69.99	3999.23	-14.38	40.74	-14.38	43.20	109.44	0.47
4100.00	1.14	31.95	4099.21	-13.21	42.16	-13.21	44.18	107.40	0.73
4200.00	0.79	30.28	4199.20	-11.77	43.03	-11.77	44.61	105.29	0.35
4300.00	1.02	344.88	4299.19	-10.31	43.15	-10.31	44.36	103.44	0.73
4400.00	0.97	4.31	4399.17	-8.61	42.98	-8.61	43.83	101.33	0.34
4500.00	0.53	14.91	4499.16	-7.32	43.16	-7.32	43.78	99.63	0.45
4600.00	0.65	348.37	4599.16	-6.31	43.17	-6.31	43.63	98.32	0.29
4700.00	0.41	324.78	4699.15	-5.47	42.85	-5.47	43.19	97.27	0.32
4800.00	0.31	269.87	4799.15	-5.18	42.37	-5.18	42.68	96.97	0.34
4900.00	0.92	250.52	4899.15	-5.44	41.34	-5.44	41.70	97.50	0.63
5000.00	0.99	256.97	4999.13	-5.91	39.75	-5.91	40.18	98.45	0.13
5100.00	0.88	238.17	5099.12	-6.51	38.25	-6.51	38.80	99.65	0.33
5200.00	0.87	254.51	5199.11	-7.11	36.87	-7.11	37.55	100.92	0.25
5300.00	0.86	260.83	5299.10	-7.43	35.40	-7.43	36.17	101.86	0.10
5400.00	0.76	258.41	5399.09	-7.69	34.01	-7.69	34.86	102.74	0.10
5500.00	1.58	279.01	5499.06	-7.61	31.99	-7.61	32.88	103.38	0.91
5600.00	1.88	278.21	5599.02	-7.15	28.99	-7.15	29.86	103.86	0.30
5700.00	1.69	286.19	5698.97	-6.51	25.95	-6.51	26.76	104.08	0.31

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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	1.37	288.87	5798.93	-5.71	23.41	-5.71	24.09	103.71	0.33
5900.00	1.77	291.24	5898.90	-4.76	20.83	-4.76	21.37	102.88	0.41
6000.00	1.61	291.92	5998.85	-3.68	18.09	-3.68	18.46	101.50	0.17
6100.00	1.80	293.20	6098.81	-2.54	15.35	-2.54	15.56	99.39	0.20
6200.00	1.70	296.87	6198.76	-1.25	12.59	-1.25	12.65	95.68	0.15
6300.00	1.74	300.10	6298.72	0.18	9.95	0.18	9.95	88.98	0.11
6400.00	1.45	269.73	6398.68	0.93	7.37	0.93	7.43	82.78	0.88
6500.00	1.82	299.80	6498.64	1.72	4.72	1.72	5.02	70.01	0.92
6600.00	1.84	293.88	6598.59	3.16	1.87	3.16	3.67	30.65	0.19
6700.00	1.54	320.44	6698.55	4.84	-0.45	4.84	4.86	354.66	0.83
6800.00	1.25	329.86	6798.52	6.82	-1.86	6.82	7.07	344.79	0.36
6900.00	1.21	291.75	6898.50	8.16	-3.39	8.16	8.84	337.45	0.81
7000.00	2.00	290.23	6998.46	9.16	-6.01	9.16	10.95	326.72	0.79
7100.00	1.82	281.11	7098.40	10.07	-9.21	10.07	13.64	317.56	0.35
7200.00	1.42	306.05	7198.36	11.10	-11.77	11.10	16.18	313.34	0.80
7300.00	1.57	294.71	7298.33	12.41	-14.01	12.41	18.72	311.52	0.33
7400.00	1.22	283.18	7398.30	13.22	-16.29	13.22	20.98	309.06	0.45
7500.00	2.15	282.43	7498.25	13.87	-19.16	13.87	23.65	305.89	0.94
7600.00	3.48	267.87	7598.13	14.16	-24.03	14.16	27.89	300.51	1.49
7700.00	3.96	262.18	7697.92	13.58	-30.48	13.58	33.36	294.01	0.60
7800.00	3.95	267.79	7797.69	12.97	-37.33	12.97	39.52	289.16	0.39
7900.00	1.39	248.31	7897.57	12.39	-41.90	12.39	43.70	286.48	2.68
8000.00	0.61	231.25	7997.55	11.61	-43.44	11.61	44.97	284.96	0.82
8100.00	0.20	289.21	8097.55	11.33	-44.03	11.33	45.46	284.44	0.54
8200.00	0.28	63.48	8197.55	11.50	-43.98	11.50	45.46	284.65	0.44
8300.00	0.42	106.37	8297.55	11.51	-43.41	11.51	44.91	284.84	0.29
8400.00	0.13	208.01	8397.55	11.30	-43.12	11.30	44.57	284.69	0.46
8500.00	0.39	163.78	8497.55	10.88	-43.07	10.88	44.43	284.18	0.31
8600.00	0.65	236.19	8597.54	10.24	-43.45	10.24	44.64	283.26	0.65



VES Survey International
West Texas
(432) 563-5444
Surveyor: Jordan Shelleby
Lusk Deep Unit A No 032H / API 30-025-42210



VES Survey Date: 12/27/2014



Survey Report - Geographic



HOBBS OCD

Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Lusk Deep Unit A
Well: Lusk Deep Unit A Well No. 32H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference: Well Lusk Deep Unit A Well No. 32H
TVD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
MD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Dbase Nov0914

MAR 19 2015

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Project: Lea County, New Mexico
Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site: Lusk Deep Unit A

Site Position: Northing: 599,764.20 usft Latitude: 32.64763363
From: Map Easting: 670,347.80 usft Longitude: -103.77989322
Position Uncertainty: 0.00 usft Slot Radius: 13-3/16 " Grid Convergence: 0.30 °

Well: Lusk Deep Unit A Well No. 32H, Surf Loc: 1980 FSL 400 FWL Sect 20

Well Position: +N/-S 0.00 usft Northing: 598,427.50 usft Latitude: 32.64402571
+E/-W 0.00 usft Easting: 665,657.50 usft Longitude: -103.79515288
Position Uncertainty: 0.00 usft Wellhead Elevation: usft Ground Level: 3,573.10 usft

Wellbore: Original hole

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/15/2014	7.36	60.46	48,552

Design: Surveys Original hole

Audit Notes:

Version: 1.0 Phase: ACTUAL Tie On Depth: 0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	87.32

Survey Program Date: 1/5/2015

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	8,600.00	Gyro (Original hole)	NS-GYRO-MS	North sensing gyrocompassing m/s
8,714.00	13,601.00	MWD (Original hole)	MWD	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	598,427.50	665,657.50	32.64402571	-103.79515288
100.00	0.44	94.66	100.00	-0.03	0.38	598,427.47	665,657.89	32.64402562	-103.79515163
Gyro									
200.00	0.12	308.55	200.00	0.00	0.68	598,427.51	665,658.19	32.64402571	-103.79515065
300.00	0.50	86.05	300.00	0.10	1.04	598,427.60	665,658.54	32.64402597	-103.79514950
400.00	0.72	28.53	399.99	0.68	1.77	598,428.18	665,659.28	32.64402756	-103.79514711
500.00	0.42	6.34	499.99	1.60	2.11	598,429.10	665,659.62	32.64403007	-103.79514598
600.00	0.43	303.63	599.98	2.17	1.84	598,429.67	665,659.35	32.64403165	-103.79514686
700.00	0.26	272.18	699.98	2.39	1.30	598,429.89	665,658.81	32.64403225	-103.79514861
800.00	0.28	253.25	799.98	2.32	0.84	598,429.83	665,658.35	32.64403209	-103.79515010
900.00	0.25	153.37	899.98	2.06	0.70	598,429.56	665,658.21	32.64403136	-103.79515055

dm



Survey Report - Geographic



Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Lusk Deep Unit A
Well: Lusk Deep Unit A Well No. 32H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference: Well Lusk Deep Unit A Well No. 32H
TVD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
MD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Dbase Nov0914

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,000.00	0.75	97.92	999.98	1.77	1.45	598,429.28	665,658.96	32.64403057	-103.79514813
1,100.00	1.08	107.29	1,099.96	1.40	3.00	598,428.91	665,660.50	32.64402953	-103.79514311
1,200.00	0.95	90.53	1,199.95	1.11	4.73	598,428.62	665,662.23	32.64402871	-103.79513750
1,300.00	1.48	93.27	1,299.93	1.03	6.85	598,428.54	665,664.35	32.64402846	-103.79513062
1,400.00	1.70	104.07	1,399.89	0.60	9.57	598,428.10	665,667.08	32.64402723	-103.79512176
1,500.00	1.41	115.09	1,499.85	-0.28	12.13	598,427.22	665,669.63	32.64402477	-103.79511348
1,600.00	0.29	118.65	1,599.84	-0.93	13.46	598,426.58	665,670.97	32.64402298	-103.79510915
1,700.00	0.31	110.37	1,699.84	-1.14	13.94	598,426.36	665,671.44	32.64402238	-103.79510761
1,800.00	1.39	59.41	1,799.83	-0.62	15.24	598,426.88	665,672.74	32.64402380	-103.79510339
1,900.00	1.94	85.17	1,899.78	0.14	17.97	598,427.64	665,675.47	32.64402585	-103.79509450
2,000.00	3.35	79.94	1,999.68	0.79	22.53	598,428.30	665,680.04	32.64402758	-103.79507967
2,100.00	2.57	75.15	2,099.54	1.88	27.58	598,429.38	665,685.08	32.64403049	-103.79506326
2,200.00	0.96	75.82	2,199.49	2.66	30.56	598,430.16	665,688.06	32.64403260	-103.79505357
2,300.00	0.21	344.42	2,299.49	3.04	31.32	598,430.54	665,688.82	32.64403363	-103.79505108
2,400.00	0.58	288.50	2,399.48	3.38	30.79	598,430.88	665,688.29	32.64403457	-103.79505280
2,500.00	1.08	234.77	2,499.47	2.99	29.54	598,430.50	665,687.04	32.64403353	-103.79505686
2,600.00	1.02	214.90	2,599.46	1.72	28.26	598,429.22	665,685.76	32.64403005	-103.79506104
2,700.00	0.92	194.53	2,699.44	0.21	27.55	598,427.72	665,685.05	32.64402592	-103.79506337
2,800.00	0.43	214.65	2,799.44	-0.87	27.13	598,426.63	665,684.64	32.64402294	-103.79506474
2,900.00	0.68	157.03	2,899.43	-1.73	27.15	598,425.78	665,684.66	32.64402059	-103.79506469
3,000.00	0.88	164.70	2,999.42	-3.01	27.59	598,424.49	665,685.09	32.64401704	-103.79506330
3,100.00	1.21	157.46	3,099.41	-4.73	28.19	598,422.77	665,685.70	32.64401232	-103.79506136
3,200.00	1.07	172.35	3,199.39	-6.63	28.72	598,420.87	665,686.23	32.64400709	-103.79505967
3,300.00	1.46	137.71	3,299.36	-8.50	29.70	598,419.00	665,687.21	32.64400194	-103.79505651
3,400.00	1.27	134.25	3,399.34	-10.21	31.36	598,417.29	665,688.86	32.64399720	-103.79505118
3,500.00	1.53	139.47	3,499.31	-12.00	33.02	598,415.50	665,690.52	32.64399226	-103.79504581
3,600.00	1.15	120.82	3,599.28	-13.53	34.75	598,413.97	665,692.25	32.64398804	-103.79504022
3,700.00	0.75	96.97	3,699.26	-14.12	36.26	598,413.38	665,693.76	32.64398638	-103.79503532
3,800.00	0.95	106.69	3,799.25	-14.44	37.70	598,413.06	665,695.21	32.64398549	-103.79503063
3,900.00	0.76	91.75	3,899.24	-14.70	39.16	598,412.80	665,696.66	32.64398476	-103.79502590
4,000.00	1.09	69.99	3,999.23	-14.40	40.72	598,413.11	665,698.22	32.64398558	-103.79502084
4,100.00	1.14	31.95	4,099.21	-13.23	42.14	598,414.28	665,699.64	32.64398877	-103.79501621
4,200.00	0.79	30.28	4,199.20	-11.79	43.01	598,415.72	665,700.51	32.64399272	-103.79501335
4,300.00	1.02	344.88	4,299.19	-10.33	43.12	598,417.17	665,700.63	32.64399671	-103.79501295
4,400.00	0.97	4.31	4,399.17	-8.63	42.96	598,418.88	665,700.46	32.64400140	-103.79501347
4,500.00	0.53	14.91	4,499.16	-7.34	43.14	598,420.17	665,700.64	32.64400494	-103.79501285
4,600.00	0.65	348.37	4,599.16	-6.33	43.14	598,421.17	665,700.65	32.64400770	-103.79501282
4,700.00	0.41	324.78	4,699.15	-5.49	42.82	598,422.02	665,700.33	32.64401004	-103.79501385
4,800.00	0.31	269.87	4,799.15	-5.20	42.35	598,422.31	665,699.85	32.64401084	-103.79501539
4,900.00	0.92	250.52	4,899.15	-5.46	41.32	598,422.04	665,698.82	32.64401012	-103.79501874
5,000.00	0.99	256.97	4,999.13	-5.93	39.72	598,421.58	665,697.23	32.64400887	-103.79502394
5,100.00	0.88	238.17	5,099.12	-6.53	38.23	598,420.98	665,695.73	32.64400724	-103.79502880
5,200.00	0.87	254.51	5,199.11	-7.13	36.84	598,420.37	665,694.35	32.64400559	-103.79503331
5,300.00	0.86	260.83	5,299.10	-7.46	35.37	598,420.05	665,692.87	32.64400473	-103.79503810
5,400.00	0.76	258.41	5,399.09	-7.71	33.98	598,419.79	665,691.48	32.64400405	-103.79504262
5,500.00	1.58	279.01	5,499.06	-7.63	31.97	598,419.88	665,689.47	32.64400431	-103.79504915
5,600.00	1.88	278.21	5,599.02	-7.18	28.98	598,420.33	665,686.49	32.64400559	-103.79505884
5,700.00	1.69	286.19	5,698.97	-6.53	25.94	598,420.97	665,683.45	32.64400740	-103.79506870
5,800.00	1.37	288.87	5,798.94	-5.73	23.40	598,421.77	665,680.90	32.64400963	-103.79507697
5,900.00	1.77	291.24	5,898.90	-4.79	20.82	598,422.72	665,678.33	32.64401227	-103.79508530
6,000.00	1.61	291.92	5,998.85	-3.70	18.08	598,423.80	665,675.59	32.64401528	-103.79509419
6,100.00	1.80	293.20	6,098.81	-2.56	15.34	598,424.94	665,672.84	32.64401846	-103.79510310
6,200.00	1.70	296.87	6,198.76	-1.27	12.57	598,426.23	665,670.07	32.64402205	-103.79511206
6,300.00	1.74	300.10	6,298.72	0.16	9.93	598,427.66	665,667.44	32.64402602	-103.79512061
6,400.00	1.45	269.73	6,398.68	0.92	7.35	598,428.42	665,664.86	32.64402813	-103.79512897



Survey Report - Geographic



Company: COG Operating LLC Local Co-ordinate Reference: Well Lusk Deep Unit A Well No. 32H
Project: Lea County, New Mexico TVD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Site: Lusk Deep Unit A MD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Well: Lusk Deep Unit A Well No. 32H North Reference: Grid
Wellbore: Original hole Survey Calculation Method: Minimum Curvature
Design: Surveys Original hole Database: Dbase Nov0914

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,500.00	1.82	299.80	6,498.64	1.70	4.71	598,429.20	665,662.22	32.64403032	-103.79513755
6,600.00	1.84	293.88	6,598.59	3.14	1.86	598,430.64	665,659.37	32.64403432	-103.79514677
6,700.00	1.54	320.44	6,698.55	4.82	-0.46	598,432.33	665,657.05	32.64403898	-103.79515429
6,800.00	1.25	329.86	6,798.52	6.80	-1.86	598,434.31	665,655.64	32.64404444	-103.79515882
6,900.00	1.21	291.75	6,898.50	8.14	-3.39	598,435.64	665,654.11	32.64404813	-103.79516376
7,000.00	2.00	290.23	6,998.46	9.13	-6.01	598,436.64	665,651.50	32.64405090	-103.79517225
7,100.00	1.82	281.11	7,098.40	10.04	-9.21	598,437.55	665,648.30	32.64405345	-103.79518261
7,200.00	1.42	306.05	7,198.36	11.08	-11.77	598,438.58	665,645.74	32.64405633	-103.79519091
7,300.00	1.57	294.71	7,298.33	12.38	-14.01	598,439.88	665,643.49	32.64405994	-103.79519819
7,400.00	1.22	283.18	7,398.30	13.20	-16.29	598,440.70	665,641.21	32.64406221	-103.79520559
7,500.00	2.15	282.43	7,498.26	13.84	-19.16	598,441.35	665,638.34	32.64406403	-103.79521489
7,600.00	3.48	267.87	7,598.13	14.13	-24.03	598,441.64	665,633.48	32.64406489	-103.79523069
7,700.00	3.96	262.18	7,697.92	13.55	-30.48	598,441.05	665,627.03	32.64406338	-103.79525167
7,800.00	3.95	267.79	7,797.69	12.95	-37.34	598,440.45	665,620.16	32.64406182	-103.79527397
7,900.00	1.39	248.31	7,897.57	12.37	-41.91	598,439.87	665,615.59	32.64406029	-103.79528883
8,000.00	0.61	231.25	7,997.55	11.58	-43.45	598,439.09	665,614.05	32.64405816	-103.79529385
8,100.00	0.20	289.21	8,097.55	11.31	-44.03	598,438.81	665,613.47	32.64405741	-103.79529574
8,200.00	0.28	63.48	8,197.55	11.48	-43.98	598,438.98	665,613.52	32.64405787	-103.79529556
8,300.00	0.42	106.37	8,297.55	11.48	-43.41	598,438.98	665,614.09	32.64405788	-103.79529371
8,400.00	0.13	208.01	8,397.55	11.28	-43.11	598,438.78	665,614.39	32.64405731	-103.79529274
8,500.00	0.39	163.78	8,497.55	10.85	-43.07	598,438.35	665,614.43	32.64405614	-103.79529261
8,600.00	0.65	236.19	8,597.54	10.21	-43.45	598,437.71	665,614.06	32.64405438	-103.79529385
8,714.00	1.80	56.90	8,711.53	10.83	-42.48	598,438.33	665,615.02	32.64405606	-103.79529071
MWD surveys									
8,746.00	6.20	75.40	8,743.45	11.54	-40.39	598,439.04	665,617.12	32.64405799	-103.79528389
8,778.00	11.10	78.70	8,775.07	12.58	-35.69	598,440.08	665,621.81	32.64406078	-103.79526862
8,810.00	15.70	79.10	8,806.19	14.00	-28.42	598,441.50	665,629.09	32.64406459	-103.79524496
8,841.00	18.80	80.10	8,835.79	15.65	-19.38	598,443.16	665,638.13	32.64406901	-103.79521556
8,873.00	21.80	81.70	8,865.80	17.40	-8.41	598,444.90	665,649.09	32.64407365	-103.79517992
8,905.00	24.50	83.60	8,895.22	18.99	4.06	598,446.50	665,661.57	32.64407787	-103.79513937
8,936.00	26.60	85.00	8,923.19	20.32	17.37	598,447.82	665,674.87	32.64408131	-103.79509613
8,968.00	29.20	85.20	8,951.47	21.59	32.28	598,449.10	665,689.79	32.64408462	-103.79504764
9,000.00	32.40	85.00	8,978.95	22.99	48.61	598,450.50	665,706.11	32.64408824	-103.79499459
9,031.00	35.70	84.30	9,004.63	24.62	65.88	598,452.12	665,723.39	32.64409246	-103.79493843
9,063.00	38.60	83.60	9,030.14	26.66	85.10	598,454.16	665,742.60	32.64409780	-103.79487598
9,095.00	41.90	83.50	9,054.56	28.98	105.64	598,456.48	665,763.15	32.64410390	-103.79480921
9,126.00	44.90	83.60	9,077.08	31.37	126.80	598,458.88	665,784.31	32.64411018	-103.79474042
9,158.00	48.50	84.70	9,099.02	33.74	149.97	598,461.24	665,807.47	32.64411636	-103.79466513
9,190.00	51.50	85.80	9,119.59	35.76	174.39	598,463.27	665,831.90	32.64412159	-103.79458574
9,221.00	54.30	86.30	9,138.29	37.46	199.06	598,464.97	665,856.56	32.64412592	-103.79450559
9,253.00	57.10	86.30	9,156.32	39.17	225.44	598,466.67	665,882.94	32.64413024	-103.79441987
9,285.00	60.80	85.20	9,172.82	41.21	252.77	598,468.71	665,910.27	32.64413546	-103.79433104
9,316.00	64.80	85.00	9,186.99	43.56	280.23	598,471.07	665,937.74	32.64414155	-103.79424178
9,348.00	68.70	85.20	9,199.62	46.07	309.52	598,473.58	665,967.03	32.64414804	-103.79414659
9,380.00	71.00	85.20	9,210.64	48.59	339.46	598,476.09	665,996.96	32.64415453	-103.79404930
9,411.00	72.50	85.80	9,220.35	50.90	368.81	598,478.40	666,026.31	32.64416047	-103.79395392
9,443.00	75.40	85.60	9,229.19	53.20	399.47	598,480.70	666,056.97	32.64416638	-103.79385427
9,474.00	78.80	85.60	9,236.11	55.52	429.59	598,483.02	666,087.10	32.64417233	-103.79375637
9,506.00	81.90	85.20	9,241.48	58.05	461.03	598,485.55	666,118.54	32.64417884	-103.79365419
9,538.00	83.50	85.40	9,245.54	60.65	492.67	598,488.15	666,150.17	32.64418555	-103.79355138
9,570.00	86.30	85.20	9,248.39	63.26	524.43	598,490.76	666,181.93	32.64419228	-103.79344815
9,601.00	89.70	84.90	9,249.47	65.93	555.29	598,493.44	666,212.80	32.64419920	-103.79334785
9,696.00	91.90	86.10	9,248.14	73.39	649.98	598,500.89	666,307.49	32.64421836	-103.79304011
9,791.00	88.10	86.30	9,248.14	79.68	744.76	598,507.19	666,402.26	32.64423434	-103.79273212
9,882.00	87.40	85.00	9,251.72	86.58	835.42	598,514.08	666,492.93	32.64425203	-103.79243747



Survey Report - Geographic



Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Lusk Deep Unit A
Well: Lusk Deep Unit A Well No. 32H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference: Well Lusk Deep Unit A Well No. 32H
TVD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
MD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Dbase Nov0914

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,914.00	87.80	85.00	9,253.06	89.36	867.27	598,516.87	666,524.78	32.64425924	-103.79233396
9,977.00	89.00	84.70	9,254.81	95.02	929.99	598,522.52	666,587.50	32.64427390	-103.79213011
10,072.00	91.50	84.70	9,254.40	103.79	1,024.58	598,531.30	666,682.08	32.64429669	-103.79182269
10,198.00	90.70	85.40	9,251.98	114.66	1,150.08	598,542.17	666,807.59	32.64432481	-103.79141479
10,325.00	89.90	85.40	9,251.32	124.85	1,276.67	598,552.35	666,934.17	32.64435103	-103.79100338
10,483.00	86.80	84.70	9,255.87	138.47	1,433.99	598,565.98	667,091.50	32.64438627	-103.79049206
10,578.00	88.00	84.30	9,260.17	147.57	1,528.46	598,575.07	667,185.96	32.64440995	-103.79018503
10,673.00	89.00	84.70	9,262.66	156.67	1,622.99	598,584.17	667,280.49	32.64443364	-103.78987779
10,768.00	90.70	85.00	9,262.91	165.20	1,717.60	598,592.70	667,375.10	32.64445574	-103.78957028
10,895.00	89.10	85.40	9,263.13	175.82	1,844.15	598,603.33	667,501.65	32.64448317	-103.78915899
10,989.00	91.50	85.00	9,262.64	183.69	1,937.81	598,611.19	667,595.32	32.64450347	-103.78885459
11,116.00	88.60	86.80	9,262.53	192.77	2,064.47	598,620.27	667,721.97	32.64452664	-103.78844297
11,180.00	88.80	87.50	9,263.98	195.95	2,128.37	598,623.45	667,785.88	32.64453448	-103.78823532
11,243.00	89.80	87.20	9,264.75	198.86	2,191.30	598,626.36	667,848.80	32.64454160	-103.78803084
11,338.00	89.20	87.90	9,265.58	202.92	2,286.21	598,630.43	667,943.71	32.64455142	-103.78772245
11,465.00	89.30	88.90	9,267.24	206.47	2,413.15	598,633.97	668,070.65	32.64455938	-103.78731002
11,591.00	87.90	89.30	9,270.32	208.45	2,539.09	598,635.95	668,196.59	32.64456303	-103.78690084
11,686.00	89.30	88.60	9,272.64	210.19	2,634.04	598,637.69	668,291.55	32.64456647	-103.78659234
11,781.00	90.10	87.90	9,273.14	213.09	2,728.99	598,640.59	668,386.50	32.64457310	-103.78628382
11,908.00	89.30	87.90	9,273.80	217.74	2,855.91	598,645.25	668,513.41	32.64458410	-103.78587145
12,035.00	86.50	87.50	9,278.46	222.83	2,982.71	598,650.34	668,640.21	32.64459630	-103.78545944
12,130.00	86.60	88.60	9,284.17	226.06	3,077.48	598,653.56	668,734.98	32.64460382	-103.78515151
12,225.00	87.10	90.00	9,289.39	227.22	3,172.32	598,654.72	668,829.83	32.64460566	-103.78484337
12,320.00	89.30	90.00	9,292.38	227.22	3,267.27	598,654.72	668,924.78	32.64460431	-103.78453492
12,383.00	90.00	90.00	9,292.76	227.22	3,330.27	598,654.72	668,987.77	32.64460342	-103.78433026
12,478.00	91.40	90.30	9,291.60	226.97	3,425.26	598,654.47	669,082.77	32.64460139	-103.78402167
12,605.00	89.60	91.00	9,290.49	225.53	3,552.24	598,653.03	669,209.75	32.64459562	-103.78360918
12,700.00	87.80	91.00	9,292.65	223.87	3,647.20	598,651.38	669,304.70	32.64458971	-103.78330072
12,795.00	89.70	91.00	9,294.72	222.22	3,742.16	598,649.72	669,399.66	32.64458381	-103.78299227
12,889.00	91.70	91.00	9,293.57	220.57	3,836.13	598,648.08	669,493.64	32.64457796	-103.78268701
12,984.00	91.30	90.30	9,291.09	219.50	3,931.09	598,647.00	669,588.60	32.64457364	-103.78237853
13,111.00	88.60	90.30	9,291.20	218.83	4,058.08	598,646.34	669,715.58	32.64457000	-103.78196601
13,238.00	87.80	90.00	9,295.19	218.50	4,185.01	598,646.00	669,842.52	32.64456728	-103.78155365
13,333.00	88.70	89.60	9,298.09	218.83	4,279.97	598,646.34	669,937.47	32.64456683	-103.78124517
13,427.00	91.00	89.30	9,298.33	219.73	4,373.96	598,647.24	670,031.46	32.64456797	-103.78093982
13,601.00	91.00	89.30	9,295.30	221.86	4,547.92	598,649.36	670,205.42	32.64457132	-103.78037465

Survey projected to 13601.00 MD

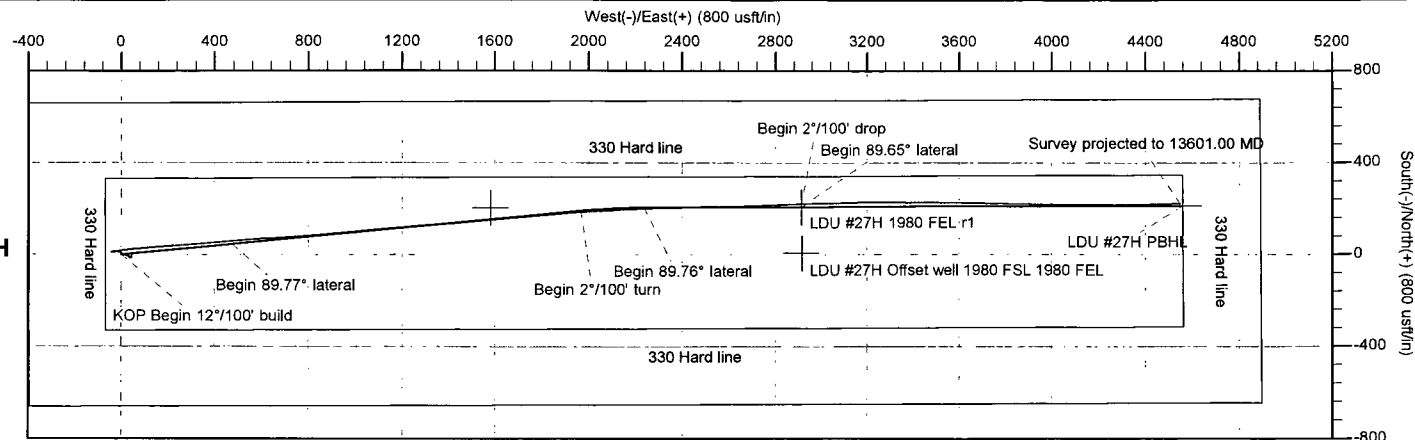
Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
100.00	100.00	-0.03	0.38	Gyro
8,714.00	8,711.53	10.83	-42.48	MWD surveys
13,601.00	9,295.30	221.86	4,547.92	Survey projected to 13601.00 MD



COG Operating LLC

Well: Lusk Deep Unit A Well No. 32H
 Site: Lusk Deep Unit A
 Project: Lea County, New Mexico
 Design: rev1
 Rig: Patriot 6



SECTION DETAILS

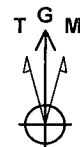
Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSec	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	8772.54	0.00	0.00	8772.54	0.00	0.00	0.00	0.00	0.00	KOP Begin 12°/100' build
3	8814.21	5.00	84.41	8814.15	0.18	1.81	12.00	84.41	1.81	
4	9520.59	89.77	84.41	9250.00	46.34	473.25	12.00	0.00	474.90	Begin 89.77° lateral
5	11020.59	89.77	84.41	9256.13	192.50	1966.10	0.00	0.00	1972.95	Begin 2°/100' turn
6	11291.06	89.76	89.82	9257.24	206.12	2236.13	2.00	90.03	2243.32	Begin 89.76° lateral
7	11963.29	89.76	89.82	9260.00	208.26	2908.35	0.00	0.00	2914.91	Begin 2°/100' drop
8	11968.88	89.65	89.82	9260.03	208.28	2913.94	2.00	179.75	2920.49	Begin 89.65° lateral
9	13613.28	89.65	89.82	9270.00	213.50	4558.30	0.00	0.00	4563.30	PBHL/TD

Surface Location: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
 US State Plane 1927 (Exact solution)
 New Mexico East 3001

Northing: 598427.50 Easting: 665657.50 Latitude: 32.64402571 Longitude: -103.79515287
 Total Correction (M => G): To convert a Magnetic Direction to a Grid Direction, Add 7.07°

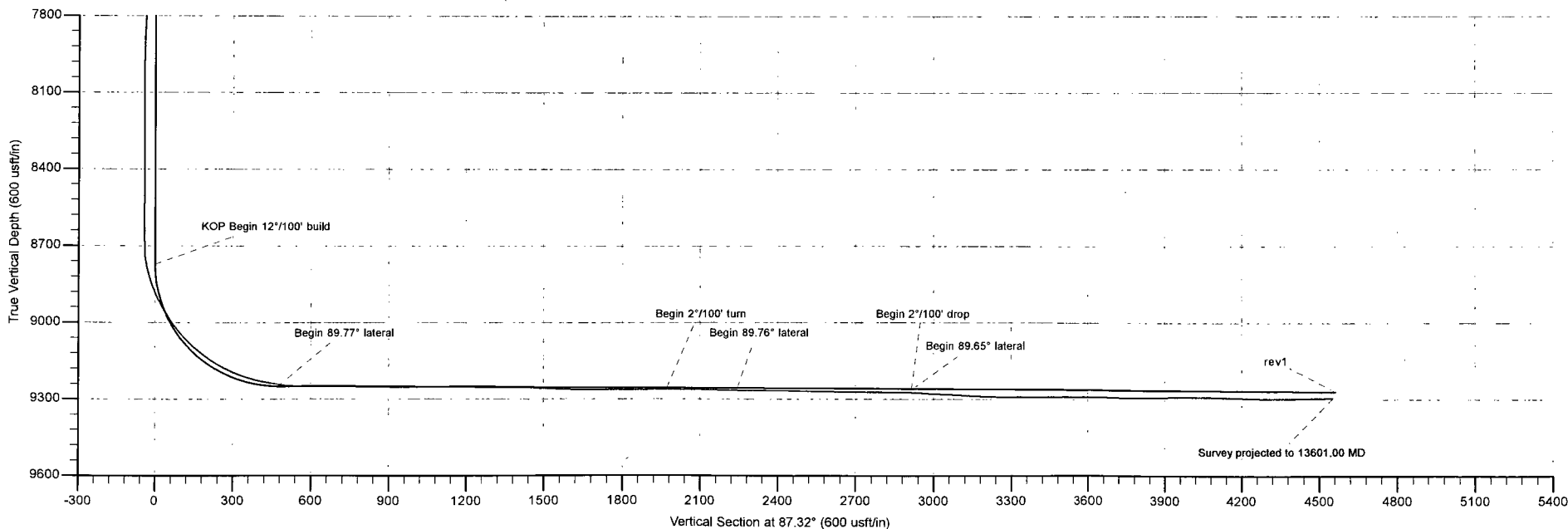
ANNOTATIONS

TVD	MD	Inc	Azi	+N-S	+E-W	VSec	Departure	Annotation
100.00	100.00	0.44	94.66	-0.03	0.38	-0.38	0.38	Gyro
8711.53	8714.00	1.80	56.90	10.83	-42.48	43.83	175.73	MWD surveys
9295.30	13601.00	91.00	89.30	221.86	4547.92	-4376.59	4775.03	Survey projected to 13601.00 MD



Azimuths to Grid North
 True North: -0.29°
 Magnetic North: 7.07°

Magnetic Field
 Strength: 48551.7nT
 Dip Angle: 60.46°
 Date: 5/15/2014
 Model: IGRF2010





Standard_report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Lusk Deep Unit A Well No. 32H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Site:	Lusk Deep Unit A	MD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Well:	Lusk Deep Unit A Well No. 32H	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	Dbase Nov0914

Project: Lea County, New Mexico			
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:	Lusk Deep Unit A				
Site Position:		Northing:	599,764.20 usft	Latitude:	32.64763363
From:	Map	Easting:	670,347.80 usft	Longitude:	-103.77989322
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.30 °

Well: Lusk Deep Unit A Well No. 32H, Surf Loc: 1980 FSL 400 FWL Sect 20						
Well Position	+N/-S	0.00 usft	Northing:	598,427.50 usft	Latitude:	32.64402571
	+E/-W	0.00 usft	Easting:	665,657.50 usft	Longitude:	-103.79515287
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	3,573.10 usft

Wellbore	Original hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/15/2014	7.36	60.46	48,552

Design		Surveys Original hole			
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.00	0.00	0.00	87.32	



Standard_report



Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Lusk Deep Unit A
Well: Lusk Deep Unit A Well No. 32H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference: Well Lusk Deep Unit A Well No. 32H
TVD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
MD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Dbase Nov0914

Survey Program Date 1/5/2015

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	8,600.00	Gyro (Original hole)	NS-GYRO-MS	North sensing gyrocompassing m/s
8,714.00	13,601.00	MWD (Original hole)	MWD	MWD - Standard

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	598,427.50	665,657.50
100.00	0.44	94.66	100.00	-0.03	0.38	0.44	0.38	598,427.47	665,657.88
Gyro									
200.00	0.12	308.55	200.00	0.00	0.68	0.54	0.68	598,427.50	665,658.18
300.00	0.50	86.05	300.00	0.10	1.04	0.59	1.04	598,427.60	665,658.54
400.00	0.72	28.53	399.99	0.68	1.77	0.62	1.80	598,428.18	665,659.27
500.00	0.42	6.34	499.99	1.60	2.11	0.37	2.19	598,429.10	665,659.61
600.00	0.43	303.63	599.98	2.17	1.84	0.44	1.94	598,429.67	665,659.34
700.00	0.26	272.18	699.98	2.39	1.30	0.25	1.41	598,429.89	665,658.80
800.00	0.28	253.25	799.98	2.32	0.84	0.09	0.95	598,429.82	665,658.34
900.00	0.25	153.37	899.98	2.06	0.70	0.41	0.80	598,429.56	665,658.20
1,000.00	0.75	97.92	999.98	1.77	1.45	0.64	1.53	598,429.27	665,658.95
1,100.00	1.08	107.29	1,099.96	1.40	3.00	0.36	3.06	598,428.90	665,660.50
1,200.00	0.95	90.53	1,199.95	1.11	4.73	0.32	4.77	598,428.61	665,662.23
1,300.00	1.48	93.27	1,299.93	1.03	6.85	0.53	6.89	598,428.53	665,664.35
1,400.00	1.70	104.07	1,399.89	0.60	9.57	0.37	9.59	598,428.10	665,667.07
1,500.00	1.41	115.09	1,499.85	-0.28	12.13	0.42	12.10	598,427.22	665,669.63
1,600.00	0.29	118.65	1,599.84	-0.93	13.46	1.12	13.41	598,426.57	665,670.96
1,700.00	0.31	110.37	1,699.84	-1.14	13.94	0.05	13.87	598,426.36	665,671.44
1,800.00	1.39	59.41	1,799.83	-0.62	15.24	1.22	15.19	598,426.88	665,672.74
1,900.00	1.94	85.17	1,899.78	0.14	17.97	0.92	17.95	598,427.64	665,675.47



Standard_report



Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Lusk Deep Unit A
Well: Lusk Deep Unit A Well No. 32H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference: Well Lusk Deep Unit A Well No. 32H
TVD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
MD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Dbase Nov0914

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)
2,000.00	3.35	79.94	1,999.68	0.79	22.53	1.43	22.54	598,428.29	665,680.03
2,100.00	2.57	75.15	2,099.54	1.88	27.58	0.82	27.63	598,429.38	665,685.08
2,200.00	0.96	75.82	2,199.49	2.66	30.56	1.61	30.65	598,430.16	665,688.06
2,300.00	0.21	344.42	2,299.49	3.04	31.32	0.99	31.43	598,430.54	665,688.82
2,400.00	0.58	288.50	2,399.48	3.38	30.79	0.49	30.91	598,430.88	665,688.29
2,500.00	1.08	234.77	2,499.47	2.99	29.54	0.87	29.65	598,430.49	665,687.04
2,600.00	1.02	214.90	2,599.46	1.72	28.26	0.37	28.31	598,429.22	665,685.76
2,700.00	0.92	194.53	2,699.44	0.21	27.55	0.36	27.53	598,427.71	665,685.05
2,800.00	0.43	214.65	2,799.44	-0.87	27.13	0.54	27.06	598,426.63	665,684.63
2,900.00	0.68	157.03	2,899.43	-1.73	27.15	0.58	27.04	598,425.77	665,684.65
3,000.00	0.88	164.70	2,999.42	-3.01	27.59	0.23	27.42	598,424.49	665,685.09
3,100.00	1.21	157.46	3,099.41	-4.73	28.19	0.35	27.94	598,422.77	665,685.69
3,200.00	1.07	172.35	3,199.39	-6.63	28.72	0.33	28.38	598,420.87	665,686.22
3,300.00	1.46	137.71	3,299.36	-8.50	29.70	0.84	29.28	598,419.00	665,687.20
3,400.00	1.27	134.25	3,399.34	-10.21	31.36	0.21	30.84	598,417.29	665,688.86
3,500.00	1.53	139.47	3,499.31	-12.00	33.02	0.29	32.42	598,415.50	665,690.52
3,600.00	1.15	120.82	3,599.28	-13.53	34.75	0.57	34.08	598,413.97	665,692.25
3,700.00	0.75	96.97	3,699.26	-14.12	36.26	0.55	35.56	598,413.38	665,693.76
3,800.00	0.95	106.69	3,799.25	-14.44	37.70	0.25	36.99	598,413.06	665,695.20
3,900.00	0.76	91.75	3,899.24	-14.70	39.16	0.29	38.43	598,412.80	665,696.66
4,000.00	1.09	69.99	3,999.23	-14.40	40.72	0.48	40.00	598,413.10	665,698.22
4,100.00	1.14	31.95	4,099.21	-13.23	42.14	0.73	41.47	598,414.27	665,699.64
4,200.00	0.79	30.28	4,199.20	-11.79	43.01	0.35	42.41	598,415.71	665,700.51
4,300.00	1.02	344.88	4,299.19	-10.33	43.12	0.73	42.59	598,417.17	665,700.62
4,400.00	0.97	4.31	4,399.17	-8.63	42.96	0.34	42.51	598,418.87	665,700.46
4,500.00	0.53	14.91	4,499.16	-7.34	43.14	0.46	42.75	598,420.16	665,700.64
4,600.00	0.65	348.37	4,599.16	-6.33	43.14	0.29	42.80	598,421.17	665,700.64



Standard_report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Lusk Deep Unit A Well No. 32H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Site:	Lusk Deep Unit A	MD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Well:	Lusk Deep Unit A Well No. 32H	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	Dbase Nov0914

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)
4,700.00	0.41	324.78	4,699.15	-5.49	42.82	0.32	42.52	598,422.01	665,700.32
4,800.00	0.31	269.87	4,799.15	-5.20	42.35	0.34	42.06	598,422.30	665,699.85
4,900.00	0.92	250.52	4,899.15	-5.46	41.32	0.64	41.02	598,422.04	665,698.82
5,000.00	0.99	256.97	4,999.13	-5.93	39.72	0.13	39.40	598,421.57	665,697.22
5,100.00	0.88	238.17	5,099.12	-6.53	38.23	0.32	37.88	598,420.97	665,695.73
5,200.00	0.87	254.51	5,199.11	-7.13	36.84	0.25	36.47	598,420.37	665,694.34
5,300.00	0.86	260.83	5,299.10	-7.46	35.37	0.10	34.98	598,420.04	665,692.87
5,400.00	0.76	258.41	5,399.09	-7.71	33.98	0.11	33.58	598,419.79	665,691.48
5,500.00	1.58	279.01	5,499.06	-7.63	31.97	0.91	31.58	598,419.87	665,689.47
5,600.00	1.88	278.21	5,599.02	-7.18	28.98	0.30	28.62	598,420.32	665,686.48
5,700.00	1.69	286.19	5,698.97	-6.53	25.94	0.31	25.61	598,420.97	665,683.44
5,800.00	1.37	288.87	5,798.93	-5.73	23.40	0.33	23.10	598,421.77	665,680.90
5,900.00	1.77	291.24	5,898.90	-4.79	20.82	0.41	20.58	598,422.71	665,678.32
6,000.00	1.61	291.92	5,998.85	-3.70	18.08	0.16	17.89	598,423.80	665,675.58
6,100.00	1.80	293.20	6,098.81	-2.56	15.34	0.19	15.20	598,424.94	665,672.84
6,200.00	1.70	296.87	6,198.76	-1.27	12.57	0.15	12.50	598,426.23	665,670.07
6,300.00	1.74	300.10	6,298.72	0.16	9.93	0.10	9.93	598,427.66	665,667.43
6,400.00	1.45	269.73	6,398.68	0.92	7.35	0.88	7.39	598,428.42	665,664.85
6,500.00	1.82	299.80	6,498.64	1.70	4.71	0.92	4.78	598,429.20	665,662.21
6,600.00	1.84	293.88	6,598.59	3.14	1.86	0.19	2.01	598,430.64	665,659.36
6,700.00	1.54	320.44	6,698.55	4.82	-0.46	0.83	-0.23	598,432.32	665,657.04
6,800.00	1.25	329.86	6,798.52	6.80	-1.86	0.37	-1.54	598,434.30	665,655.64
6,900.00	1.21	291.75	6,898.50	8.14	-3.39	0.80	-3.01	598,435.64	665,654.11
7,000.00	2.00	290.23	6,998.46	9.13	-6.01	0.79	-5.58	598,436.63	665,651.49
7,100.00	1.82	281.11	7,098.40	10.04	-9.21	0.35	-8.73	598,437.54	665,648.29
7,200.00	1.42	306.05	7,198.36	11.08	-11.77	0.80	-11.23	598,438.58	665,645.73
7,300.00	1.57	294.71	7,298.33	12.38	-14.01	0.33	-13.42	598,439.88	665,643.49



Standard_report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Lusk Deep Unit A Well No. 32H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Site:	Lusk Deep Unit A	MD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Well:	Lusk Deep Unit A Well No. 32H	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	Dbase Nov0914

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)	
7,400.00	1.22	283.18	7,398.30	13.20	-16.29	0.45	-15.66	598,440.70	665,641.21	
7,500.00	2.15	282.43	7,498.26	13.84	-19.16	0.93	-18.49	598,441.34	665,638.34	
7,600.00	3.48	267.87	7,598.13	14.13	-24.03	1.50	-23.34	598,441.63	665,633.47	
7,700.00	3.96	262.18	7,697.92	13.55	-30.48	0.60	-29.81	598,441.05	665,627.02	
7,800.00	3.95	267.79	7,797.69	12.95	-37.34	0.39	-36.70	598,440.45	665,620.16	
7,900.00	1.39	248.31	7,897.57	12.37	-41.91	2.68	-41.29	598,439.87	665,615.59	
8,000.00	0.61	231.25	7,997.55	11.58	-43.45	0.83	-42.87	598,439.08	665,614.05	
8,100.00	0.20	289.21	8,097.55	11.31	-44.03	0.53	-43.46	598,438.81	665,613.47	
8,200.00	0.28	63.48	8,197.55	11.48	-43.98	0.44	-43.40	598,438.98	665,613.52	
8,300.00	0.42	106.37	8,297.55	11.48	-43.41	0.29	-42.83	598,438.98	665,614.09	
8,400.00	0.13	208.01	8,397.55	11.28	-43.11	0.46	-42.54	598,438.78	665,614.39	
8,500.00	0.39	163.78	8,497.55	10.85	-43.07	0.31	-42.52	598,438.35	665,614.43	
8,600.00	0.65	236.19	8,597.54	10.21	-43.45	0.65	-42.92	598,437.71	665,614.05	
8,714.00	1.80	56.90	8,711.53	10.83	-42.48	2.15	-41.93	598,438.33	665,615.02	
MWD surveys										
8,746.00	6.20	75.40	8,743.45	11.54	-40.39	14.15	-39.81	598,439.04	665,617.11	
8,778.00	11.10	78.70	8,775.07	12.58	-35.69	15.38	-35.07	598,440.08	665,621.81	
8,810.00	15.70	79.10	8,806.19	14.00	-28.42	14.38	-27.73	598,441.50	665,629.08	
8,841.00	18.80	80.10	8,835.79	15.65	-19.38	10.05	-18.62	598,443.15	665,638.12	
8,873.00	21.80	81.70	8,865.80	17.40	-8.41	9.53	-7.59	598,444.90	665,649.09	
8,905.00	24.50	83.60	8,895.22	18.99	4.06	8.75	4.95	598,446.49	665,661.56	
8,936.00	26.60	85.00	8,923.19	20.32	17.37	7.05	18.30	598,447.82	665,674.87	
8,968.00	29.20	85.20	8,951.47	21.59	32.28	8.13	33.26	598,449.09	665,689.78	
9,000.00	32.40	85.00	8,978.95	22.99	48.61	10.01	49.63	598,450.49	665,706.11	
9,031.00	35.70	84.30	9,004.63	24.62	65.88	10.72	66.96	598,452.12	665,723.38	
9,063.00	38.60	83.60	9,030.14	26.66	85.10	9.16	86.25	598,454.16	665,742.60	
9,095.00	41.90	83.50	9,054.56	28.98	105.64	10.31	106.88	598,456.48	665,763.14	



Standard_report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Lusk Deep Unit A Well No. 32H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Site:	Lusk Deep Unit A	MD Reference:	RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Well:	Lusk Deep Unit A Well No. 32H	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	Dbase Nov0914

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)	
9,126.00	44.90	83.60	9,077.08	31.37	126.80	9.68	128.13	598,458.87	665,784.30	
9,158.00	48.50	84.70	9,099.02	33.74	149.97	11.52	151.38	598,461.24	665,807.47	
9,190.00	51.50	85.80	9,119.59	35.76	174.39	9.74	175.88	598,463.26	665,831.89	
9,221.00	54.30	86.30	9,138.29	37.46	199.06	9.12	200.59	598,464.96	665,856.56	
9,253.00	57.10	86.30	9,156.32	39.17	225.44	8.75	227.02	598,466.67	665,882.94	
9,285.00	60.80	85.20	9,172.82	41.21	252.77	11.93	254.42	598,468.71	665,910.27	
9,316.00	64.80	85.00	9,186.99	43.56	280.23	12.92	281.96	598,471.06	665,937.73	
9,348.00	68.70	85.20	9,199.62	46.07	309.52	12.20	311.34	598,473.57	665,967.02	
9,380.00	71.00	85.20	9,210.64	48.59	339.46	7.19	341.36	598,476.09	665,996.96	
9,411.00	72.50	85.80	9,220.35	50.90	368.81	5.18	370.78	598,478.40	666,026.31	
9,443.00	75.40	85.60	9,229.19	53.20	399.47	9.08	401.52	598,480.70	666,056.97	
9,474.00	78.80	85.60	9,236.11	55.52	429.59	10.97	431.72	598,483.02	666,087.09	
9,506.00	81.90	85.20	9,241.48	58.05	461.03	9.77	463.24	598,485.55	666,118.53	
9,538.00	83.50	85.40	9,245.54	60.65	492.67	5.04	494.96	598,488.15	666,150.17	
9,570.00	86.30	85.20	9,248.39	63.26	524.43	8.77	526.81	598,490.76	666,181.93	
9,601.00	89.70	84.90	9,249.47	65.93	555.29	11.01	557.77	598,493.43	666,212.79	
9,696.00	91.90	86.10	9,248.14	73.39	649.98	2.64	652.70	598,500.89	666,307.48	
9,791.00	88.10	86.30	9,248.14	79.68	744.76	4.01	747.67	598,507.18	666,402.26	
9,882.00	87.40	85.00	9,251.72	86.58	835.42	1.62	838.56	598,514.08	666,492.92	
9,914.00	87.80	85.00	9,253.06	89.36	867.27	1.25	870.50	598,516.86	666,524.77	
9,977.00	89.00	84.70	9,254.81	95.02	929.99	1.96	933.42	598,522.52	666,587.49	
10,072.00	91.50	84.70	9,254.40	103.79	1,024.58	2.63	1,028.31	598,531.29	666,682.08	
10,198.00	90.70	85.40	9,251.98	114.66	1,150.08	0.84	1,154.18	598,542.16	666,807.58	
10,325.00	89.90	85.40	9,251.32	124.85	1,276.67	0.63	1,281.11	598,552.35	666,934.17	
10,483.00	86.80	84.70	9,255.87	138.47	1,433.99	2.01	1,438.90	598,565.97	667,091.49	
10,578.00	88.00	84.30	9,260.17	147.57	1,528.46	1.33	1,533.69	598,575.07	667,185.96	
10,673.00	89.00	84.70	9,262.66	156.67	1,622.99	1.13	1,628.54	598,584.17	667,280.49	



Standard_report



Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Lusk Deep Unit A
Well: Lusk Deep Unit A Well No. 32H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well Lusk Deep Unit A Well No. 32H
RKB=3573.1+18 @ 3591.10usft (Patriot 6)
RKB=3573.1+18 @ 3591.10usft (Patriot 6)
Grid
Minimum Curvature
Dbase Nov0914

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)
10,768.00	90.70	85.00	9,262.91	165.20	1,717.60	1.82	1,723.45	598,592.70	667,375.10
10,895.00	89.10	85.40	9,263.13	175.82	1,844.15	1.30	1,850.35	598,603.32	667,501.65
10,989.00	91.50	85.00	9,262.64	183.69	1,937.81	2.59	1,944.28	598,611.19	667,595.31
11,116.00	88.60	86.80	9,262.53	192.77	2,064.47	2.69	2,071.22	598,620.27	667,721.97
11,180.00	88.80	87.50	9,263.98	195.95	2,128.37	1.14	2,135.21	598,623.45	667,785.87
11,243.00	89.80	87.20	9,264.75	198.86	2,191.30	1.66	2,198.20	598,626.36	667,848.80
11,338.00	89.20	87.90	9,265.58	202.92	2,286.21	0.97	2,293.20	598,630.42	667,943.71
11,465.00	89.30	88.90	9,267.24	206.47	2,413.15	0.79	2,420.16	598,633.97	668,070.65
11,591.00	87.90	89.30	9,270.32	208.45	2,539.09	1.16	2,546.06	598,635.95	668,196.59
11,686.00	89.30	88.60	9,272.64	210.19	2,634.04	1.65	2,640.99	598,637.69	668,291.54
11,781.00	90.10	87.90	9,273.14	213.09	2,728.99	1.12	2,735.97	598,640.59	668,386.49
11,908.00	89.30	87.90	9,273.80	217.74	2,855.91	0.63	2,862.96	598,645.24	668,513.41
12,035.00	86.50	87.50	9,278.46	222.83	2,982.71	2.23	2,989.86	598,650.33	668,640.21
12,130.00	86.60	88.60	9,284.17	226.06	3,077.48	1.16	3,084.68	598,653.56	668,734.98
12,225.00	87.10	90.00	9,289.39	227.22	3,172.32	1.56	3,179.48	598,654.72	668,829.82
12,320.00	89.30	90.00	9,292.38	227.22	3,267.27	2.32	3,274.32	598,654.72	668,924.77
12,383.00	90.00	90.00	9,292.76	227.22	3,330.27	1.11	3,337.25	598,654.72	668,967.77
12,478.00	91.40	90.30	9,291.60	226.97	3,425.26	1.51	3,432.13	598,654.47	669,082.76
12,605.00	89.60	91.00	9,290.49	225.53	3,552.24	1.52	3,558.90	598,653.03	669,209.74
12,700.00	87.80	91.00	9,292.65	223.87	3,647.20	1.89	3,653.68	598,651.37	669,304.70
12,795.00	89.70	91.00	9,294.72	222.22	3,742.16	2.00	3,748.45	598,649.72	669,399.66
12,889.00	91.70	91.00	9,293.57	220.57	3,836.13	2.13	3,842.25	598,648.07	669,493.63
12,984.00	91.30	90.30	9,291.09	219.50	3,931.09	0.85	3,937.05	598,647.00	669,588.59
13,111.00	88.60	90.30	9,291.20	218.83	4,058.08	2.13	4,063.87	598,646.33	669,715.58
13,238.00	87.80	90.00	9,295.19	218.50	4,185.01	0.67	4,190.65	598,646.00	669,842.51
13,333.00	88.70	89.60	9,298.09	218.83	4,279.97	1.04	4,285.52	598,646.33	669,937.47
13,427.00	91.00	89.30	9,298.33	219.73	4,373.96	2.47	4,379.45	598,647.23	670,031.46



Standard_report



Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Lusk Deep Unit A
Well: Lusk Deep Unit A Well No. 32H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference: Well Lusk Deep Unit A Well No. 32H
TVD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
MD Reference: RKB=3573.1+18 @ 3591.10usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Dbase Nov0914

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)
13,601.00	91.00	89.30	9,295.30	221.86	4,547.92	0.00	4,553.32	598,649.36	670,205.42

Survey projected to 13601.00 MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
100.00	100.00	-0.03	0.38	Gyro
8,714.00	8,711.53	10.83	-42.48	MWD surveys
13,601.00	9,295.30	221.86	4,547.92	Survey projected to 13601.00 MD