

30-015-40214

COG Operating LLC

Eddy County, New Mexico (NAD 27 NME)

Clydesdale 1 Fee

#1H

Wellbore #1 / Job #1310195

Survey: Phoenix MWD Surveys

Survey Report

10 March, 2013



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, New Mexico (NAD 27 NME)	TVD Reference:	RF @ 3447.00usft (JW 4)
Site:	Clydesdale-1 Fee	MD Reference:	RF @ 3447.00usft (JW 4)
Well:	#1H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310195	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1 / Job #1310195	Database:	GCR DB v5000

Project: Eddy County, New Mexico (NAD-27-NME)	
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		Clydesdale-1 Fee			
Site Position:		Northing:	616,840.10 usft	Latitude:	32° 41' 44.717849 N
From:	Map	Easting:	470,401.70 usft	Longitude:	104° 25' 46.368925 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.05 °

Well	#1H					
Well Position	+N-S	0.00 usft	Northing:	616,840.10 usft	Latitude:	32° 41' 44.717849 N
	+E-W	0.00 usft	Easting:	470,401.70 usft	Longitude:	104° 25' 46.368925 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	3,434.00 usft

Wellbore		Wellbore #1 / Job #1310195			
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	02/14/13	7.81	60.43	48,637

Design: Wellbore #1./Job #1310195				
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	271.25

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Well:	#1H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310195	Survey/Calculation Method:	Minimum Curvature
Design:	Wellbore #1 / Job #1310195	Database:	GCR DB v5000

Survey Program		Date: 03/10/13			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,149.00	VES Gyro Surveys (Wellbore #1 / Job #13	MWD	MWD - Standard	
2,241.00	7,424.00	Phoenix MWD Surveys (Wellbore #1 / Job	MWD	MWD - Standard	

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,149.00	1.86	278.09	-1,298.38	2,148.62	11.41	-31.88	32.12	0.00	616,851.51	470,369.82
Tie On Survey										
2,241.00	1.90	278.40	-1,206.43	2,240.57	11.84	-34.86	35.11	0.04	616,851.94	470,366.84
First Phoenix MWD Survey										
2,272.00	2.50	275.30	-1,175.45	2,271.55	11.98	-36.04	36.30	1.97	616,852.08	470,365.66
2,303.00	4.30	272.10	-1,144.51	2,302.49	12.08	-37.88	38.13	5.84	616,852.18	470,363.82
2,334.00	6.50	271.60	-1,113.65	2,333.35	12.17	-40.79	41.05	7.10	616,852.27	470,360.91
2,366.00	8.90	273.50	-1,081.94	2,365.06	12.37	-45.08	45.34	7.54	616,852.47	470,356.62
2,397.00	11.30	274.80	-1,051.42	2,395.58	12.78	-50.50	50.76	7.78	616,852.88	470,351.20
2,428.00	13.60	274.50	-1,021.15	2,425.85	13.32	-57.16	57.44	7.42	616,853.42	470,344.54
2,459.00	16.10	273.30	-991.19	2,455.81	13.85	-65.08	65.37	8.12	616,853.95	470,336.62
2,491.00	18.80	272.10	-960.66	2,486.34	14.29	-74.67	74.96	8.51	616,854.39	470,327.03
2,522.00	22.00	270.60	-931.61	2,515.39	14.54	-85.47	85.77	10.46	616,854.64	470,316.23
2,554.00	27.50	267.00	-902.56	2,544.44	14.21	-98.85	99.14	17.81	616,854.31	470,302.85
2,585.00	33.80	266.50	-875.90	2,571.10	13.31	-114.62	114.88	20.34	616,853.41	470,287.08
2,617.00	40.00	265.80	-850.33	2,596.67	12.01	-133.78	134.01	19.42	616,852.11	470,267.92
2,648.00	44.30	266.60	-827.35	2,619.65	10.64	-154.53	154.73	13.98	616,850.74	470,247.17
2,679.00	47.00	267.40	-805.68	2,641.32	9.48	-176.67	176.83	8.90	616,849.58	470,225.03
2,710.00	50.10	268.00	-785.16	2,661.84	8.55	-199.88	200.02	10.10	616,848.65	470,201.82
2,741.00	53.60	268.50	-766.02	2,680.98	7.81	-224.25	224.36	11.36	616,847.91	470,177.45
2,772.00	56.60	269.60	-748.28	2,698.72	7.40	-249.66	249.77	10.11	616,847.50	470,152.04
2,804.00	59.40	270.60	-731.32	2,715.68	7.45	-276.80	276.89	9.14	616,847.55	470,124.90

Survey Report



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Site:	Clydesdale 1 Fee	MD Reference:	RF @ 3447.00usft (JW 4)
Well:	#1H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310195	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1 / Job #1310195	Database:	GCR DB v5000

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	EW (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,835.00	61.80	271.00	-716.11	2,730.89	7.83	-303.80	303.90	7.82	616,847.93	470,097.90
2,866.00	64.40	271.30	-702.08	2,744.92	8.38	-331.44	331.54	8.43	616,848.48	470,070.26
2,897.00	67.40	271.80	-689.43	2,757.57	9.15	-359.72	359.84	9.79	616,849.25	470,041.98
2,928.00	70.90	272.00	-678.39	2,768.61	10.11	-388.67	388.80	11.31	616,850.21	470,013.03
2,960.00	74.40	272.10	-668.85	2,778.15	11.20	-419.19	419.34	10.94	616,851.30	469,982.51
2,991.00	77.60	272.00	-661.35	2,785.65	12.28	-449.25	449.41	10.33	616,852.38	469,952.45
3,022.00	80.00	272.20	-655.33	2,791.67	13.39	-479.63	479.81	7.77	616,853.49	469,922.07
3,053.00	81.70	272.50	-650.40	2,796.60	14.65	-510.21	510.41	5.57	616,854.75	469,891.49
3,085.00	83.20	272.80	-646.20	2,800.80	16.11	-541.90	542.12	4.78	616,856.21	469,859.80
3,116.00	84.80	272.80	-642.96	2,804.04	17.62	-572.69	572.94	5.16	616,857.72	469,829.01
3,147.00	86.80	272.70	-640.69	2,806.31	19.10	-603.57	603.85	6.46	616,859.20	469,798.13
3,241.00	90.70	272.20	-638.64	2,808.36	23.12	-697.45	697.78	4.18	616,863.22	469,704.25
3,334.00	92.80	271.90	-641.48	2,805.52	26.44	-790.34	790.73	2.28	616,866.54	469,611.36
3,428.00	93.40	271.00	-646.56	2,800.44	28.82	-884.17	884.59	1.15	616,868.92	469,517.53
3,521.00	93.00	272.30	-651.75	2,795.25	31.49	-976.98	977.44	1.46	616,871.59	469,424.72
3,615.00	91.50	272.30	-655.44	2,791.56	35.26	-1,070.83	1,071.35	1.60	616,875.36	469,330.87
3,708.00	92.00	272.00	-658.28	2,788.72	38.75	-1,163.72	1,164.29	0.63	616,878.85	469,237.98
3,802.00	92.50	271.20	-661.98	2,785.02	41.37	-1,257.61	1,258.22	1.00	616,881.47	469,144.09
3,895.00	93.10	271.10	-666.52	2,780.48	43.24	-1,350.48	1,351.11	0.65	616,883.34	469,051.22
3,989.00	91.50	271.50	-670.29	2,776.71	45.37	-1,444.38	1,445.03	1.75	616,885.47	468,957.32
4,082.00	91.70	271.00	-672.89	2,774.11	47.40	-1,537.32	1,537.99	0.58	616,887.50	468,864.38
4,176.00	92.30	270.80	-676.17	2,770.83	48.87	-1,631.25	1,631.93	0.67	616,888.97	468,770.45
4,270.00	92.80	270.50	-680.35	2,766.65	49.94	-1,725.15	1,725.83	0.62	616,890.04	468,676.55
4,364.00	93.00	270.20	-685.11	2,761.89	50.51	-1,819.03	1,819.70	0.38	616,890.61	468,582.67
4,457.00	91.60	270.60	-688.84	2,758.16	51.16	-1,911.95	1,912.61	1.57	616,891.26	468,489.75
4,550.00	91.80	270.60	-691.60	2,755.40	52.13	-2,004.90	2,005.56	0.22	616,892.23	468,396.80
4,644.00	93.00	270.40	-695.53	2,751.47	52.95	-2,098.82	2,099.47	1.29	616,893.05	468,302.88

Survey Report



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Site:	Clydesdale 1-Fee	MD Reference:	RF @ 3447.00usft (JW 4)
Well:	#1H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310195	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1 / Job #1310195	Database:	GCR DB v5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
4,738.00	91.90	270.40	-699.55	2,747.45	53.61	-2,192.73	2,193.37	1.17	616,893.71	468,208.97	
4,831.00	92.20	270.60	-702.88	2,744.12	54.42	-2,285.66	2,286.31	0.39	616,894.52	468,116.04	
4,925.00	91.40	270.60	-705.83	2,741.17	55.40	-2,379.61	2,380.25	0.85	616,895.50	468,022.09	
5,019.00	91.60	270.50	-708.29	2,738.71	56.30	-2,473.57	2,474.21	0.24	616,896.40	467,928.13	
5,113.00	91.80	270.00	-711.08	2,735.92	56.71	-2,567.53	2,568.16	0.57	616,896.81	467,834.17	
5,206.00	92.00	270.60	-714.16	2,732.84	57.20	-2,660.48	2,661.09	0.68	616,897.30	467,741.22	
5,300.00	92.60	272.00	-717.94	2,729.06	59.33	-2,754.38	2,755.02	1.62	616,899.43	467,647.32	
5,393.00	93.20	271.20	-722.64	2,724.36	61.93	-2,847.22	2,847.89	1.07	616,902.03	467,554.48	
5,487.00	93.10	272.10	-727.81	2,719.19	64.63	-2,941.04	2,941.75	0.96	616,904.73	467,460.66	
5,581.00	93.60	272.00	-733.30	2,713.70	67.98	-3,034.82	3,035.58	0.54	616,908.08	467,366.88	
5,674.00	92.60	272.10	-738.33	2,708.67	71.31	-3,127.62	3,128.43	1.08	616,911.41	467,274.08	
5,767.00	92.90	271.70	-742.79	2,704.21	74.39	-3,220.46	3,221.32	0.54	616,914.49	467,181.24	
5,861.00	93.70	271.40	-748.20	2,698.80	76.92	-3,314.27	3,315.16	0.91	616,917.02	467,087.43	
5,955.00	92.10	271.60	-752.96	2,694.04	79.38	-3,408.12	3,409.04	1.72	616,919.48	466,993.58	
6,048.00	92.00	271.10	-756.28	2,690.72	81.57	-3,501.03	3,501.98	0.55	616,921.67	466,900.67	
6,142.00	92.20	271.10	-759.73	2,687.27	83.38	-3,594.95	3,595.91	0.21	616,923.48	466,806.75	
6,236.00	92.40	270.60	-763.50	2,683.50	84.77	-3,688.86	3,689.83	0.57	616,924.87	466,712.84	
6,329.00	92.50	270.80	-767.48	2,679.52	85.90	-3,781.77	3,782.74	0.24	616,926.00	466,619.93	
6,423.00	92.70	270.60	-771.74	2,675.26	87.05	-3,875.67	3,876.64	0.30	616,927.15	466,526.03	
6,516.00	93.00	269.60	-776.36	2,670.64	87.21	-3,968.55	3,969.51	1.12	616,927.31	466,433.15	
6,610.00	92.00	270.70	-780.47	2,666.53	87.46	-4,062.46	4,063.40	1.58	616,927.56	466,339.24	
6,703.00	92.20	270.40	-783.87	2,663.13	88.35	-4,155.39	4,156.33	0.39	616,928.45	466,246.31	
6,796.00	92.50	269.80	-787.69	2,659.31	88.51	-4,248.31	4,249.23	0.72	616,928.61	466,153.39	
6,890.00	92.90	270.60	-792.11	2,654.89	88.84	-4,342.21	4,343.11	0.95	616,928.94	466,059.49	
6,984.00	91.90	272.10	-796.05	2,650.95	91.05	-4,436.09	4,437.02	1.92	616,931.15	465,965.61	
7,077.00	92.10	271.70	-799.30	2,647.70	94.14	-4,528.99	4,529.96	0.48	616,934.24	465,872.71	
7,171.00	92.30	271.50	-802.91	2,644.09	96.76	-4,622.88	4,623.89	0.30	616,936.86	465,778.82	

Survey Report



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Site:	Clydesdale 1 Fee	MD Reference:	RF @ 3447.00usft (JW 4)
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Design:	Wellbore #1 / Job #1310195	Database:	GCR-DB v5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
7,264.00	92.60	271.50	-806.88	2,640.12	99.19	-4,715.76	4,716.80	0.32	616,939.29	465,685.94
7,363.00	92.70	271.00	-811.46	2,635.54	101.35	-4,814.63	4,815.70	0.51	616,941.45	465,587.07
Final MWD Survey										
7,424.00	92.70	271.00	-814.33	2,632.67	102.41	-4,875.56	4,876.63	0.00	616,942.51	465,526.14
Projection to TD										

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,149.00	2,148.62	11.41	-31.88	Tie On Survey
2,241.00	2,240.57	11.84	-34.86	First Phoenix MWD Survey
7,363.00	2,635.54	101.35	-4,814.63	Final MWD Survey
7,424.00	2,632.67	102.41	-4,875.56	Projection to TD

PHOENIX TECHNOLOGY SERVICES SURVEY DATA CERTIFICATION



PHOENIX
TECHNOLOGY SERVICES

PHOENIX JOB NUMBER 1310195

OPERATOR COG Operating

WELL NAME Clydesdale 1 Fee # 1H

COUNTY & STATE Eddy, NM

API WELL NUMBER 30-015-40214

PROPOSED DIRECTION 271.25

TIE-IN DATA						
MEASURED	VERTICAL			N-S	E-W	DATA
DEPTH	DEPTH	INCLIN	AZIMUTH	COORD	COORD	SOURCE
2,149 ft	2,148.62 ft	1.86	278.09	11.41	-31.88	Gyro

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
3-Mar-13	2,241 ft	1.9	278.4

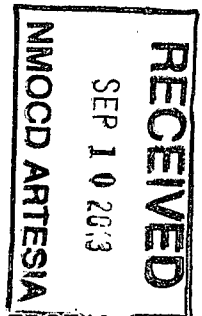
LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
9-Mar-13	7,363 ft	92.7	271

PROJECTED TD SURVEY DATE	PROJECTED TD SURVEY DEPTH	INCLIN	AZIMUTH
9-Mar-13	7,424 ft	92.7	271

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.86
DECLINATION OR GRID	GRID

SURVEY INSTRUMENT TYPE
PHOENIX MWD



TO THE BEST OF MY KNOWLEDGE I
CERTIFY THIS SURVEY DATA TO BE
TRUE AND CORRECT.

Robert D. Dillon

PRINT YOUR NAME ABOVE

Robert D. Dillon

SIGN YOUR NAME ABOVE

3-9-2013

TODAY'S DATE

MWD SUPERVISOR 1

Bob Dillon

DIRECTIONAL DRILLER 1

Andrew Hodgkins

MWD SUPERVISOR 2

Eric Burchinal

DIRECTIONAL DRILLER 2

Nathan Hodgkins

1805 Brittmore Road

Houston, Texas 77043

(713)3370609 (Voice), (713)337-0599 (Fax)

Company: COG Operating LLC (Concho)

Lease/Well: Clydesdale 1 Fee/No 001H



Rig Name: JW 4

State/County: NM/Eddy

Latitude: 32.70, Longitude: -104.43

GRID North is 0.05 Degrees West of True North

VS-Azi: 271.25 Degrees



Depth Reference : RKB = 13Ft

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: final.ut

Minimum Curvature Method

Report Date/Time: 3/12/2013 / 09:03

Vaughn Energy Services

Fort Worth, Texas

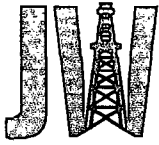
817-741-3610

Surveyor: Jay Carroll

Clydesdale 1 Fee No 001H / API 30-015-40214

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	0.71	272.92	100.00	0.03	-0.61	0.62	0.62	272.92	0.71
200.00	0.44	272.61	199.99	0.08	-1.61	1.61	1.61	272.84	0.27
300.00	0.57	263.70	299.99	0.04	-2.49	2.49	2.49	270.98	0.16
400.00	0.83	290.56	399.98	0.24	-3.67	3.67	3.67	273.76	0.41
500.00	0.92	293.12	499.97	0.81	-5.08	5.10	5.15	279.06	0.10
600.00	0.43	297.00	599.96	1.30	-6.15	6.18	6.29	281.89	0.49
700.00	0.55	311.94	699.96	1.79	-6.84	6.88	7.07	284.63	0.18
800.00	0.40	308.84	799.96	2.33	-7.47	7.52	7.83	287.30	0.15
900.00	0.58	303.37	899.95	2.83	-8.17	8.23	8.65	289.08	0.18
1000.00	0.57	301.33	999.95	3.36	-9.02	9.09	9.62	290.45	0.02
1100.00	0.37	297.94	1099.94	3.77	-9.73	9.81	10.43	291.20	0.21
1200.00	0.70	292.32	1199.94	4.15	-10.57	10.66	11.36	291.45	0.34
1300.00	0.55	301.98	1299.93	4.64	-11.54	11.64	12.44	291.89	0.18
1400.00	0.60	306.75	1399.93	5.21	-12.37	12.48	13.42	292.83	0.07
1500.00	0.98	305.41	1499.92	6.01	-13.49	13.61	14.77	294.04	0.37
1600.00	1.32	292.86	1599.90	6.96	-15.24	15.39	16.75	294.53	0.43
1700.00	1.63	292.14	1699.86	7.94	-17.63	17.79	19.33	294.25	0.31
1800.00	1.66	286.93	1799.82	8.90	-20.33	20.52	22.20	293.64	0.15

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	1.81	284.39	1899.78	9.72	-23.25	23.46	25.20	292.68	0.16
2000.00	2.00	279.93	1999.72	10.41	-26.49	26.71	28.46	291.45	0.24
2100.00	2.25	281.47	2099.65	11.10	-30.13	30.37	32.11	290.22	0.26
2149.00	1.86	278.09	2148.62	11.40	-31.86	32.10	33.84	289.69	0.83



DRILLING INC. Oil Well Drilling Contractor

Post Office Box 160 Artesia, New Mexico 88211-0160 Office (575) 748-8704 Fax (575) 748-8719

March 7, 2013

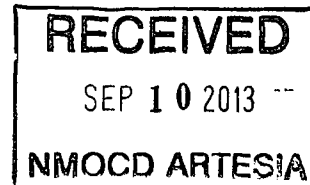
COG Operating, LLC
One Concho Center 600 W. Illinois Ave
Midland, Texas 79701

Re: Clydesdale 1 Fee # 1 H
Sec. 1, T-19-S, R-25-E
Eddy County, New Mexico

Attn: Jim Evans

The following is a Deviation Survey on the referenced well in Eddy County, New Mexico:

196' - 1°	855' - 1°	1590' - 1.25°
457' - 1°	1165' - 1°	1995' - 2°



Sincerely,

Gary W. Chappell
Contracts Manager

STATE OF NEW MEXICO)
)
COUNTY OF EDDY)

The foregoing was acknowledged before me this 7th day of March, 2013 by Gary W. Chappell.

NOTARY PUBLIC

