



February 12, 2015

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

30-025-42375

HOBBS OGD

APR 09 2015

RECEIVED

Attn: Kanicia Castillo

RE: Flat Head Fed Com 8H

Please find enclosed a copy of the survey from 0.00' to 5310.00' 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.

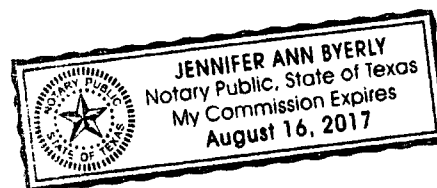
Sincerely,

Kimberly D Moller
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 12 day of Feb,
A.D., 2015, by Kimberly D Moller.

Jennifer Ann Byerly
Notary Public, State of Texas



APR 22 2015



Company: COG Operating
Lease/Well: Flat Head Fed Com/8H
Location: S14 T17S R32E
Rig Name: United 43
State/County: New Mexico/Lea
Latitude: 32.84, Longitude: -103.73
GRID North is 0.33 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 14 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 2/12/2015 / 16:36

VES Survey International
Midland, TX
432-563-5444

Surveyor: Andrew Askew
Flat Head Fed Com 8H / API 30-025-42375

HOBBSOCD

APR 09 2015

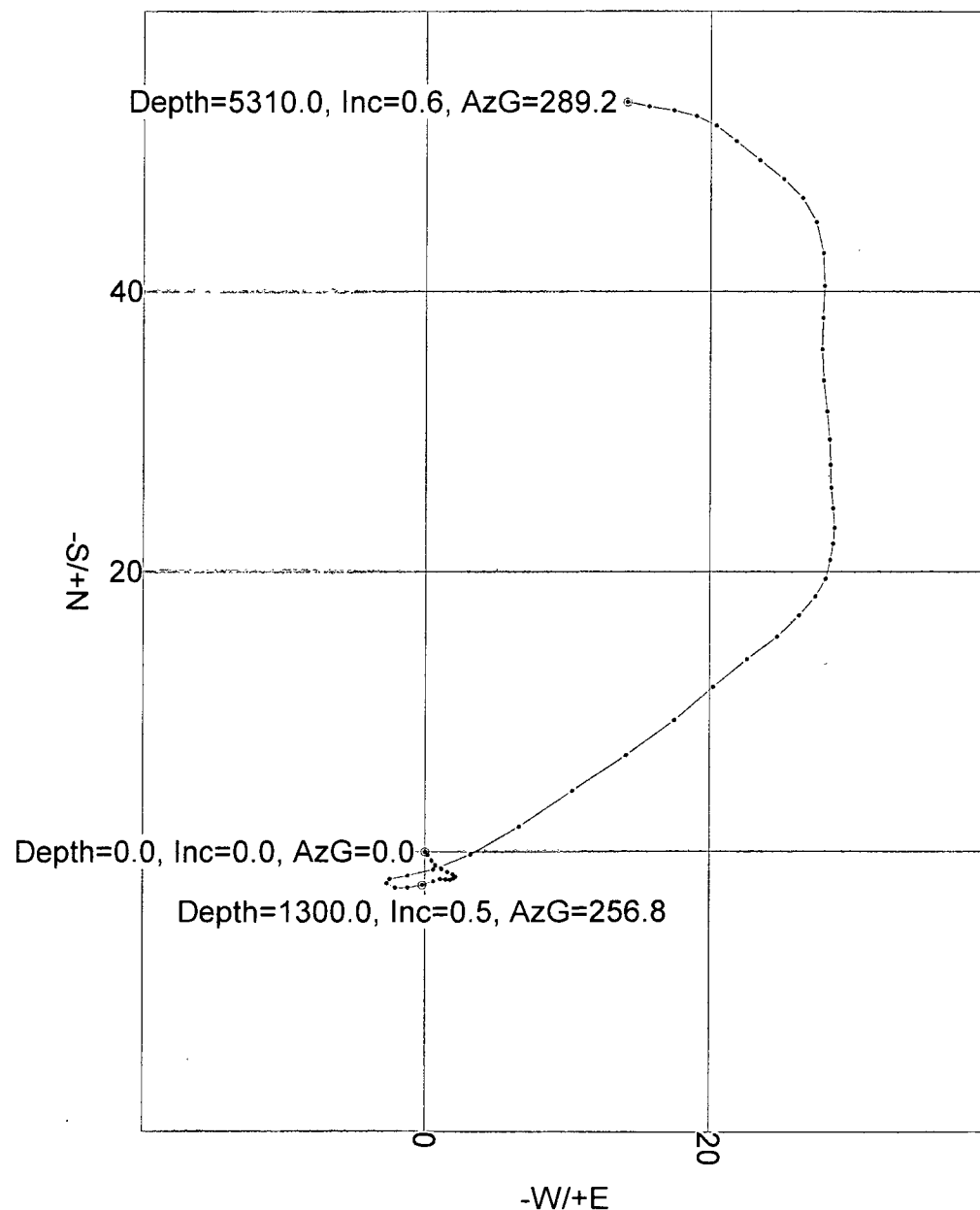
RECEIVED

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	0.34	139.40	100.00	-0.23	0.19	-0.23	0.30	139.40	0.34
200.00	0.23	154.49	200.00	-0.64	0.48	-0.64	0.79	143.17	0.14
300.00	0.26	131.20	300.00	-0.97	0.74	-0.97	1.22	142.78	0.11
400.00	0.31	115.92	400.00	-1.24	1.16	-1.24	1.70	137.02	0.09
500.00	0.23	115.49	499.99	-1.45	1.59	-1.45	2.15	132.40	
600.00	0.24	115.76	599.99	-1.63	1.96	-1.63	2.55	129.71	0.
700.00	0.09	176.67	699.99	-1.80	2.15	-1.80	2.81	129.90	0.21
800.00	0.18	252.96	799.99	-1.93	2.01	-1.93	2.78	133.91	0.19
900.00	0.09	252.96	899.99	-2.00	1.77	-2.00	2.67	138.43	0.09
1000.00	0.27	279.22	999.99	-1.99	1.47	-1.99	2.47	143.56	0.19
1100.00	0.19	265.17	1099.99	-1.96	1.07	-1.96	2.24	151.35	0.10
1200.00	0.41	245.35	1199.99	-2.13	0.58	-2.13	2.21	164.70	0.24
1300.00	0.53	256.81	1299.99	-2.38	-0.20	-2.38	2.39	184.69	0.15
1400.00	0.67	261.10	1399.98	-2.58	-1.22	-2.58	2.85	205.34	0.14
1500.00	0.37	286.76	1499.98	-2.58	-2.10	-2.58	3.32	219.20	0.37
1600.00	0.41	305.65	1599.98	-2.28	-2.70	-2.28	3.53	229.83	0.13
1700.00	0.61	77.70	1699.97	-1.96	-2.47	-1.96	3.15	231.58	0.94
1800.00	0.84	79.60	1799.97	-1.71	-1.22	-1.71	2.10	215.61	0.23

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	1.29	74.51	1899.95	-1.28	0.58	-1.28	1.40	155.50	0.46
2000.00	1.99	63.70	1999.91	-0.20	3.23	-0.20	3.23	93.62	0.77
2100.00	2.58	56.68	2099.83	1.80	6.67	1.80	6.91	74.87	0.65
2200.00	2.60	54.75	2199.72	4.35	10.41	4.35	11.28	67.31	0.09
2300.00	2.59	57.04	2299.62	6.89	14.16	6.89	15.75	64.04	0.10
2400.00	2.26	49.30	2399.53	9.41	17.55	9.41	19.92	61.81	0.47
2500.00	1.86	47.48	2499.47	11.79	20.24	11.79	23.42	59.78	0.41
2600.00	1.68	53.90	2599.42	13.75	22.62	13.75	26.47	58.71	0.27
2700.00	1.37	50.98	2699.38	15.36	24.73	15.36	29.11	58.15	0.32
2800.00	1.13	39.25	2799.36	16.88	26.28	16.88	31.23	57.29	0.35
2900.00	0.92	41.29	2899.34	18.25	27.44	18.25	32.95	56.37	0.22
3000.00	0.77	16.25	2999.33	19.50	28.16	19.50	34.25	55.29	0.07
3100.00	0.79	11.29	3099.32	20.82	28.48	20.82	35.28	53.83	0.07
3200.00	0.57	8.44	3199.32	21.99	28.69	21.99	36.15	52.53	0.22
3300.00	0.74	1.93	3299.31	23.13	28.78	23.13	36.93	51.21	0.19
3400.00	0.86	350.97	3399.30	24.52	28.69	24.52	37.74	49.48	0.19
3500.00	0.85	358.29	3499.29	26.00	28.55	26.00	38.61	47.67	0.11
3600.00	1.02	357.74	3599.28	27.63	28.49	27.63	39.69	45.88	0.16
3700.00	1.06	358.47	3699.26	29.44	28.43	29.44	40.92	44.00	0.04
3800.00	1.26	351.85	3799.24	31.45	28.25	31.45	42.27	41.94	0.24
3900.00	1.29	354.62	3899.21	33.66	27.99	33.66	43.77	39.75	0.07
4000.00	1.26	359.68	3999.19	35.88	27.88	35.88	45.44	37.84	0.12
4100.00	1.31	2.94	4099.16	38.12	27.93	38.12	47.26	36.23	0.09
4200.00	1.30	2.51	4199.14	40.40	28.04	40.40	49.18	34.76	0.01
4300.00	1.38	353.60	4299.11	42.73	27.95	42.73	51.06	33.19	0.22
4400.00	1.24	340.55	4399.09	44.95	27.46	44.95	52.67	31.42	0.07
4500.00	1.08	318.41	4499.07	46.67	26.47	46.67	53.66	29.56	0.07
4600.00	1.14	310.36	4599.05	48.02	25.09	48.02	54.18	27.59	0.17
4700.00	1.31	307.64	4699.02	49.36	23.43	49.36	54.64	25.40	0.18
4800.00	1.15	311.20	4799.00	50.71	21.78	50.71	55.19	23.24	0.18
4900.00	0.92	305.07	4898.98	51.84	20.36	51.84	55.69	21.45	0.26
5000.00	0.85	286.38	4998.97	52.50	19.00	52.50	55.84	19.89	0.30
5100.00	1.02	283.17	5098.96	52.92	17.42	52.92	55.71	18.23	0.18
5200.00	1.00	276.14	5198.94	53.21	15.69	53.21	55.48	16.43	0.12
5310.00	0.65	289.24	5308.93	53.52	14.15	53.52	55.36	14.81	0.36



VES Survey International
Midland, TX
432-563-5444
Surveyor: Andrew Askew
Flat Head Fed Com 8H / API 30-025-42375



VES Survey Date: 02/05/2015

APR 09 2015

1 of 2

RECEIVED

WELL NAME AND NUMBER Flat Head Federal Com No. 8HLOCATION Section 14, T17S, R32E, Unit A, 1170-FNL, 330 FEL, Lea CountyOPERATOR COG Operating LLCDRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

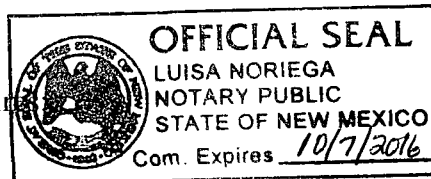
Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
.3° @ 307'	7.7° @ 5500'	82.9° @ 6226'
.7° @ 671'	11.4° @ 5532'	86.6° @ 6258'
.4° @ 1135'	22.3° @ 5626'	89.2° @ 6289'
.4° @ 1493'	24.9° @ 5658'	89.6° @ 6449'
.9° @ 1874'	21.6° @ 5690'	90.1° @ 6539'
2.6° @ 2284'	29.8° @ 5721'	89.0° @ 6634'
2.8° @ 2360'	34.3° @ 5753'	89.0° @ 6728'
1.3° @ 2667'	39.0° @ 5785'	89.4° @ 6823'
.6° @ 2982'	43.9° @ 5816'	89.1° @ 6918'
.8° @ 3301'	47.7° @ 5848'	89.4° @ 7012'
.9° @ 3606'	51.0° @ 5880'	89.9° @ 7107'
1.2° @ 3917'	53.9° @ 5911'	90.3° @ 7201'
1.2° @ 4232'	56.9° @ 5942'	90.1° @ 7391'
1.9° @ 4519'	59.3° @ 5974'	91.1° @ 7485'
1.1° @ 4834'	65.8° @ 6069'	89.9° @ 7580'
.9° @ 5116'	69.5° @ 6100'	89.3° @ 7769'
.5° @ 5309'	73.6° @ 6132'	90.2° @ 7564'
3.5° @ 5469'	29.2° @ 6195'	91.3° @ 7957'

Drilling Contractor- UNITED DRILLING, INC.By: *Angel Salazar*

(Angel Salazar)

Title: Vice PresidentSubscribed and sworn to before me this 19th day of February 2015.*Luisa Noriega*
Notary PublicChaves
CountyNM
State

My Commission Expires



APR 09 2015

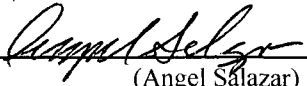
2 of 2

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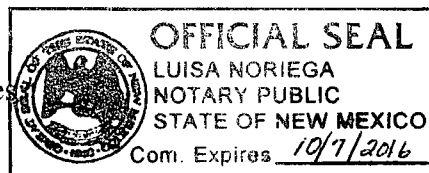
WELL NAME AND NUMBER Flat Head Federal Com No. 8HLOCATION Section 14, T17S, R32E, Unit A, 1170 FNL, 330 FEL, Lea CountyOPERATOR COG Operating LLCDRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
90.0° @ 8052'	88.8° @ 9754'	
91.2° @ 8147'	89.9° @ 9849'	
90.7° @ 8241'	90.1° @ 9943'	
89.4° @ 8336'	89.8° @ 10038'	
88.4° @ 8430'	91.2° @ 10227'	
88.4° @ 8525'	91.1° @ 10321'	
88.6° @ 8620'	91.0° @ 10416'	
88.7° @ 8714'	91.3° @ 10511'	
88.7° @ 8809'	90.6° @ 10700'	
88.4° @ 8903'	91.2° @ 10889'	
89.7° @ 9093'	90.6° @ 10983'	
90.5° @ 9187'	89.3° @ 11078'	
90.8° @ 9282'	90.4° @ 11266'	
90.9° @ 9376'	91.1° @ 11361'	
91.3° @ 9471'	91.0° @ 11456'	
89.3° @ 9566'	91.3° @ 11551'	
89.2° @ 9660'	90.0° @ 11646'	
29.2° @ 6195'	90.8° @ 11708'	

Drilling Contractor- UNITED DRILLING, INC.By: 
(Angel Salazar)Title: Vice PresidentSubscribed and sworn to before me this 19th day of February 2015.
Notary PublicCharles NM
County State

My Commission Expires





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APR 09 2015

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COG Operating LLC

Lea County, New Mexico

Flat Head Federal Com

No. 8H

OH

Survey: ProDirectional

Survey Report

16 February, 2015





Professional Directional
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No: 8H
Project:	Lea County New Mexico	TVD Reference:	WELL @ 4119.00usft (Original Well Elev)
Site:	Flat Head Federal Com	MD Reference:	WELL @ 4119.00usft (Original Well Elev)
Well:	No: 8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Well Planner1

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	Flat Head Federal Com		
Site Position:		Northing:	669,324.90 usft
From:	Map	Easting:	684,275.70 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 50' 19.038 N
		Longitude:	103° 44' 0.115 W
		Grid Convergence:	0.33 °

Well	No: 8H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty		0.00 usft	Wellhead Elevation:
			usft
			Latitude:
			Longitude:
			Ground Level:
			4,107.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	2/16/2015	7.25
			Dip Angle
			(°)
			60.63
			Field Strength
			(nT)
			48,595

Design	OH		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			359.35



Professional Directional
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No. 8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 4119.00usft (Original Well Elev)
Site:	Flat Head Federal Com	MD Reference:	WELL @ 4119.00usft (Original Well Elev)
Well:	No. 8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Well_Planner1

Survey Program		Date: 2/16/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	5,310.00	Survey #1 (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
5,406.00	11,762.00	Survey #2 (OH)	MWD	MWD - Standard	

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	669,280.40	685,595.80
100.00	0.34	139.40	100.00	-0.23	-0.23	0.19	0.30	139.40	669,280.17	685,595.99
200.00	0.23	154.49	200.00	-0.64	-0.63	0.47	0.79	143.20	669,279.77	685,596.27
300.00	0.26	131.20	300.00	-0.97	-0.96	0.73	1.21	142.82	669,279.44	685,596.53
400.00	0.31	115.92	400.00	-1.24	-1.23	1.14	1.68	137.08	669,279.17	685,596.94
500.00	0.23	115.49	499.99	-1.45	-1.43	1.57	2.13	132.45	669,278.97	685,597.37
600.00	0.24	115.76	599.99	-1.63	-1.61	1.94	2.52	129.75	669,278.79	685,597.74
700.00	0.09	176.67	699.99	-1.81	-1.78	2.13	2.78	129.89	669,278.62	685,597.93
800.00	0.18	252.96	799.99	-1.93	-1.91	1.99	2.75	133.83	669,278.49	685,597.79
900.00	0.09	252.96	899.99	-1.99	-1.97	1.76	2.65	138.29	669,278.43	685,597.56
1,000.00	0.27	279.22	999.99	-1.98	-1.96	1.45	2.44	143.46	669,278.44	685,597.25
1,100.00	0.19	265.17	1,099.99	-1.95	-1.94	1.05	2.21	151.42	669,278.46	685,596.85
1,200.00	0.41	245.35	1,199.99	-2.11	-2.10	0.56	2.17	164.95	669,278.30	685,596.36
1,300.00	0.53	256.81	1,299.99	-2.35	-2.35	-0.21	2.36	185.12	669,278.05	685,595.59
1,400.00	0.67	261.10	1,399.98	-2.54	-2.55	-1.24	2.84	205.91	669,277.85	685,594.56
1,500.00	0.37	286.76	1,499.98	-2.52	-2.55	-2.13	3.32	219.84	669,277.85	685,593.67
1,600.00	0.41	305.65	1,599.98	-2.21	-2.25	-2.73	3.53	230.51	669,278.15	685,593.07
1,700.00	0.61	77.70	1,699.97	-1.90	-1.92	-2.50	3.15	232.37	669,278.48	685,593.30
1,800.00	0.84	79.60	1,799.97	-1.66	-1.68	-1.26	2.10	216.79	669,278.72	685,594.54
1,900.00	1.29	74.51	1,899.95	-1.25	-1.25	0.55	1.36	156.15	669,279.15	685,596.35
2,000.00	1.99	63.70	1,999.91	-0.21	-0.18	3.19	3.20	93.15	669,280.22	685,598.99



Professional Directional
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No: 8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 4119.00usft (Original Well Elev)
Site:	Flat Head Federal Com	MD Reference:	WELL @ 4119.00usft (Original Well Elev)
Well:	No. 8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Well_Planner1

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
2,100.00	2.58	56.68	2,099.83	1.75	1.83	6.63	6.88	74.57	669,282.23	685,602.43	
2,200.00	2.60	54.75	2,199.72	4.26	4.38	10.36	11.25	67.11	669,284.78	685,606.16	
2,300.00	2.59	57.04	2,299.62	6.75	6.91	14.11	15.71	63.90	669,287.31	685,609.91	
2,400.00	2.26	49.30	2,399.53	9.23	9.43	17.50	19.88	61.69	669,289.83	685,613.30	
2,500.00	1.86	47.48	2,499.47	11.58	11.81	20.19	23.39	59.67	669,292.21	685,615.99	
2,600.00	1.68	53.90	2,599.42	13.51	13.77	22.57	26.44	58.61	669,294.17	685,618.37	
2,700.00	1.37	50.98	2,699.38	15.11	15.39	24.69	29.09	58.06	669,295.79	685,620.49	
2,800.00	1.13	39.25	2,799.36	16.61	16.90	26.24	31.21	57.21	669,297.30	685,622.04	
2,900.00	0.92	41.29	2,899.34	17.96	18.27	27.39	32.93	56.30	669,298.67	685,623.19	
3,000.00	0.77	16.25	2,999.33	19.20	19.52	28.11	34.22	55.22	669,299.92	685,623.91	
3,100.00	0.79	11.29	3,099.32	20.52	20.84	28.43	35.25	53.76	669,301.24	685,624.23	
3,200.00	0.57	8.44	3,199.32	21.68	22.01	28.64	36.12	52.46	669,302.41	685,624.44	
3,300.00	0.74	1.93	3,299.31	22.82	23.15	28.74	36.90	51.15	669,303.55	685,624.54	
3,400.00	0.86	350.97	3,399.30	24.21	24.53	28.64	37.71	49.42	669,304.93	685,624.44	
3,500.00	0.85	358.29	3,499.29	25.69	26.02	28.50	38.59	47.61	669,306.42	685,624.30	
3,600.00	1.02	357.74	3,599.28	27.32	27.65	28.44	39.66	45.81	669,308.05	685,624.24	
3,700.00	1.06	358.47	3,699.26	29.14	29.46	28.38	40.91	43.93	669,309.86	685,624.18	
3,800.00	1.26	351.85	3,799.24	31.15	31.47	28.20	42.26	41.86	669,311.87	685,624.00	
3,900.00	1.29	354.62	3,899.22	33.36	33.68	27.94	43.76	39.68	669,314.08	685,623.74	
4,000.00	1.26	359.68	3,999.19	35.58	35.90	27.83	45.42	37.78	669,316.30	685,623.63	
4,100.00	1.31	2.94	4,099.17	37.82	38.14	27.88	47.25	36.17	669,318.54	685,623.68	
4,200.00	1.30	2.51	4,199.14	40.10	40.42	27.99	49.16	34.70	669,320.82	685,623.79	
4,300.00	1.38	353.60	4,299.11	42.43	42.75	27.90	51.05	33.14	669,323.15	685,623.70	
4,400.00	1.24	340.55	4,399.09	44.65	44.97	27.41	52.66	31.37	669,325.37	685,623.21	
4,500.00	1.08	318.41	4,499.07	46.39	46.69	26.42	53.65	29.51	669,327.09	685,622.22	
4,600.00	1.14	310.36	4,599.05	47.75	48.04	25.04	54.17	27.53	669,328.44	685,620.84	
4,700.00	1.31	307.64	4,699.02	49.11	49.38	23.38	54.64	25.33	669,329.78	685,619.18	



Professional Directional
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well No. 8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 4119.00usft (Original Well Elev)
Site:	Flat-Head Federal Com	MD Reference:	WELL @ 4119.00usft (Original Well Elev)
Well:	No. 8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Well_Planner1

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V_Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
4,800.00	1.15	311.20	4,799.00	50.49	50.74	21.72	55.19	23.17	669,331.14	685,617.52	
4,900.00	0.92	305.07	4,898.99	51.63	51.86	20.31	55.70	21.38	669,332.26	685,616.11	
5,000.00	0.85	286.38	4,998.97	52.32	52.53	18.94	55.84	19.82	669,332.93	685,614.74	
5,100.00	1.02	283.17	5,098.96	52.75	52.95	17.36	55.72	18.15	669,333.35	685,613.16	
5,200.00	1.00	276.14	5,198.94	53.06	53.24	15.62	55.49	16.35	669,333.64	685,611.42	
5,310.00	0.65	289.24	5,308.93	53.39	53.55	14.08	55.37	14.73	669,333.95	685,609.88	
Last Gyro: 5,310' MD											
5,406.00	0.80	286.30	5,404.93	53.77	53.92	12.92	55.44	13.48	669,334.32	685,608.72	
Pro MWD First Survey: 5,406' MD											
5,438.00	0.80	300.40	5,436.92	53.95	54.09	12.52	55.52	13.03	669,334.49	685,608.32	
5,469.00	3.50	336.10	5,467.90	54.93	55.07	11.95	56.35	12.24	669,335.47	685,607.75	
5,500.00	7.70	342.30	5,498.74	57.79	57.91	10.93	58.94	10.69	669,338.31	685,606.73	
5,532.00	11.40	345.20	5,530.30	62.90	63.01	9.47	63.72	8.55	669,343.41	685,605.27	
5,563.00	14.90	347.50	5,560.48	69.78	69.87	7.82	70.31	6.39	669,350.27	685,603.62	
5,595.00	18.60	347.50	5,591.11	78.80	78.87	5.83	79.09	4.23	669,359.27	685,601.63	
5,626.00	22.30	346.60	5,620.16	89.38	89.42	3.40	89.49	2.17	669,369.82	685,599.20	
5,658.00	24.90	348.90	5,649.48	101.93	101.94	0.69	101.95	0.39	669,382.34	685,596.49	
5,690.00	26.60	350.10	5,678.30	115.63	115.61	-1.84	115.63	359.09	669,396.01	685,593.96	
5,721.00	29.80	352.60	5,705.62	130.13	130.09	-4.02	130.15	358.23	669,410.49	685,591.78	
5,753.00	34.30	355.20	5,732.73	147.03	146.97	-5.80	147.09	357.74	669,427.37	685,590.00	
5,785.00	39.00	356.20	5,758.40	166.09	166.01	-7.23	166.17	357.51	669,446.41	685,588.57	
5,816.00	43.90	356.60	5,781.63	186.57	186.49	-8.51	186.68	357.39	669,466.89	685,587.29	
5,848.00	47.70	357.20	5,803.93	209.49	209.39	-9.75	209.62	357.33	669,489.79	685,586.05	
5,880.00	51.00	357.60	5,824.78	233.75	233.64	-10.85	233.89	357.34	669,514.04	685,584.95	
5,911.00	53.90	358.00	5,843.67	258.32	258.20	-11.79	258.47	357.39	669,538.60	685,584.01	
5,942.00	56.90	358.40	5,861.27	283.83	283.70	-12.59	283.98	357.46	669,564.10	685,583.21	
5,974.00	59.30	358.50	5,878.18	310.99	310.86	-13.32	311.14	357.55	669,591.26	685,582.48	



Professional Directional
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No. 8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 4119.00usft (Original Well Elev)
Site:	Flat Head Federal Com.	MD Reference:	WELL @ 4119.00usft (Original Well Elev)
Well:	No. 8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Well_Planner1

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
6,005.00	61.20	358.70	5,893.56	337.90	337.76	-13.98	338.05	357.63	669,618.16	685,581.82
6,037.00	63.10	358.00	5,908.51	366.19	366.04	-14.80	366.34	357.69	669,646.44	685,581.00
6,069.00	65.80	356.70	5,922.31	395.03	394.88	-16.13	395.21	357.66	669,675.28	685,579.67
6,100.00	69.40	355.00	5,934.12	423.64	423.46	-18.21	423.85	357.54	669,703.86	685,577.59
6,132.00	73.60	354.70	5,944.27	453.88	453.67	-20.94	454.16	357.36	669,734.07	685,574.86
6,163.00	76.00	355.00	5,952.40	483.70	483.47	-23.62	484.04	357.20	669,763.87	685,572.18
6,195.00	79.20	355.20	5,959.27	514.87	514.60	-26.29	515.27	357.08	669,795.00	685,569.51
6,226.00	82.90	355.30	5,964.09	545.41	545.11	-28.83	545.87	356.97	669,825.51	685,566.97
6,258.00	86.60	356.40	5,967.02	577.21	576.89	-31.13	577.73	356.91	669,857.29	685,564.67
6,289.00	89.20	357.40	5,968.16	608.15	607.82	-32.81	608.70	356.91	669,888.22	685,562.99
6,323.00	90.10	358.00	5,968.36	642.14	641.79	-34.17	642.70	356.95	669,922.19	685,561.63
6,354.00	90.60	358.00	5,968.18	673.13	672.77	-35.25	673.70	357.00	669,953.17	685,560.55
6,449.00	89.60	358.80	5,968.01	768.11	767.73	-37.90	768.67	357.17	670,048.13	685,557.90
6,539.00	90.10	358.70	5,968.25	858.11	857.71	-39.87	858.64	357.34	670,138.11	685,555.93
6,634.00	89.00	359.10	5,968.99	953.10	952.69	-41.69	953.60	357.49	670,233.09	685,554.11
6,728.00	89.00	359.30	5,970.63	1,047.09	1,046.67	-43.00	1,047.55	357.65	670,327.07	685,552.80
6,823.00	89.40	358.90	5,971.96	1,142.08	1,141.64	-44.50	1,142.51	357.77	670,422.04	685,551.30
6,918.00	89.10	0.00	5,973.20	1,237.07	1,236.63	-45.41	1,237.46	357.90	670,517.03	685,550.39
7,012.00	89.40	0.10	5,974.43	1,331.05	1,330.62	-45.33	1,331.39	358.05	670,611.02	685,550.47
7,107.00	89.90	359.90	5,975.01	1,426.04	1,425.62	-45.33	1,426.34	358.18	670,706.02	685,550.47
7,201.00	90.30	359.20	5,974.85	1,520.04	1,519.62	-46.06	1,520.31	358.26	670,800.02	685,549.74
7,296.00	89.50	0.50	5,975.01	1,615.03	1,614.61	-46.31	1,615.28	358.36	670,895.01	685,549.49
7,391.00	90.10	0.20	5,975.35	1,710.02	1,709.61	-45.73	1,710.22	358.47	670,990.01	685,550.07
7,485.00	91.10	359.70	5,974.36	1,804.01	1,803.60	-45.81	1,804.18	358.54	671,084.00	685,549.99
7,580.00	89.90	0.20	5,973.53	1,899.00	1,898.60	-45.90	1,899.15	358.62	671,179.00	685,549.90
7,675.00	90.70	0.10	5,973.04	1,993.98	1,993.59	-45.65	1,994.12	358.69	671,273.99	685,550.15
7,769.00	89.30	0.70	5,973.04	2,087.97	2,087.59	-44.99	2,088.07	358.77	671,367.99	685,550.81



Professional Directional
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No. 8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 4119.00usft (Original Well Elev)
Site:	Flat Head Federal Com	MD Reference:	WELL @ 4119.00usft (Original Well Elev)
Well:	No. 8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Well_Planner1

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
7,864.00	90.20	0.60	5,973.45	2,182.94	2,182.58	-43.92	2,183.02	358.85	671,462.98	685,551.88	
7,957.00	91.30	0.90	5,972.23	2,275.90	2,275.56	-42.70	2,275.96	358.93	671,555.96	685,553.10	
8,052.00	90.40	0.40	5,970.82	2,370.87	2,370.55	-41.62	2,370.91	358.99	671,650.95	685,554.18	
8,147.00	91.20	0.10	5,969.50	2,465.84	2,465.54	-41.21	2,465.88	359.04	671,745.94	685,554.59	
8,241.00	90.70	359.90	5,967.94	2,559.82	2,559.52	-41.21	2,559.85	359.08	671,839.92	685,554.59	
8,336.00	89.40	359.80	5,967.86	2,654.82	2,654.52	-41.45	2,654.84	359.11	671,934.92	685,554.35	
8,430.00	88.40	358.90	5,969.66	2,748.80	2,748.49	-42.52	2,748.82	359.11	672,028.89	685,553.28	
8,525.00	88.40	358.90	5,972.31	2,843.76	2,843.44	-44.34	2,843.79	359.11	672,123.84	685,551.46	
8,620.00	88.60	358.90	5,974.80	2,938.72	2,938.39	-46.17	2,938.75	359.10	672,218.79	685,549.63	
8,714.00	88.70	358.80	5,977.01	3,032.69	3,032.34	-48.05	3,032.73	359.09	672,312.74	685,547.75	
8,809.00	88.70	358.30	5,979.17	3,127.66	3,127.29	-50.46	3,127.70	359.08	672,407.69	685,545.34	
8,903.00	88.40	358.10	5,981.55	3,221.61	3,221.21	-53.41	3,221.66	359.05	672,501.61	685,542.39	
8,998.00	89.90	358.20	5,982.96	3,316.58	3,316.15	-56.47	3,316.63	359.02	672,596.55	685,539.33	
9,093.00	89.70	359.50	5,983.29	3,411.57	3,411.13	-58.38	3,411.63	359.02	672,691.53	685,537.42	
9,187.00	90.50	0.30	5,983.12	3,505.56	3,505.13	-58.54	3,505.62	359.04	672,785.53	685,537.26	
9,282.00	90.80	0.30	5,982.05	3,600.55	3,600.12	-58.05	3,600.59	359.08	672,880.52	685,537.75	
9,376.00	90.90	0.30	5,980.65	3,694.52	3,694.11	-57.56	3,694.56	359.11	672,974.51	685,538.24	
9,471.00	91.30	0.90	5,978.83	3,789.48	3,789.08	-56.56	3,789.51	359.14	673,069.48	685,539.24	
9,566.00	89.30	0.50	5,978.33	3,884.45	3,884.07	-55.40	3,884.47	359.18	673,164.47	685,540.40	
9,660.00	89.20	0.20	5,979.56	3,978.43	3,978.06	-54.83	3,978.44	359.21	673,258.46	685,540.97	
9,754.00	88.80	0.10	5,981.20	4,072.40	4,072.05	-54.58	4,072.41	359.23	673,352.45	685,541.22	
9,849.00	89.90	359.90	5,982.28	4,167.39	4,167.04	-54.58	4,167.40	359.25	673,447.44	685,541.22	
9,943.00	90.10	359.70	5,982.28	4,261.39	4,261.04	-54.91	4,261.39	359.26	673,541.44	685,540.89	
10,038.00	89.80	359.50	5,982.36	4,356.38	4,356.03	-55.57	4,356.39	359.27	673,636.43	685,540.23	
10,132.00	89.70	359.50	5,982.77	4,450.38	4,450.03	-56.39	4,450.39	359.27	673,730.43	685,539.41	
10,227.00	91.20	359.50	5,982.03	4,545.38	4,545.02	-57.22	4,545.38	359.28	673,825.42	685,538.58	
10,321.00	91.10	359.50	5,980.14	4,639.36	4,639.00	-58.04	4,639.36	359.28	673,919.40	685,537.76	



Professional Directional Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No. 8H
Project:	Lea County, New Mexico	TVD Reference:	WELL @ 4119.00usft (Original Well Elev)
Site:	Flat Head Federal Com	MD Reference:	WELL @ 4119.00usft (Original Well Elev)
Well:	No. 8H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Well Planner1

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
10,416.00	91.00	359.50	5,978.40	4,734.34	4,733.98	-58.87	4,734.35	359.29	674,014.38	685,536.93
10,511.00	91.30	359.50	5,976.49	4,829.32	4,828.96	-59.70	4,829.33	359.29	674,109.36	685,536.10
10,605.00	91.60	359.60	5,974.11	4,923.29	4,922.92	-60.44	4,923.29	359.30	674,203.32	685,535.36
10,700.00	90.60	359.10	5,972.29	5,018.27	5,017.90	-61.51	5,018.27	359.30	674,298.30	685,534.29
10,794.00	90.80	359.10	5,971.14	5,112.26	5,111.88	-62.99	5,112.27	359.29	674,392.28	685,532.81
10,889.00	91.20	359.50	5,969.48	5,207.25	5,206.86	-64.15	5,207.25	359.29	674,487.26	685,531.65
10,983.00	90.60	359.40	5,968.01	5,301.24	5,300.84	-65.05	5,301.24	359.30	674,581.24	685,530.75
11,078.00	89.30	359.30	5,968.09	5,396.24	5,395.83	-66.13	5,396.24	359.30	674,676.23	685,529.67
11,172.00	89.20	358.50	5,969.32	5,490.22	5,489.81	-67.94	5,490.23	359.29	674,770.21	685,527.86
11,266.00	90.40	357.60	5,969.65	5,584.20	5,583.75	-71.13	5,584.20	359.27	674,864.15	685,524.67
11,361.00	91.10	357.60	5,968.41	5,679.14	5,678.66	-75.11	5,679.15	359.24	674,959.06	685,520.69
11,456.00	91.00	358.60	5,966.66	5,774.10	5,773.59	-78.26	5,774.12	359.22	675,053.99	685,517.54
11,551.00	91.30	0.10	5,964.76	5,869.08	5,868.56	-79.34	5,869.10	359.23	675,148.96	685,516.46
11,646.00	90.00	0.40	5,963.68	5,964.06	5,963.55	-78.92	5,964.07	359.24	675,243.95	685,516.88
11,708.00	89.50	0.70	5,963.95	6,026.05	6,025.55	-78.33	6,026.06	359.26	675,305.95	685,517.47
Last Survey: 11,708' MD, 5,963.95' TVD										
11,762.00	89.50	0.70	5,964.42	6,080.03	6,079.54	-77.67	6,080.04	359.27	675,359.94	685,518.13
PBHL: 11,762' MD										

Design Annotations:				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
5,310.00	5,308.93	53.55	14.08	Last Gyro: 5,310' MD
5,406.00	5,404.93	53.92	12.92	Pro MWD First Survey: 5,406' MD
11,708.00	5,963.95	6,025.55	-78.33	Last Survey: 11,708' MD, 5,963.95' TVD
11,762.00	5,964.42	6,079.54	-77.67	PBHL: 11,762' MD