



COG Operating, LLC

Eddy County, NM (NAD 27)

Sec 28, T26S, R28E

Graham Nash State Com #8H

Wellbore #1

Survey: MWD

DDC Survey Report

02 June, 2014

30-015-42203

NM OIL CONSERVATION
ARTESIA DISTRICT

SEP 24 2014

RECEIVED





DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well, Graham Nash State, Com #8H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3007.0usft (Patterson #79)
Site:	Sec 28, T26S, R28E	MD Reference:	Well @ 3007.0usft (Patterson #79)
Well:	Graham Nash State, Com #8H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Eddy County, NM (NAD 27)		
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 28, T26S, R28E		
Site Position:		Northing:	371,092.90 usft
From:	Map	Easting:	572,910.50 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 1' 12.109 N
		Longitude:	104° 5' 53.100 W
		Grid Convergence:	0.12 °

Well	Graham Nash State, Com #8H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 1' 12.109 N
		Longitude:	104° 5' 53.100 W
		Ground Level:	2,989.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	4/23/2014	(°)
			7.46
			Dip Angle
			(°)
			59.84
			Field Strength
			(nT)
			48,154

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			180.72

Survey Program	Date 5/27/2014		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	7,240.0	Gyro Survey (Wellbore #1)	Good_gyro
7,334.0	14,634.0	MWD (Wellbore #1)	Good Gyro

Survey										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate	
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
Tie In @ 7240' MD / 7238' TVD										
7,240.0	2.39	227.96	7,238.1	-65.9	-86.8	66.9	0.00	0.00	0.00	
7,334.0	3.70	213.50	7,331.9	-69.7	-89.9	70.8	1.60	1.39	-15.38	
7,366.0	4.70	224.30	7,363.8	-71.5	-91.4	72.6	3.97	3.13	33.75	
7,398.0	6.70	227.60	7,395.7	-73.7	-93.7	74.9	6.33	6.25	10.31	
7,429.0	9.10	222.90	7,426.4	-76.7	-96.7	77.9	8.01	7.74	-15.16	
7,460.0	11.80	217.80	7,456.9	-81.0	-100.3	82.3	9.20	8.71	-16.45	
7,492.0	14.30	218.80	7,488.0	-86.7	-104.8	88.0	7.84	7.81	3.13	
7,523.0	17.00	216.50	7,517.9	-93.3	-109.9	94.7	8.94	8.71	-7.42	
7,555.0	19.60	214.90	7,548.3	-101.5	-115.8	102.9	8.27	8.13	-5.00	



DDC Survey Report



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Project:	Eddy County NM (NAD 27)	TVD Reference:	Well @ 3007' 0usft (Patterson #79)
Site:	Sec 28 T26S R28E	MD Reference:	Well @ 3007' 0usft (Patterson #79)
Well:	Graham Nash State Com #8H	North Reference:	Gnd
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM:5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,587.0	22.60	211.80	7,578.1	-111.1	-122.1	112.6	10.00	9.38	-9.69
7,618.0	25.70	210.00	7,606.4	-122.0	-128.6	123.6	10.28	10.00	-5.81
7,650.0	28.30	208.10	7,634.9	-134.7	-135.6	136.4	8.56	8.13	-5.94
7,682.0	31.20	207.20	7,662.7	-148.8	-143.0	150.5	9.17	9.06	-2.81
7,713.0	33.40	204.60	7,688.9	-163.7	-150.2	165.5	8.39	7.10	-8.39
7,745.0	36.90	201.90	7,715.0	-180.6	-157.5	182.6	11.97	10.94	-8.44
7,776.0	41.00	197.40	7,739.2	-198.9	-164.0	201.0	16.06	13.23	-14.52
7,808.0	45.00	194.40	7,762.6	-219.9	-169.9	222.0	14.04	12.50	-9.38
7,840.0	49.00	190.90	7,784.4	-242.8	-175.0	244.9	14.84	12.50	-10.94
7,871.0	53.40	188.00	7,803.8	-266.6	-179.0	268.8	15.95	14.19	-9.35
7,903.0	57.50	184.90	7,822.0	-292.8	-181.9	295.0	15.09	12.81	-9.69
7,934.0	61.50	182.10	7,837.7	-319.4	-183.5	321.7	15.07	12.90	-9.03
7,966.0	66.00	179.80	7,851.8	-348.1	-184.0	350.4	15.47	14.06	-7.19
7,997.0	70.10	177.10	7,863.4	-376.8	-183.2	379.1	15.50	13.23	-8.71
8,029.0	74.90	175.20	7,873.0	-407.3	-181.2	409.5	16.03	15.00	-5.94
8,059.0	79.80	174.00	7,879.6	-436.4	-178.4	438.6	16.79	16.33	-4.00
8,090.0	83.20	174.00	7,884.2	-466.9	-175.2	469.1	10.97	10.97	0.00
8,122.0	84.20	173.30	7,887.7	-498.5	-171.7	500.6	3.81	3.13	-2.19
8,154.0	86.00	172.90	7,890.4	-530.2	-167.9	532.2	5.76	5.63	-1.25
8,280.0	91.10	174.00	7,893.6	-655.2	-153.5	657.1	4.14	4.05	0.87
8,309.0	91.50	173.60	7,893.0	-684.1	-150.4	685.9	1.95	1.38	-1.38
8,404.0	92.50	175.20	7,889.7	-778.6	-141.1	780.3	1.99	1.05	1.68
8,499.0	92.60	176.80	7,885.4	-873.2	-134.5	874.8	1.69	0.11	1.68
8,593.0	92.40	178.00	7,881.3	-967.0	-130.2	968.6	1.29	-0.21	1.28
8,688.0	91.70	178.70	7,877.9	-1,061.9	-127.5	1,063.5	1.04	-0.74	0.74
8,783.0	89.30	178.60	7,877.1	-1,156.9	-125.2	1,158.4	2.53	-2.53	-0.11
8,878.0	89.70	179.60	7,877.9	-1,251.9	-123.7	1,253.3	1.13	0.42	1.05
8,973.0	90.00	180.10	7,878.2	-1,346.9	-123.5	1,348.3	0.61	0.32	0.53
9,068.0	88.10	179.60	7,879.7	-1,441.9	-123.3	1,443.3	2.07	-2.00	-0.53
9,162.0	89.30	179.80	7,881.9	-1,535.8	-122.8	1,537.3	1.29	1.28	0.21
9,257.0	91.00	180.00	7,881.6	-1,630.8	-122.6	1,632.2	1.80	1.79	0.21
9,352.0	90.20	179.80	7,880.6	-1,725.8	-122.4	1,727.2	0.87	-0.84	-0.21
9,447.0	89.50	179.30	7,880.9	-1,820.8	-121.7	1,822.2	0.91	-0.74	-0.53
9,541.0	90.30	179.30	7,881.1	-1,914.8	-120.5	1,916.2	0.85	0.85	0.00
9,637.0	88.60	178.90	7,882.0	-2,010.8	-119.0	2,012.1	1.82	-1.77	-0.42
9,733.0	89.20	178.60	7,883.8	-2,106.8	-116.9	2,108.1	0.70	0.63	-0.31
9,828.0	89.70	178.60	7,884.7	-2,201.7	-114.6	2,203.0	0.53	0.53	0.00
9,923.0	90.40	178.40	7,884.6	-2,296.7	-112.1	2,297.9	0.77	0.74	-0.21
10,015.0	90.60	178.40	7,883.8	-2,388.6	-109.6	2,389.8	0.22	0.22	0.00
10,110.0	91.70	179.60	7,881.9	-2,483.6	-107.9	2,484.8	1.71	1.16	1.26
10,204.0	90.80	179.40	7,879.9	-2,577.6	-107.1	2,578.7	0.98	-0.96	-0.21
10,299.0	89.90	180.00	7,879.3	-2,672.6	-106.6	2,673.7	1.14	-0.95	0.63
10,395.0	90.70	180.10	7,878.8	-2,768.6	-106.7	2,769.7	0.84	0.83	0.10



DDC
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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,490.0	90.10	178.60	7,878.1	-2,863.6	-105.6	2,864.7	1.70	-0.63	-1.58
10,585.0	89.60	179.80	7,878.4	-2,958.6	-104.3	2,959.6	1.37	-0.53	1.26
10,681.0	90.70	179.40	7,878.1	-3,054.5	-103.6	3,055.6	1.22	1.15	-0.42
10,777.0	90.80	180.50	7,876.9	-3,150.5	-103.5	3,151.6	1.15	0.10	1.15
10,872.0	90.10	180.30	7,876.1	-3,245.5	-104.2	3,246.6	0.77	-0.74	-0.21
10,967.0	92.30	180.30	7,874.1	-3,340.5	-104.7	3,341.6	2.32	2.32	0.00
11,062.0	92.70	181.20	7,870.0	-3,435.4	-105.9	3,436.5	1.04	0.42	0.95
11,158.0	90.30	181.20	7,867.5	-3,531.3	-107.9	3,532.4	2.50	-2.50	0.00
11,253.0	89.70	181.70	7,867.5	-3,626.3	-110.3	3,627.4	0.82	-0.63	0.53
11,348.0	88.70	181.90	7,868.8	-3,721.3	-113.3	3,722.4	1.07	-1.05	0.21
11,443.0	89.70	181.90	7,870.1	-3,816.2	-116.5	3,817.4	1.05	1.05	0.00
11,539.0	89.10	182.20	7,871.1	-3,912.1	-119.9	3,913.3	0.70	-0.63	0.31
11,634.0	89.10	181.90	7,872.6	-4,007.1	-123.3	4,008.3	0.32	0.00	-0.32
11,729.0	89.40	180.80	7,873.9	-4,102.0	-125.5	4,103.3	1.20	0.32	-1.16
11,825.0	90.00	180.50	7,874.4	-4,198.0	-126.6	4,199.3	0.70	0.63	-0.31
11,920.0	89.80	179.60	7,874.5	-4,293.0	-126.7	4,294.3	0.97	-0.21	-0.95
12,015.0	91.60	179.80	7,873.4	-4,388.0	-126.2	4,389.2	1.91	1.89	0.21
12,111.0	91.20	179.40	7,871.0	-4,484.0	-125.5	4,485.2	0.59	-0.42	-0.42
12,206.0	91.70	178.40	7,868.6	-4,578.9	-123.7	4,580.1	1.18	0.53	-1.05
12,301.0	91.40	178.40	7,866.1	-4,673.8	-121.1	4,675.0	0.32	-0.32	0.00
12,400.0	90.50	178.70	7,864.4	-4,772.8	-118.6	4,773.9	0.96	-0.91	0.30
12,495.0	91.50	178.70	7,862.8	-4,867.8	-116.4	4,868.8	1.05	1.05	0.00
12,590.0	90.30	177.90	7,861.3	-4,962.7	-113.6	4,963.7	1.52	-1.26	-0.84
12,685.0	91.70	177.10	7,859.6	-5,057.6	-109.4	5,058.6	1.70	1.47	-0.84
12,779.0	90.90	179.30	7,857.5	-5,151.5	-106.5	5,152.4	2.49	-0.85	2.34
12,875.0	89.20	180.00	7,857.4	-5,247.5	-105.9	5,248.4	1.92	-1.77	0.73
12,970.0	89.80	180.00	7,858.2	-5,342.5	-105.9	5,343.4	0.63	0.63	0.00
13,065.0	90.00	181.40	7,858.4	-5,437.5	-107.1	5,438.4	1.49	0.21	1.47
13,162.0	90.90	180.50	7,857.6	-5,534.5	-108.7	5,535.4	1.31	0.93	-0.93
13,256.0	91.30	179.60	7,855.8	-5,628.5	-108.7	5,629.4	1.05	0.43	-0.96
13,351.0	90.00	181.00	7,854.8	-5,723.4	-109.2	5,724.4	2.01	-1.37	1.47
13,446.0	88.60	181.20	7,855.9	-5,818.4	-111.1	5,819.4	1.49	-1.47	0.21
13,541.0	89.10	181.90	7,857.8	-5,913.4	-113.6	5,914.3	0.91	0.53	0.74
13,636.0	89.80	181.90	7,858.7	-6,008.3	-116.8	6,009.3	0.74	0.74	0.00
13,732.0	90.50	181.40	7,858.5	-6,104.3	-119.6	6,105.3	0.90	0.73	-0.52
13,827.0	91.40	182.20	7,856.9	-6,199.2	-122.5	6,200.3	1.27	0.95	0.84
13,923.0	90.00	181.70	7,855.7	-6,295.1	-125.8	6,296.2	1.55	-1.46	-0.52
14,018.0	89.10	182.60	7,856.5	-6,390.1	-129.4	6,391.2	1.34	-0.95	0.95
14,114.0	89.30	182.80	7,857.8	-6,486.0	-133.9	6,487.1	0.29	0.21	0.21
14,208.0	90.20	182.80	7,858.2	-6,579.8	-138.5	6,581.1	0.96	0.96	0.00
14,304.0	90.40	182.80	7,857.7	-6,675.7	-143.2	6,677.0	0.21	0.21	0.00
14,399.0	90.60	182.90	7,856.9	-6,770.6	-147.9	6,771.9	0.24	0.21	0.11
14,495.0	90.70	182.60	7,855.8	-6,866.5	-152.5	6,867.9	0.33	0.10	-0.31



DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well: Graham Nash State Com #8H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3007.0usft (Patterson #79)
Site:	Sec 28, T26S, R28E	MD Reference:	Well @ 3007.0usft (Patterson #79)
Well:	Graham Nash State Com #8H	North Reference:	Grid:
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
14,584.0	91.30	183.50	7,854.3	-6,955.3	-157.2	6,956.8	1.22	0.67	1.01
TD @ 14634' MD 7853' TVD									
14,634.0	91.30	183.50	7,853.1	-7,005.2	-160.3	7,006.7	0.00	0.00	0.00

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,240.0	7,238.1	-65.9	-86.8	Tie In @ 7240' MD / 7238' TVD
14,634.0	7,853.1	-7,005.2	-160.3	TD @ 14634' MD / 7853' TVD

Checked By: _____ Approved By: _____ Date: _____



5/19/2014

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

NM OIL CONSERVATION
ARTESIA DISTRICT
SEP 24 2014
RECEIVED

Attn: Kanicia Castillo

RE: **Graham Nash State Com No. 008H**

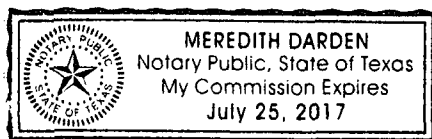
Please find enclosed a copy of the survey from 0.00' to 7240.00' ran on the above referenced well.

Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 14th day of May, A.D., 2014, by Keith Havelka.




Meredith Darden
Notary Public, State of Texas



Company: COG Operating, LLC (Concho)
Lease/Well: Graham Nash State Com /No. 008H
Location: Sec 8 T26S R28E
Rig Name: Patterson 79
State/County: New Mexico/Eddy
Latitude: 32.02, Longitude: -104.10
GRID North is 0.12 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 17.5 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ... state com #8h gyro -de_01.ut

Minimum Curvature Method

Report Date/Time: 5/16/2014 / 15:53

VES Survey International

West, Texas

432-563-5444

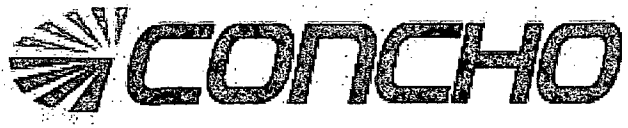
Surveyor: Chris Bankson

Graham Nash State Com No. 008H / API 30-015-42203

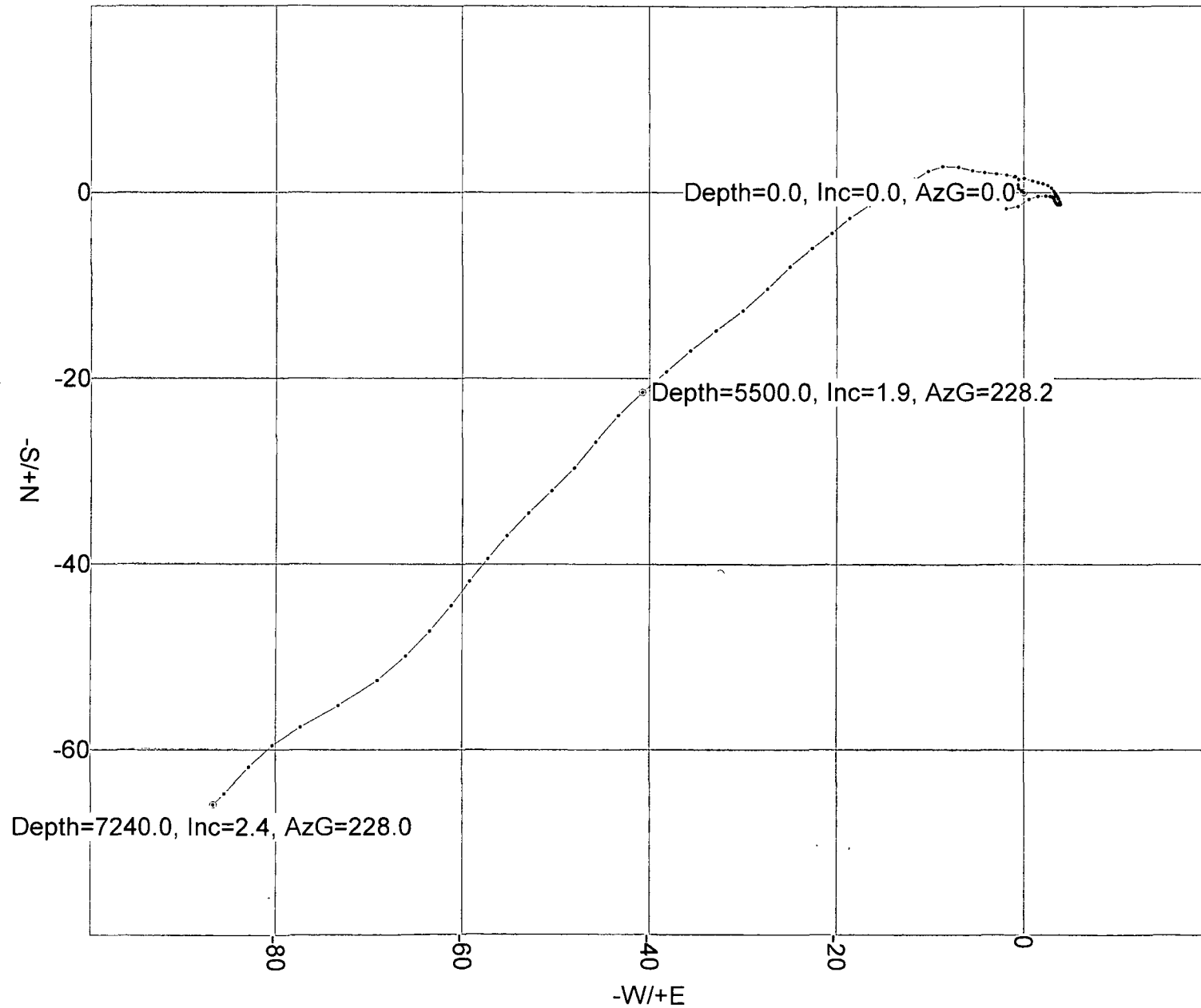
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.36	300.82	100.00	0.16	-0.27	0.16	0.31	300.82	0.36
200.00	0.13	336.19	200.00	0.42	-0.58	0.42	0.72	306.17	0.26
300.00	0.31	359.73	300.00	0.80	-0.63	0.80	1.01	321.81	0.19
400.00	0.38	10.69	400.00	1.39	-0.57	1.39	1.50	337.86	0.10
500.00	0.64	256.81	499.99	1.59	-1.05	1.59	1.91	326.66	0.87
600.00	0.96	220.26	599.98	0.83	-2.13	0.83	2.28	291.21	0.59
700.00	0.96	176.58	699.97	-0.65	-2.62	-0.65	2.70	256.08	0.71
800.00	0.80	112.09	799.96	-1.75	-1.92	-1.75	2.60	227.63	0.95
900.00	0.95	52.07	899.95	-1.51	-0.62	-1.51	1.63	202.32	0.88
1000.00	0.66	63.24	999.94	-0.74	0.55	-0.74	0.92	143.64	0.32
1100.00	0.51	81.91	1099.94	-0.42	1.50	-0.42	1.56	105.66	0.24
1200.00	0.45	92.75	1199.93	-0.38	2.32	-0.38	2.35	99.20	0.11
1300.00	0.12	101.96	1299.93	-0.42	2.81	-0.42	2.85	98.42	0.33
1400.00	0.16	109.64	1399.93	-0.49	3.05	-0.49	3.09	99.06	0.05
1500.00	0.02	141.75	1499.93	-0.55	3.20	-0.55	3.25	99.78	0.14
1600.00	0.09	178.57	1599.93	-0.65	3.22	-0.65	3.28	101.40	0.07
1700.00	0.19	160.44	1699.93	-0.89	3.27	-0.89	3.39	105.15	0.11
1800.00	0.14	133.39	1799.93	-1.13	3.42	-1.13	3.60	108.29	0.09

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.12	137.61	1899.93	-1.30	3.58	-1.30	3.81	109.88	0.02
2000.00	0.15	77.81	1999.93	-1.35	3.78	-1.35	4.01	109.63	0.14
2100.00	0.05	22.31	2099.93	-1.28	3.92	-1.28	4.12	108.10	0.12
2200.00	0.27	337.18	2199.93	-1.02	3.85	-1.02	3.98	104.91	0.24
2300.00	0.18	335.58	2299.93	-0.66	3.69	-0.66	3.75	100.17	0.09
2400.00	0.14	321.64	2399.93	-0.42	3.55	-0.42	3.57	96.81	0.06
2500.00	0.09	324.33	2499.93	-0.27	3.43	-0.27	3.44	94.43	0.05
2600.00	0.08	325.28	2599.93	-0.14	3.34	-0.14	3.34	92.43	0.01
2700.00	0.24	334.22	2699.93	0.11	3.21	0.11	3.21	88.11	0.16
2800.00	0.27	316.22	2799.93	0.47	2.95	0.47	2.99	81.03	0.09
2900.00	0.30	297.08	2899.93	0.76	2.55	0.76	2.66	73.48	0.10
3000.00	0.34	279.59	2999.92	0.93	2.03	0.93	2.23	65.48	0.10
3100.00	0.29	290.22	3099.92	1.06	1.50	1.06	1.84	54.67	0.07
3200.00	0.40	286.42	3199.92	1.25	0.93	1.25	1.56	36.51	0.11
3300.00	0.66	285.38	3299.92	1.50	0.03	1.50	1.50	1.31	0.26
3400.00	0.47	280.33	3399.91	1.73	-0.92	1.73	1.96	331.92	0.20
3500.00	0.62	277.19	3499.91	1.87	-1.86	1.87	2.63	315.18	0.15
3600.00	0.68	274.20	3599.90	1.98	-2.98	1.98	3.58	303.56	0.07
3700.00	0.78	277.21	3699.89	2.11	-4.25	2.11	4.75	296.37	0.11
3800.00	0.74	285.12	3799.88	2.36	-5.55	2.36	6.03	293.05	0.11
3900.00	0.99	282.83	3899.87	2.72	-7.02	2.72	7.52	291.20	0.25
4000.00	0.97	261.86	3999.86	2.79	-8.69	2.79	9.13	287.82	0.36
4100.00	0.91	238.39	4099.85	2.26	-10.20	2.26	10.45	282.48	0.39
4200.00	1.07	239.89	4199.83	1.37	-11.69	1.37	11.77	276.70	0.16
4300.00	0.90	239.85	4299.82	0.51	-13.17	0.51	13.18	272.22	0.17
4400.00	0.97	241.23	4399.80	-0.29	-14.59	-0.29	14.59	268.86	0.08
4500.00	1.51	239.58	4499.78	-1.36	-16.47	-1.36	16.52	265.26	0.54
4600.00	1.43	232.88	4599.75	-2.78	-18.60	-2.78	18.80	261.48	0.19
4700.00	1.40	226.08	4699.72	-4.39	-20.48	-4.39	20.94	257.90	0.17
4800.00	1.70	237.84	4799.68	-6.03	-22.62	-6.03	23.41	255.07	0.44
4900.00	1.85	224.68	4899.63	-7.97	-25.01	-7.97	26.25	252.33	0.43
5000.00	2.05	225.98	4999.57	-10.36	-27.43	-10.36	29.32	249.31	0.20
5100.00	2.02	230.43	5099.51	-12.73	-30.08	-12.73	32.66	247.07	0.16
5200.00	2.07	235.62	5199.45	-14.87	-32.93	-14.87	36.13	245.70	0.19
5300.00	1.91	227.41	5299.39	-17.02	-35.65	-17.02	39.50	244.48	0.33
5400.00	1.96	229.80	5399.33	-19.25	-38.18	-19.25	42.76	243.24	0.10
5500.00	1.94	228.16	5499.27	-21.48	-40.75	-21.48	46.06	242.20	0.06
5600.00	2.17	223.75	5599.21	-23.98	-43.32	-23.98	49.51	241.03	0.28
5700.00	2.16	217.29	5699.14	-26.85	-45.77	-26.85	53.06	239.61	0.24

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	1.97	220.24	5799.07	-29.66	-48.02	-29.66	56.44	238.30	0.22
5900.00	1.96	228.40	5899.01	-32.11	-50.41	-32.11	59.77	237.51	0.28
6000.00	2.00	223.10	5998.95	-34.52	-52.88	-34.52	63.15	236.87	0.19
6100.00	1.84	223.73	6098.90	-36.95	-55.18	-36.95	66.41	236.20	0.16
6200.00	1.81	216.47	6198.85	-39.38	-57.23	-39.38	69.47	235.47	0.23
6300.00	1.81	221.27	6298.80	-41.84	-59.22	-41.84	72.51	234.76	0.15
6400.00	1.94	213.60	6398.74	-44.44	-61.20	-44.44	75.64	234.01	0.28
6500.00	2.15	225.30	6498.68	-47.17	-63.47	-47.17	79.08	233.38	0.46
6600.00	2.10	221.65	6598.61	-49.86	-66.02	-49.86	82.73	232.94	0.14
6700.00	2.55	234.66	6698.53	-52.51	-69.05	-52.51	86.74	232.75	0.69
6800.00	3.16	239.36	6798.40	-55.20	-73.23	-55.20	91.71	232.99	0.66
6900.00	2.27	242.05	6898.29	-57.54	-77.36	-57.54	96.41	233.36	0.90
7000.00	1.86	230.24	6998.23	-59.51	-80.36	-59.51	99.99	233.48	0.59
7100.00	2.08	225.20	7098.17	-61.83	-82.90	-61.83	103.41	233.28	0.28
7200.00	2.47	221.70	7198.09	-64.71	-85.62	-64.71	107.32	232.92	0.41
7240.00	2.39	227.96	7238.05	-65.91	-86.81	-65.91	109.00	232.79	0.69



VES Survey International
West, Texas
432-563-5444
Surveyor: Chris Bankson
Graham Nash State Com No. 008H / API 30-015-42203



VES Survey Date: 05/11/2014



Survey Certification Sheet

COG Operating, LLC
Company

WT-140408
Job Number

5/29/14
Date

Sec 28, T26S, R28E
Lease

Graham Nash State Com #8H
Well Name

Eddy, NM
County & State

API: 30-015-42203

Surveyed from a depth of: 7240 feet to 14634 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Marty White

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Digitally signed by Larry Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company,
ou=GM of Guidance Services,
email=larryw@directionaldrillers.co
m, c=US
Date: 2014.06.02 11:38:32 -05'00'

Larry Wright
MWD General Manager