

COG Operating LLC

Lea County, NM (NAD27 NME)

Eider Federal

302H

OH / 62734

Design: Surveys (Ensign 155)

Standard Survey Report

20 June, 2018

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Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

Project:	Lea County, NM (NAD27 NME)	System Datum:	Mean Sea Level
Map System:	US State Plane 1927 (Exact solution)		
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Eider Federal		
Site Position:		Northing:	425,274.00 usft
From:	Map	Easting:	711,380.40 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 10' 2.46309 N
		Longitude:	103° 39' 0.76609 W
		Grid Convergence:	0.36 °

Well:	302H		
Well Position	+N/-S	0.00 usft	Northing: 425,244.20 usft
	+E/-W	0.00 usft	Easting: 711,410.50 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 10' 2.16631 N
		Longitude:	103° 39' 0.41812 W
		Ground Level:	3,521.40 usft

Wellbore	OH / 62734				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	6/2/2018	6.74	59.86	47,943.59558691

Design	Surveys (Ensign 155)				
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	359.19	

Survey Program	Date	6/20/2018		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100.00	8,444.44	Scientific Gyro Surveys (OH / 62734)	Scientific Gyro	Scientific Drilling Intl. Standard Wireline Keeper
8,461.00	16,879.00	Phoenix MWD Surveys (OH / 62734)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.44	73.28	100.00	0.11	0.37	0.11	0.44	0.44	0.00
125.00	0.35	70.60	125.00	0.16	0.53	0.16	0.37	-0.36	-10.72
150.00	0.40	58.24	150.00	0.23	0.68	0.23	0.38	0.20	-49.44
175.00	0.44	56.43	175.00	0.33	0.83	0.32	0.17	0.16	-7.24
200.00	0.61	72.96	200.00	0.43	1.04	0.41	0.90	0.68	66.12
225.00	0.55	71.97	224.99	0.50	1.28	0.48	0.24	-0.24	-3.96
250.00	0.62	71.21	249.99	0.58	1.52	0.56	0.28	0.28	-3.04
275.00	0.74	73.03	274.99	0.67	1.81	0.65	0.49	0.48	7.28
300.00	0.76	70.84	299.99	0.77	2.12	0.74	0.14	0.08	-8.76

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TYD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
325.00	0.85	73.04	324.99	0.88	2.45	0.85	0.38	0.36	8.80
350.00	0.76	71.74	349.98	0.99	2.79	0.95	0.37	-0.36	-5.20
375.00	0.63	61.83	374.98	1.11	3.06	1.06	0.71	-0.52	-39.64
400.00	0.66	70.25	399.98	1.22	3.32	1.17	0.40	0.12	33.68
425.00	0.68	80.17	424.98	1.29	3.60	1.24	0.47	0.08	39.68
450.00	0.76	75.48	449.98	1.36	3.91	1.31	0.40	0.32	-18.76
475.00	0.84	85.80	474.98	1.42	4.25	1.36	0.66	0.32	41.28
500.00	0.78	94.58	499.97	1.42	4.60	1.35	0.55	-0.24	35.12
525.00	0.67	92.05	524.97	1.40	4.92	1.33	0.46	-0.44	-10.12
550.00	0.75	108.01	549.97	1.34	5.22	1.27	0.85	0.32	63.84
575.00	0.81	116.11	574.97	1.21	5.54	1.13	0.50	0.24	32.40
600.00	0.62	130.16	599.96	1.05	5.80	0.97	1.03	-0.76	56.20
625.00	0.52	156.15	624.96	0.86	5.95	0.77	1.10	-0.40	103.96
650.00	0.48	182.78	649.96	0.65	5.99	0.56	0.93	-0.16	106.52
675.00	0.53	210.55	674.96	0.44	5.92	0.36	0.99	0.20	111.08
700.00	0.99	233.50	699.96	0.22	5.69	0.14	2.17	1.84	91.80
725.00	1.02	237.07	724.96	-0.03	5.33	-0.11	0.28	0.12	14.28
750.00	1.18	235.62	749.95	-0.30	4.93	-0.37	0.65	0.64	-5.80
775.00	1.18	233.47	774.95	-0.60	4.51	-0.66	0.18	0.00	-8.60
800.00	1.15	240.35	799.94	-0.88	4.09	-0.93	0.57	-0.12	27.52
825.00	1.26	236.65	824.93	-1.15	3.64	-1.20	0.54	0.44	-14.80
850.00	1.35	235.79	849.93	-1.47	3.17	-1.51	0.37	0.36	-3.44
875.00	1.35	231.05	874.92	-1.82	2.69	-1.86	0.45	0.00	-18.96
900.00	1.48	224.70	899.91	-2.23	2.24	-2.26	0.81	0.52	-25.40
925.00	1.51	230.48	924.91	-2.67	1.76	-2.70	0.61	0.12	23.12
950.00	1.70	228.92	949.90	-3.13	1.22	-3.14	0.78	0.76	-6.24
975.00	1.84	225.73	974.88	-3.65	0.66	-3.66	0.68	0.56	-12.76
1,000.00	1.89	225.56	999.87	-4.22	0.08	-4.22	0.20	0.20	-0.68
1,025.00	1.95	227.11	1,024.86	-4.80	-0.53	-4.79	0.32	0.24	6.20
1,050.00	2.11	223.63	1,049.84	-5.42	-1.16	-5.40	0.81	0.64	-13.92
1,075.00	2.04	225.43	1,074.82	-6.06	-1.79	-6.04	0.38	-0.28	7.20
1,100.00	2.13	222.31	1,099.81	-6.72	-2.42	-6.68	0.58	0.36	-12.48
1,125.00	2.29	220.45	1,124.79	-7.44	-3.06	-7.40	0.70	0.64	-7.44
1,150.00	2.33	222.65	1,149.77	-8.20	-3.73	-8.14	0.39	0.16	8.80
1,175.00	2.47	222.78	1,174.75	-8.97	-4.44	-8.90	0.56	0.56	0.52
1,200.00	2.37	223.61	1,199.72	-9.74	-5.16	-9.66	0.42	-0.40	3.32
1,225.00	2.30	221.76	1,224.70	-10.48	-5.85	-10.40	0.41	-0.28	-7.40
1,250.00	2.39	220.76	1,249.68	-11.25	-6.53	-11.16	0.40	0.36	-4.00
1,275.00	2.25	220.00	1,274.66	-12.02	-7.18	-11.92	0.57	-0.56	-3.04
1,300.00	1.80	212.84	1,299.65	-12.73	-7.71	-12.62	2.06	-1.80	-28.64
1,325.00	1.26	190.54	1,324.64	-13.33	-7.97	-13.22	3.18	-2.16	-89.20
1,350.00	1.09	156.56	1,349.63	-13.82	-7.93	-13.70	2.82	-0.68	-135.92
1,375.00	0.99	133.06	1,374.63	-14.18	-7.68	-14.07	1.74	-0.40	-94.00

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Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
1,400.00	1.26	97.58	1,399.62	-14.37	-7.25	-14.26	2.93	1.08	-141.92
1,425.00	2.05	83.97	1,424.61	-14.36	-6.53	-14.26	3.51	3.16	-54.44
1,450.00	2.12	74.91	1,449.60	-14.19	-5.64	-14.11	1.35	0.28	-36.24
1,475.00	2.06	71.50	1,474.58	-13.93	-4.77	-13.86	0.55	-0.24	-13.64
1,500.00	2.18	70.42	1,499.56	-13.63	-3.89	-13.57	0.51	0.48	-4.32
1,525.00	2.06	71.65	1,524.55	-13.32	-3.02	-13.28	0.51	-0.48	4.92
1,550.00	1.93	68.07	1,549.53	-13.03	-2.20	-12.99	0.72	-0.52	-14.32
1,575.00	1.24	60.75	1,574.52	-12.74	-1.57	-12.71	2.87	-2.76	-29.28
1,600.00	0.61	32.55	1,599.52	-12.49	-1.27	-12.47	3.04	-2.52	-112.80
1,625.00	0.44	345.92	1,624.52	-12.29	-1.22	-12.27	1.78	-0.68	-186.52
1,650.00	0.59	320.48	1,649.52	-12.09	-1.32	-12.07	1.08	0.60	-101.76
1,675.00	0.65	311.74	1,674.52	-11.90	-1.51	-11.88	0.45	0.24	-34.96
1,700.00	0.66	313.99	1,699.51	-11.71	-1.72	-11.68	0.11	0.04	9.00
1,725.00	0.56	317.84	1,724.51	-11.52	-1.91	-11.49	0.43	-0.40	15.40
1,750.00	0.50	314.20	1,749.51	-11.35	-2.07	-11.32	0.28	-0.24	-14.56
1,775.00	0.61	312.31	1,774.51	-11.18	-2.24	-11.15	0.45	0.44	-7.56
1,800.00	0.52	316.23	1,799.51	-11.01	-2.42	-10.98	0.39	-0.36	15.68
1,825.00	0.68	320.44	1,824.51	-10.82	-2.59	-10.78	0.66	0.64	16.84
1,850.00	0.72	316.98	1,849.51	-10.59	-2.79	-10.55	0.23	0.16	-13.84
1,875.00	0.66	313.60	1,874.50	-10.37	-3.01	-10.33	0.29	-0.24	-13.52
1,900.00	0.69	312.23	1,899.50	-10.17	-3.22	-10.12	0.14	0.12	-5.48
1,925.00	0.55	321.69	1,924.50	-9.98	-3.41	-9.93	0.69	-0.56	37.84
1,950.00	0.51	328.24	1,949.50	-9.79	-3.54	-9.74	0.29	-0.16	26.20
1,975.00	0.47	329.34	1,974.50	-9.60	-3.65	-9.55	0.16	-0.16	4.40
2,000.00	0.56	331.96	1,999.50	-9.41	-3.76	-9.35	0.37	0.36	10.48
2,025.00	0.68	311.96	2,024.50	-9.20	-3.93	-9.15	0.98	0.48	-80.00
2,050.00	0.76	277.46	2,049.49	-9.08	-4.20	-9.02	1.74	0.32	-138.00
2,075.00	0.96	264.07	2,074.49	-9.08	-4.58	-9.02	1.13	0.80	-53.56
2,100.00	1.02	257.12	2,099.49	-9.15	-5.00	-9.08	0.54	0.24	-27.80
2,125.00	1.05	255.75	2,124.48	-9.26	-5.44	-9.18	0.16	0.12	-5.48
2,150.00	1.26	259.62	2,149.48	-9.36	-5.93	-9.28	0.90	0.84	15.48
2,175.00	1.16	252.54	2,174.47	-9.49	-6.44	-9.40	0.72	-0.40	-28.32
2,200.00	1.19	251.45	2,199.47	-9.65	-6.93	-9.55	0.15	0.12	-4.36
2,225.00	1.26	248.18	2,224.46	-9.83	-7.43	-9.73	0.40	0.28	-13.08
2,250.00	1.28	254.83	2,249.46	-10.01	-7.96	-9.89	0.59	0.08	26.60
2,275.00	1.17	254.13	2,274.45	-10.15	-8.47	-10.03	0.44	-0.44	-2.80
2,300.00	1.38	255.89	2,299.44	-10.29	-9.01	-10.17	0.85	0.84	7.04
2,325.00	1.51	244.49	2,324.44	-10.51	-9.60	-10.37	1.26	0.52	-45.60
2,350.00	1.47	236.34	2,349.43	-10.83	-10.16	-10.68	0.86	-0.16	-32.60
2,375.00	1.56	233.14	2,374.42	-11.21	-10.70	-11.06	0.49	0.36	-12.80
2,400.00	1.58	229.14	2,399.41	-11.64	-11.24	-11.48	0.45	0.08	-16.00
2,425.00	1.64	222.33	2,424.40	-12.13	-11.74	-11.96	0.80	0.24	-27.24
2,450.00	1.55	209.77	2,449.39	-12.69	-12.15	-12.51	1.44	-0.36	-50.24

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Elder Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
2,475.00	1.63	210.18	2,474.38	-13.29	-12.49	-13.11	0.32	0.32	1.64
2,500.00	1.57	197.21	2,499.37	-13.92	-12.77	-13.74	1.47	-0.24	-51.88
2,525.00	1.37	200.94	2,524.36	-14.53	-12.98	-14.34	0.89	-0.80	14.92
2,550.00	1.35	194.08	2,549.36	-15.10	-13.16	-14.91	0.66	-0.08	-27.44
2,575.00	1.24	194.43	2,574.35	-15.64	-13.30	-15.45	0.44	-0.44	1.40
2,600.00	1.24	191.23	2,599.34	-16.17	-13.42	-15.98	0.28	0.00	-12.80
2,625.00	1.23	192.77	2,624.34	-16.70	-13.53	-16.50	0.14	-0.04	6.16
2,650.00	1.26	191.43	2,649.33	-17.23	-13.64	-17.03	0.17	0.12	-5.36
2,675.00	1.26	192.55	2,674.33	-17.77	-13.76	-17.57	0.10	0.00	4.48
2,700.00	1.23	190.17	2,699.32	-18.30	-13.87	-18.10	0.24	-0.12	-9.52
2,725.00	1.31	185.60	2,724.31	-18.85	-13.94	-18.65	0.52	0.32	-18.28
2,750.00	1.33	189.82	2,749.31	-19.42	-14.02	-19.22	0.40	0.08	16.88
2,775.00	1.28	195.06	2,774.30	-19.97	-14.14	-19.77	0.52	-0.20	20.96
2,800.00	1.18	202.90	2,799.29	-20.48	-14.31	-20.27	0.78	-0.40	31.36
2,825.00	1.18	211.34	2,824.29	-20.94	-14.55	-20.73	0.69	0.00	33.76
2,850.00	1.17	220.61	2,849.28	-21.35	-14.85	-21.14	0.76	-0.04	37.08
2,875.00	1.22	217.24	2,874.28	-21.76	-15.17	-21.54	0.34	0.20	-13.48
2,900.00	1.06	221.35	2,899.27	-22.14	-15.49	-21.92	0.72	-0.64	16.44
2,925.00	1.21	222.04	2,924.27	-22.51	-15.82	-22.28	0.60	0.60	2.76
2,950.00	1.10	220.53	2,949.26	-22.89	-16.15	-22.66	0.46	-0.44	-6.04
2,975.00	1.06	217.78	2,974.26	-23.25	-16.45	-23.02	0.26	-0.16	-11.00
3,000.00	0.89	202.67	2,999.26	-23.62	-16.67	-23.38	1.23	-0.68	-60.44
3,025.00	0.89	195.75	3,024.25	-23.98	-16.79	-23.74	0.43	0.00	-27.68
3,050.00	0.92	187.21	3,049.25	-24.37	-16.87	-24.13	0.55	0.12	-34.16
3,075.00	0.87	188.26	3,074.25	-24.76	-16.92	-24.51	0.21	-0.20	4.20
3,100.00	0.85	181.28	3,099.24	-25.13	-16.95	-24.88	0.43	-0.08	-27.92
3,125.00	1.02	179.82	3,124.24	-25.54	-16.96	-25.29	0.69	0.68	-5.84
3,150.00	0.98	182.35	3,149.24	-25.97	-16.97	-25.73	0.24	-0.16	10.12
3,175.00	0.99	181.20	3,174.23	-26.40	-16.98	-26.16	0.09	0.04	-4.60
3,200.00	1.06	184.17	3,199.23	-26.85	-17.00	-26.60	0.35	0.28	11.88
3,225.00	1.04	174.26	3,224.22	-27.30	-16.99	-27.06	0.73	-0.08	-39.64
3,250.00	1.10	177.86	3,249.22	-27.77	-16.96	-27.53	0.36	0.24	14.40
3,275.00	1.14	181.45	3,274.22	-28.26	-16.96	-28.01	0.32	0.16	14.36
3,300.00	1.04	173.33	3,299.21	-28.73	-16.94	-28.49	0.74	-0.40	-32.48
3,325.00	1.06	191.20	3,324.21	-29.18	-16.96	-28.94	1.31	0.08	71.48
3,350.00	1.14	183.85	3,349.20	-29.66	-17.02	-29.42	0.65	0.32	-29.40
3,375.00	1.26	178.62	3,374.20	-30.18	-17.03	-29.94	0.65	0.48	-20.92
3,400.00	1.19	182.52	3,399.19	-30.72	-17.04	-30.47	0.44	-0.28	15.60
3,425.00	1.32	176.90	3,424.18	-31.26	-17.03	-31.02	0.72	0.52	-22.48
3,450.00	1.35	181.86	3,449.18	-31.85	-17.03	-31.60	0.48	0.12	19.84
3,475.00	1.30	179.14	3,474.17	-32.42	-17.03	-32.18	0.32	-0.20	-10.88
3,500.00	1.32	183.51	3,499.16	-32.99	-17.04	-32.75	0.41	0.08	17.48
3,525.00	1.48	184.71	3,524.16	-33.60	-17.09	-33.36	0.65	0.64	4.80
3,550.00	1.44	182.94	3,549.15	-34.24	-17.13	-33.99	0.24	-0.16	-7.08

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
3,575.00	1.44	181.03	3,574.14	-34.87	-17.15	-34.62	0.19	0.00	-7.64
3,600.00	1.54	179.64	3,599.13	-35.52	-17.16	-35.27	0.43	0.40	-5.56
3,625.00	1.31	174.80	3,624.13	-36.14	-17.13	-35.89	1.04	-0.92	-19.36
3,650.00	0.60	176.03	3,649.12	-36.55	-17.09	-36.31	2.84	-2.84	4.92
3,675.00	0.35	19.31	3,674.12	-36.61	-17.06	-36.37	3.73	-1.00	-626.88
3,700.00	0.89	359.37	3,699.12	-36.35	-17.04	-36.10	2.29	2.16	-79.76
3,725.00	1.01	357.87	3,724.12	-35.93	-17.05	-35.68	0.49	0.48	-6.00
3,750.00	0.98	0.52	3,749.11	-35.50	-17.05	-35.25	0.22	-0.12	10.60
3,775.00	0.98	0.08	3,774.11	-35.07	-17.05	-34.82	0.03	0.00	-1.76
3,800.00	1.03	5.45	3,799.11	-34.63	-17.03	-34.39	0.43	0.20	21.48
3,825.00	0.72	349.69	3,824.10	-34.25	-17.03	-34.01	1.56	-1.24	-63.04
3,850.00	0.23	287.55	3,849.10	-34.08	-17.11	-33.84	2.58	-1.96	-248.56
3,875.00	0.50	226.94	3,874.10	-34.14	-17.24	-33.89	1.74	1.08	-242.44
3,900.00	0.46	224.03	3,899.10	-34.29	-17.39	-34.04	0.19	-0.16	-11.64
3,925.00	0.61	224.28	3,924.10	-34.46	-17.55	-34.20	0.60	0.60	1.00
3,950.00	0.53	228.51	3,949.10	-34.63	-17.73	-34.37	0.36	-0.32	16.92
3,975.00	0.54	216.58	3,974.10	-34.80	-17.89	-34.54	0.45	0.04	-47.72
4,000.00	0.67	222.14	3,999.10	-35.00	-18.06	-34.74	0.57	0.52	22.24
4,025.00	0.72	226.73	4,024.09	-35.22	-18.27	-34.96	0.30	0.20	18.36
4,050.00	0.64	222.95	4,049.09	-35.43	-18.48	-35.16	0.37	-0.32	-15.12
4,075.00	0.65	228.07	4,074.09	-35.63	-18.68	-35.36	0.23	0.04	20.48
4,100.00	0.54	210.59	4,099.09	-35.82	-18.84	-35.55	0.84	-0.44	-69.92
4,125.00	0.57	218.52	4,124.09	-36.02	-18.98	-35.75	0.33	0.12	31.72
4,150.00	0.55	180.91	4,149.09	-36.24	-19.06	-35.96	1.45	-0.08	-150.44
4,175.00	0.59	161.87	4,174.09	-36.48	-19.02	-36.21	0.77	0.16	-76.16
4,200.00	0.62	191.00	4,199.08	-36.74	-19.01	-36.46	1.22	0.12	116.52
4,225.00	0.66	176.19	4,224.08	-37.01	-19.02	-36.74	0.68	0.16	-59.24
4,250.00	0.82	183.44	4,249.08	-37.33	-19.02	-37.06	0.74	0.64	29.00
4,275.00	0.82	176.85	4,274.08	-37.69	-19.03	-37.42	0.38	0.00	-26.36
4,300.00	0.82	181.69	4,299.08	-38.05	-19.02	-37.77	0.28	0.00	19.36
4,325.00	0.86	168.06	4,324.07	-38.41	-18.99	-38.14	0.81	0.16	-54.52
4,350.00	0.98	172.85	4,349.07	-38.81	-18.92	-38.53	0.57	0.48	19.16
4,375.00	1.12	163.83	4,374.07	-39.25	-18.83	-38.98	0.86	0.56	-36.08
4,400.00	1.24	160.00	4,399.06	-39.74	-18.67	-39.47	0.57	0.48	-15.32
4,425.00	1.33	161.31	4,424.05	-40.27	-18.48	-40.01	0.38	0.36	5.24
4,450.00	1.47	164.28	4,449.05	-40.86	-18.30	-40.59	0.63	0.56	11.88
4,475.00	1.50	163.16	4,474.04	-41.48	-18.12	-41.22	0.17	0.12	-4.48
4,500.00	1.41	164.92	4,499.03	-42.09	-17.95	-41.83	0.40	-0.36	7.04
4,525.00	1.41	165.41	4,524.02	-42.68	-17.79	-42.42	0.05	0.00	1.96
4,550.00	1.46	166.26	4,549.01	-43.29	-17.63	-43.03	0.22	0.20	3.40
4,575.00	1.33	170.83	4,574.01	-43.88	-17.51	-43.63	0.68	-0.52	18.28
4,600.00	1.24	176.54	4,599.00	-44.44	-17.45	-44.19	0.63	-0.36	22.84
4,625.00	1.10	178.46	4,624.00	-44.95	-17.43	-44.70	0.58	-0.56	7.68

Survey Report

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)	
4,650.00	1.08	179.64	4,648.99	-45.43	-17.42	-45.17	0.12	-0.08	4.72	
4,675.00	1.10	175.51	4,673.99	-45.90	-17.40	-45.65	0.32	0.08	-16.52	
4,700.00	1.11	178.52	4,698.98	-46.38	-17.37	-46.13	0.24	0.04	12.04	
4,725.00	1.20	176.68	4,723.98	-46.89	-17.35	-46.63	0.39	0.36	-7.36	
4,750.00	1.12	177.92	4,748.97	-47.39	-17.33	-47.14	0.34	-0.32	4.96	
4,775.00	1.09	181.88	4,773.97	-47.87	-17.33	-47.62	0.33	-0.12	15.84	
4,800.00	1.15	172.68	4,798.96	-48.36	-17.30	-48.11	0.76	0.24	-36.80	
4,825.00	1.16	183.87	4,823.96	-48.86	-17.29	-48.61	0.90	0.04	44.76	
4,850.00	1.22	177.00	4,848.95	-49.38	-17.29	-49.13	0.62	0.24	-27.48	
4,875.00	1.12	171.74	4,873.95	-49.89	-17.24	-49.64	0.59	-0.40	-21.04	
4,900.00	1.01	180.17	4,898.94	-50.35	-17.21	-50.10	0.76	-0.44	33.72	
4,925.00	1.08	176.49	4,923.94	-50.80	-17.19	-50.56	0.39	0.28	-14.72	
4,950.00	1.20	180.57	4,948.93	-51.30	-17.18	-51.05	0.58	0.48	16.32	
4,975.00	1.02	182.88	4,973.93	-51.79	-17.20	-51.54	0.74	-0.72	9.24	
5,000.00	1.07	180.02	4,998.92	-52.24	-17.21	-51.99	0.29	0.20	-11.44	
5,025.00	1.04	196.16	5,023.92	-52.69	-17.27	-52.44	1.19	-0.12	64.56	
5,050.00	0.92	211.27	5,048.92	-53.08	-17.44	-52.83	1.14	-0.48	60.44	
5,075.00	1.04	235.06	5,073.91	-53.38	-17.73	-53.13	1.68	0.48	95.16	
5,100.00	1.29	249.98	5,098.91	-53.61	-18.18	-53.35	1.56	1.00	59.68	
5,125.00	1.20	245.52	5,123.90	-53.81	-18.68	-53.54	0.53	-0.36	-17.84	
5,150.00	1.29	250.67	5,148.90	-54.02	-19.19	-53.74	0.57	0.36	20.60	
5,175.00	1.20	247.83	5,173.89	-54.21	-19.69	-53.92	0.44	-0.36	-11.36	
5,200.00	1.29	250.62	5,198.88	-54.40	-20.20	-54.11	0.43	0.36	11.16	
5,225.00	1.12	248.56	5,223.88	-54.58	-20.69	-54.28	0.70	-0.68	-8.24	
5,250.00	0.35	163.13	5,248.88	-54.75	-20.90	-54.44	4.59	-3.08	-341.72	
5,275.00	0.62	129.25	5,273.88	-54.90	-20.77	-54.60	1.53	1.08	-135.52	
5,300.00	0.85	123.37	5,298.87	-55.09	-20.51	-54.79	0.97	0.92	-23.52	
5,325.00	0.93	118.29	5,323.87	-55.29	-20.18	-55.00	0.45	0.32	-20.32	
5,350.00	0.93	121.46	5,348.87	-55.49	-19.83	-55.20	0.21	0.00	12.68	
5,375.00	0.86	121.59	5,373.86	-55.70	-19.49	-55.41	0.28	-0.28	0.52	
5,400.00	0.75	126.92	5,398.86	-55.89	-19.20	-55.61	0.53	-0.44	21.32	
5,425.00	0.61	176.59	5,423.86	-56.12	-19.07	-55.85	2.34	-0.56	198.68	
5,450.00	0.94	208.64	5,448.86	-56.44	-19.16	-56.16	2.13	1.32	128.20	
5,475.00	1.62	222.46	5,473.85	-56.88	-19.49	-56.59	2.97	2.72	55.28	
5,500.00	1.86	229.27	5,498.84	-57.40	-20.04	-57.11	1.27	0.96	27.24	
5,525.00	2.05	231.78	5,523.83	-57.94	-20.70	-57.64	0.83	0.76	10.04	
5,550.00	2.02	230.89	5,548.81	-58.50	-21.39	-58.19	0.17	-0.12	-3.56	
5,575.00	2.12	230.53	5,573.79	-59.07	-22.09	-58.75	0.40	0.40	-1.44	
5,600.00	1.96	233.04	5,598.78	-59.62	-22.79	-59.29	0.73	-0.64	10.04	
5,625.00	0.89	250.34	5,623.77	-59.94	-23.31	-59.61	4.57	-4.28	69.20	
5,650.00	0.36	341.23	5,648.77	-59.93	-23.52	-59.59	3.86	-2.12	363.56	
5,675.00	0.50	12.69	5,673.77	-59.75	-23.52	-59.41	1.08	0.56	125.84	
5,700.00	0.47	344.59	5,698.77	-59.55	-23.53	-59.21	0.95	-0.12	-112.40	

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
5,725.00	0.49	351.36	5,723.77	-59.34	-23.57	-59.00	0.24	0.08	27.08
5,750.00	0.43	359.21	5,748.77	-59.14	-23.59	-58.80	0.35	-0.24	31.40
5,775.00	0.34	18.86	5,773.76	-58.98	-23.56	-58.64	0.63	-0.36	78.60
5,800.00	0.44	340.77	5,798.76	-58.82	-23.57	-58.48	1.09	0.40	-152.36
5,825.00	0.34	24.69	5,823.76	-58.66	-23.57	-58.32	1.22	-0.40	175.68
5,850.00	0.41	354.60	5,848.76	-58.51	-23.55	-58.17	0.82	0.28	-120.36
5,875.00	0.50	0.69	5,873.76	-58.31	-23.56	-57.97	0.41	0.36	24.36
5,900.00	0.50	4.95	5,898.76	-58.09	-23.55	-57.75	0.15	0.00	17.04
5,925.00	0.42	355.31	5,923.76	-57.89	-23.54	-57.55	0.44	-0.32	-38.56
5,950.00	0.51	358.07	5,948.76	-57.69	-23.55	-57.35	0.37	0.36	11.04
5,975.00	0.46	1.45	5,973.76	-57.48	-23.56	-57.14	0.23	-0.20	13.52
6,000.00	0.42	348.17	5,998.76	-57.29	-23.57	-56.94	0.44	-0.16	-53.12
6,025.00	0.42	357.97	6,023.76	-57.10	-23.59	-56.76	0.29	0.00	39.20
6,050.00	0.55	343.47	6,048.76	-56.90	-23.63	-56.56	0.71	0.52	-58.00
6,075.00	0.65	302.40	6,073.76	-56.71	-23.79	-56.36	1.72	0.40	-164.28
6,100.00	0.82	299.65	6,098.75	-56.54	-24.06	-56.19	0.69	0.68	-11.00
6,125.00	1.11	282.15	6,123.75	-56.40	-24.45	-56.05	1.64	1.16	-70.00
6,150.00	1.27	279.93	6,148.74	-56.30	-24.96	-55.94	0.67	0.64	-8.88
6,175.00	1.43	278.54	6,173.74	-56.21	-25.54	-55.84	0.65	0.64	-5.56
6,200.00	1.53	272.73	6,198.73	-56.15	-26.19	-55.77	0.72	0.40	-23.24
6,225.00	1.47	274.30	6,223.72	-56.11	-26.84	-55.72	0.29	-0.24	6.28
6,250.00	1.66	268.42	6,248.71	-56.09	-27.52	-55.70	0.99	0.76	-23.52
6,275.00	1.64	274.78	6,273.70	-56.07	-28.24	-55.67	0.74	-0.08	25.44
6,300.00	1.82	270.67	6,298.69	-56.04	-28.99	-55.62	0.87	0.72	-16.44
6,325.00	2.11	266.69	6,323.67	-56.06	-29.85	-55.63	1.28	1.16	-15.92
6,350.00	2.05	264.41	6,348.66	-56.13	-30.75	-55.69	0.41	-0.24	-9.12
6,375.00	2.50	257.80	6,373.64	-56.29	-31.73	-55.83	2.08	1.80	-26.44
6,400.00	2.87	253.53	6,398.61	-56.58	-32.86	-56.11	1.68	1.48	-17.08
6,425.00	3.07	252.04	6,423.58	-56.97	-34.10	-56.48	0.86	0.80	-5.96
6,450.00	2.99	253.49	6,448.54	-57.36	-35.36	-56.85	0.44	-0.32	5.80
6,475.00	2.81	252.23	6,473.51	-57.73	-36.57	-57.21	0.76	-0.72	-5.04
6,500.00	2.50	247.61	6,498.48	-58.13	-37.66	-57.58	1.51	-1.24	-18.48
6,525.00	2.34	249.36	6,523.46	-58.51	-38.64	-57.96	0.70	-0.64	7.00
6,550.00	2.28	246.93	6,548.44	-58.89	-39.58	-58.32	0.46	-0.24	-9.72
6,575.00	2.16	248.23	6,573.42	-59.26	-40.47	-58.68	0.52	-0.48	5.20
6,600.00	2.29	244.80	6,598.40	-59.64	-41.36	-59.05	0.74	0.52	-13.72
6,625.00	2.29	243.90	6,623.38	-60.08	-42.26	-59.47	0.14	0.00	-3.60
6,650.00	2.59	240.45	6,648.36	-60.58	-43.20	-59.96	1.34	1.20	-13.80
6,675.00	3.03	235.19	6,673.33	-61.23	-44.24	-60.60	2.04	1.76	-21.04
6,700.00	2.73	232.20	6,698.30	-61.97	-45.25	-61.32	1.34	-1.20	-11.96
6,725.00	2.97	233.79	6,723.27	-62.72	-46.24	-62.06	1.01	0.96	6.36
6,750.00	2.85	235.35	6,748.24	-63.46	-47.28	-62.78	0.58	-0.48	6.24
6,775.00	2.56	231.17	6,773.21	-64.16	-48.22	-63.47	1.40	-1.16	-16.72
6,800.00	2.48	231.83	6,798.18	-64.84	-49.08	-64.14	0.34	-0.32	2.64

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
6,825.00	2.53	229.40	6,823.16	-65.54	-49.93	-64.82	0.47	0.20	-9.72
6,850.00	3.09	220.98	6,848.13	-66.41	-50.79	-65.68	2.78	2.24	-33.68
6,875.00	3.46	220.44	6,873.09	-67.49	-51.72	-66.75	1.49	1.48	-2.16
6,900.00	3.51	217.16	6,898.04	-68.67	-52.67	-67.92	0.82	0.20	-13.12
6,925.00	3.56	218.35	6,923.00	-69.89	-53.61	-69.12	0.36	0.20	4.76
6,950.00	3.32	205.37	6,947.95	-71.15	-54.41	-70.37	3.25	-0.96	-51.92
6,975.00	3.08	197.15	6,972.91	-72.45	-54.91	-71.66	2.07	-0.96	-32.88
7,000.00	3.01	193.10	6,997.88	-73.73	-55.26	-72.94	0.90	-0.28	-16.20
7,025.00	3.08	191.08	7,022.84	-75.03	-55.54	-74.23	0.51	0.28	-8.08
7,050.00	3.09	193.74	7,047.81	-76.34	-55.83	-75.54	0.57	0.04	10.64
7,075.00	3.02	189.38	7,072.77	-77.65	-56.09	-76.84	0.97	-0.28	-17.44
7,100.00	3.11	191.80	7,097.73	-78.96	-56.34	-78.15	0.63	0.36	9.68
7,125.00	3.16	193.51	7,122.70	-80.29	-56.64	-79.48	0.42	0.20	6.84
7,150.00	3.08	190.47	7,147.66	-81.63	-56.92	-80.81	0.74	-0.32	-12.16
7,175.00	3.11	191.90	7,172.62	-82.95	-57.19	-82.13	0.33	0.12	5.72
7,200.00	3.20	189.04	7,197.59	-84.30	-57.43	-83.48	0.73	0.36	-11.44
7,225.00	3.17	188.36	7,222.55	-85.68	-57.64	-84.85	0.19	-0.12	-2.72
7,250.00	3.22	187.17	7,247.51	-87.06	-57.83	-86.23	0.33	0.20	-4.76
7,275.00	3.17	188.04	7,272.47	-88.44	-58.02	-87.60	0.28	-0.20	3.48
7,300.00	3.23	186.27	7,297.43	-89.82	-58.19	-88.99	0.46	0.24	-7.08
7,325.00	3.19	187.09	7,322.39	-91.21	-58.35	-90.37	0.24	-0.16	3.28
7,350.00	3.26	186.59	7,347.35	-92.61	-58.52	-91.77	0.30	0.28	-2.00
7,375.00	3.28	185.45	7,372.31	-94.03	-58.67	-93.18	0.27	0.08	-4.56
7,400.00	3.37	186.77	7,397.27	-95.47	-58.82	-94.62	0.47	0.36	5.28
7,425.00	3.53	183.50	7,422.22	-96.97	-58.96	-96.12	1.01	0.64	-13.08
7,450.00	3.47	185.50	7,447.18	-98.49	-59.08	-97.64	0.54	-0.24	8.00
7,475.00	3.52	183.78	7,472.13	-100.01	-59.20	-99.15	0.46	0.20	-6.88
7,500.00	3.09	183.20	7,497.09	-101.44	-59.29	-100.59	1.73	-1.72	-2.32
7,525.00	2.22	179.45	7,522.06	-102.60	-59.32	-101.75	3.55	-3.48	-15.00
7,550.00	1.62	175.19	7,547.05	-103.44	-59.29	-102.58	2.47	-2.40	-17.04
7,575.00	1.61	168.68	7,572.04	-104.13	-59.19	-103.28	0.73	-0.04	-26.04
7,600.00	1.24	173.76	7,597.03	-104.75	-59.09	-103.90	1.56	-1.48	20.32
7,625.00	0.70	184.71	7,622.03	-105.17	-59.07	-104.32	2.27	-2.16	43.80
7,650.00	0.58	171.11	7,647.02	-105.45	-59.07	-104.60	0.77	-0.48	-54.40
7,675.00	0.47	182.87	7,672.02	-105.67	-59.05	-104.82	0.61	-0.44	47.04
7,700.00	0.16	187.78	7,697.02	-105.81	-59.06	-104.96	1.24	-1.24	19.64
7,725.00	0.10	102.60	7,722.02	-105.85	-59.05	-105.00	0.73	-0.24	-340.72
7,750.00	0.15	13.22	7,747.02	-105.82	-59.02	-104.97	0.72	0.20	-357.52
7,775.00	0.14	11.61	7,772.02	-105.76	-59.00	-104.91	0.04	-0.04	-6.44
7,800.00	0.20	16.75	7,797.02	-105.69	-58.99	-104.84	0.25	0.24	20.56
7,825.00	0.18	26.18	7,822.02	-105.61	-58.96	-104.76	0.15	-0.08	37.72
7,850.00	0.22	40.21	7,847.02	-105.54	-58.91	-104.69	0.25	0.16	56.12
7,875.00	0.31	40.11	7,872.02	-105.45	-58.83	-104.61	0.36	0.36	-0.40

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
7,900.00	0.32	33.65	7,897.02	-105.34	-58.75	-104.50	0.15	0.04	-25.84
7,925.00	0.37	31.35	7,922.02	-105.21	-58.67	-104.37	0.21	0.20	-9.20
7,950.00	0.37	38.41	7,947.02	-105.08	-58.58	-104.24	0.18	0.00	28.24
7,975.00	0.49	44.86	7,972.02	-104.94	-58.45	-104.10	0.52	0.48	25.80
8,000.00	0.38	40.88	7,997.02	-104.81	-58.32	-103.97	0.46	-0.44	-15.92
8,025.00	0.33	26.88	8,022.02	-104.68	-58.24	-103.84	0.40	-0.20	-56.00
8,050.00	0.31	60.53	8,047.02	-104.58	-58.14	-103.74	0.74	-0.08	134.60
8,075.00	0.15	59.74	8,072.02	-104.53	-58.06	-103.70	0.64	-0.64	-3.16
8,100.00	0.08	223.28	8,097.02	-104.53	-58.04	-103.69	0.91	-0.28	654.16
8,125.00	0.18	216.23	8,122.02	-104.57	-58.08	-103.74	0.40	0.40	-28.20
8,150.00	0.25	217.90	8,147.02	-104.65	-58.13	-103.81	0.28	0.28	6.68
8,175.00	0.14	236.43	8,172.02	-104.71	-58.19	-103.87	0.50	-0.44	74.12
8,200.00	0.22	222.46	8,197.02	-104.76	-58.25	-103.92	0.36	0.32	-55.88
8,225.00	0.36	227.76	8,222.02	-104.85	-58.34	-104.01	0.57	0.56	21.20
8,250.00	0.29	230.51	8,247.02	-104.94	-58.45	-104.10	0.29	-0.28	11.00
8,275.00	0.40	239.24	8,272.02	-105.02	-58.57	-104.18	0.49	0.44	34.92
8,300.00	0.35	223.24	8,297.02	-105.12	-58.70	-104.28	0.46	-0.20	-64.00
8,325.00	0.45	234.90	8,322.02	-105.24	-58.83	-104.39	0.51	0.40	46.64
8,350.00	0.66	239.14	8,347.01	-105.37	-59.03	-104.52	0.86	0.84	16.96
8,375.00	0.58	222.25	8,372.01	-105.53	-59.24	-104.68	0.79	-0.32	-67.56
8,400.00	0.65	230.80	8,397.01	-105.72	-59.44	-104.86	0.46	0.28	34.20
8,425.00	0.57	211.37	8,422.01	-105.91	-59.61	-105.06	0.88	-0.32	-77.72
8,444.44	0.81	226.36	8,441.45	-106.09	-59.76	-105.23	1.53	1.23	77.11
Tie In									
8,461.00	0.76	223.05	8,458.01	-106.25	-59.92	-105.39	0.41	-0.30	-19.99
First Phoenix MWD Survey									
8,556.00	0.09	147.48	8,553.00	-106.78	-60.31	-105.91	0.78	-0.71	-79.55
8,650.00	0.20	61.74	8,647.00	-106.76	-60.13	-105.89	0.23	0.12	-91.21
8,744.00	0.40	275.85	8,741.00	-106.65	-60.31	-105.78	0.61	0.21	-155.20
8,838.00	0.73	299.19	8,835.00	-106.32	-61.16	-105.44	0.42	0.35	24.83
8,932.00	1.63	302.81	8,928.98	-105.31	-62.81	-104.40	0.96	0.96	3.85
8,941.00	1.75	304.91	8,937.97	-105.16	-63.03	-104.25	1.50	1.33	23.33
9,037.00	7.44	346.15	9,033.64	-98.28	-65.72	-97.33	6.49	5.93	42.96
9,084.00	14.54	350.72	9,079.75	-89.49	-67.40	-88.52	15.21	15.11	9.72
9,131.00	21.68	349.62	9,124.39	-75.11	-69.92	-74.11	15.21	15.19	-2.34
9,178.00	27.13	347.15	9,167.18	-56.11	-73.87	-55.05	11.79	11.60	-5.26
9,225.00	29.64	353.42	9,208.53	-34.11	-77.59	-33.00	8.28	5.34	13.34
9,272.00	32.69	351.11	9,248.75	-10.01	-80.88	-8.86	6.97	6.49	-4.91
9,319.00	37.59	351.29	9,287.17	16.71	-85.01	17.92	10.43	10.43	0.38
9,366.00	40.91	353.02	9,323.56	46.17	-89.06	47.43	7.44	7.06	3.68
9,412.00	44.89	353.85	9,357.25	77.27	-92.63	78.58	8.74	8.65	1.80
9,459.00	48.26	355.53	9,389.56	111.25	-95.77	112.60	7.63	7.17	3.57
9,469.00	48.84	355.89	9,396.18	118.73	-96.33	120.08	6.43	5.83	3.60
FTP: 9469' MD, 330' FSL & 367 FEL									

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)	
9,506.00	51.01	357.17	9,420.00	146.98	-98.04	148.36	6.43	5.86	3.46	
9,553.00	54.91	359.28	9,448.30	184.47	-99.19	185.86	9.04	8.30	4.49	
9,600.00	60.93	4.29	9,473.27	224.24	-97.89	225.60	15.67	12.81	10.66	
9,647.00	66.77	4.25	9,493.97	266.29	-94.75	267.61	12.43	12.43	-0.09	
9,694.00	71.73	3.95	9,510.62	310.11	-91.61	311.39	10.57	10.55	-0.64	
9,741.00	76.92	0.81	9,523.31	355.31	-89.75	356.55	12.78	11.04	-6.68	
9,788.00	82.78	359.27	9,531.59	401.55	-89.72	402.78	12.88	12.47	-3.28	
9,816.00	85.69	1.24	9,534.41	429.40	-89.60	430.63	12.53	10.39	7.04	
9,910.00	91.61	2.58	9,536.62	523.28	-86.46	524.46	6.46	6.30	1.43	
10,004.00	94.54	2.85	9,531.58	617.03	-82.02	618.13	3.13	3.12	0.29	
10,098.00	92.66	4.07	9,525.68	710.67	-76.36	711.68	2.38	-2.00	1.30	
10,192.00	90.65	3.55	9,522.96	804.42	-70.11	805.33	2.21	-2.14	-0.55	
10,286.00	89.10	0.36	9,523.17	898.35	-66.91	899.21	3.77	-1.65	-3.39	
10,380.00	87.90	358.14	9,525.63	992.30	-68.14	993.17	2.68	-1.28	-2.36	
10,474.00	87.76	358.83	9,529.19	1,086.20	-70.62	1,087.09	0.75	-0.15	0.73	
10,568.00	87.13	359.10	9,533.38	1,180.09	-72.32	1,181.00	0.73	-0.67	0.29	
10,662.00	88.27	359.60	9,537.15	1,274.00	-73.38	1,274.92	1.32	1.21	0.53	
10,755.00	89.42	359.85	9,539.02	1,366.98	-73.83	1,367.89	1.27	1.24	0.27	
10,849.00	88.84	0.09	9,540.45	1,460.97	-73.88	1,461.87	0.67	-0.62	0.26	
10,943.00	88.33	0.93	9,542.77	1,554.94	-73.04	1,555.82	1.05	-0.54	0.89	
11,037.00	88.85	0.98	9,545.09	1,648.90	-71.47	1,649.74	0.56	0.55	0.05	
11,131.00	87.60	359.28	9,548.00	1,742.84	-71.26	1,743.68	2.24	-1.33	-1.81	
11,225.00	88.61	359.22	9,551.11	1,836.78	-72.49	1,837.63	1.08	1.07	-0.06	
11,319.00	87.77	357.78	9,554.07	1,930.70	-74.95	1,931.57	1.77	-0.89	-1.53	
11,413.00	88.98	357.61	9,556.74	2,024.59	-78.73	2,025.50	1.30	1.29	-0.18	
11,507.00	90.08	357.58	9,557.51	2,118.50	-82.67	2,119.46	1.17	1.17	-0.03	
11,601.00	91.78	357.62	9,555.99	2,212.40	-86.61	2,213.41	1.81	1.81	0.04	
11,695.00	91.61	359.22	9,553.21	2,306.32	-89.20	2,307.36	1.71	-0.18	1.70	
11,789.00	90.45	0.51	9,551.52	2,400.30	-89.42	2,401.33	1.85	-1.23	1.37	
11,883.00	91.61	0.49	9,549.83	2,494.28	-88.60	2,495.29	1.23	1.23	-0.02	
11,977.00	90.22	359.42	9,548.32	2,588.27	-88.67	2,589.26	1.87	-1.48	-1.14	
12,071.00	89.25	359.29	9,548.76	2,682.26	-89.73	2,683.26	1.04	-1.03	-0.14	
12,165.00	90.15	359.14	9,549.25	2,776.25	-91.02	2,777.26	0.97	0.96	-0.16	
12,259.00	88.79	359.58	9,550.12	2,870.23	-92.07	2,871.25	1.52	-1.45	0.47	
12,353.00	88.27	359.55	9,552.53	2,964.20	-92.78	2,965.22	0.55	-0.55	-0.03	
12,447.00	88.41	359.40	9,555.26	3,058.16	-93.64	3,059.18	0.22	0.15	-0.16	
12,541.00	88.76	359.35	9,557.58	3,152.12	-94.67	3,153.15	0.38	0.37	-0.05	
12,635.00	89.85	359.78	9,558.72	3,246.11	-95.38	3,247.14	1.25	1.16	0.46	
12,729.00	90.96	0.19	9,558.05	3,340.11	-95.41	3,341.13	1.26	1.18	0.44	
12,822.00	92.24	0.34	9,555.46	3,433.07	-94.98	3,434.07	1.39	1.38	0.16	
12,916.00	91.61	359.35	9,552.30	3,527.01	-95.23	3,528.01	1.25	-0.67	-1.05	
13,010.00	90.30	359.47	9,550.73	3,620.99	-96.20	3,621.99	1.40	-1.39	0.13	
13,104.00	89.24	0.27	9,551.11	3,714.99	-96.41	3,715.98	1.41	-1.13	0.85	

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
13,199.00	90.81	0.15	9,551.07	3,809.99	-96.06	3,810.97	1.66	1.65	-0.13
13,293.00	90.18	0.13	9,550.26	3,903.98	-95.83	3,904.95	0.67	-0.67	-0.02
13,386.00	89.13	359.95	9,550.82	3,996.98	-95.77	3,997.94	1.15	-1.13	-0.19
13,480.00	89.35	0.01	9,552.06	4,090.97	-95.80	4,091.92	0.24	0.23	0.06
13,574.00	90.30	0.67	9,552.35	4,184.97	-95.24	4,185.90	1.23	1.01	0.70
13,668.00	88.64	0.91	9,553.22	4,278.95	-93.95	4,279.85	1.78	-1.77	0.26
13,762.00	88.90	0.72	9,555.24	4,372.92	-92.61	4,373.79	0.34	0.28	-0.20
13,856.00	90.25	359.96	9,555.93	4,466.91	-92.05	4,467.77	1.65	1.44	-0.81
13,950.00	89.82	358.38	9,555.88	4,560.90	-93.42	4,561.77	1.74	-0.46	-1.68
14,044.00	90.16	357.66	9,555.89	4,654.84	-96.66	4,655.75	0.85	0.36	-0.77
14,138.00	91.04	357.72	9,554.91	4,748.76	-100.45	4,749.71	0.94	0.94	0.06
14,232.00	89.14	358.09	9,554.76	4,842.69	-103.89	4,843.68	2.06	-2.02	0.39
14,327.00	89.13	358.08	9,556.19	4,937.63	-107.06	4,938.65	0.01	-0.01	-0.01
14,420.00	90.50	358.17	9,556.50	5,030.58	-110.11	5,031.63	1.48	1.47	0.10
14,514.00	90.25	359.11	9,555.88	5,124.55	-112.34	5,125.62	1.03	-0.27	1.00
14,608.00	90.16	1.39	9,555.54	5,218.54	-111.93	5,219.60	2.43	-0.10	2.43
14,702.00	89.58	1.27	9,555.76	5,312.51	-109.74	5,313.54	0.63	-0.62	-0.13
14,796.00	90.38	1.70	9,555.79	5,406.48	-107.31	5,407.46	0.97	0.85	0.46
14,890.00	90.75	1.75	9,554.86	5,500.43	-104.48	5,501.36	0.40	0.39	0.05
14,984.00	89.71	2.65	9,554.49	5,594.36	-100.87	5,595.23	1.46	-1.11	0.96
15,078.00	87.77	2.60	9,556.55	5,688.23	-96.57	5,689.03	2.06	-2.06	-0.05
15,173.00	86.68	1.20	9,561.15	5,783.07	-93.42	5,783.81	1.87	-1.15	-1.47
15,267.00	86.28	359.49	9,566.92	5,876.88	-92.85	5,877.61	1.86	-0.43	-1.82
15,361.00	89.04	357.59	9,570.76	5,970.76	-95.25	5,971.51	3.56	2.94	-2.02
15,455.00	89.36	357.88	9,572.07	6,064.68	-98.96	6,065.47	0.46	0.34	0.31
15,549.00	89.61	357.91	9,572.92	6,158.61	-102.42	6,159.45	0.27	0.27	0.03
15,643.00	90.32	357.98	9,572.98	6,252.55	-105.79	6,253.42	0.76	0.76	0.07
15,738.00	90.64	357.65	9,572.18	6,347.48	-109.41	6,348.39	0.48	0.34	-0.35
15,832.00	91.26	358.20	9,570.62	6,441.40	-112.81	6,442.36	0.88	0.66	0.59
15,926.00	91.29	358.58	9,568.53	6,535.34	-115.45	6,536.32	0.41	0.03	0.40
16,020.00	92.32	358.93	9,565.57	6,629.27	-117.49	6,630.27	1.16	1.10	0.37
16,114.00	91.90	0.19	9,562.11	6,723.20	-118.21	6,724.20	1.41	-0.45	1.34
16,208.00	90.01	1.17	9,560.54	6,817.18	-117.10	6,818.15	2.26	-2.01	1.04
16,302.00	89.92	359.35	9,560.60	6,911.17	-116.67	6,912.13	1.94	-0.10	-1.94
16,396.00	91.04	358.90	9,559.81	7,005.16	-118.11	7,006.13	1.28	1.19	-0.48
16,490.00	89.36	359.19	9,559.48	7,099.14	-119.67	7,100.12	1.81	-1.79	0.31
16,584.00	89.56	359.46	9,560.37	7,193.13	-120.78	7,194.12	0.36	0.21	0.29
16,678.00	90.38	359.82	9,560.42	7,287.13	-121.37	7,288.12	0.95	0.87	0.38
16,773.00	91.64	0.55	9,558.74	7,382.11	-121.07	7,383.08	1.53	1.33	0.77
16,778.00	91.69	0.59	9,558.60	7,387.11	-121.02	7,388.08	1.25	1.00	0.75
LTP: 16778' MD, 320 FNL & 349' FEL									
16,822.00	92.13	0.92	9,557.13	7,431.08	-120.44	7,432.04	1.25	1.00	0.76
Final Phoenix MWD Survey									
16,879.00	92.13	0.92	9,555.01	7,488.03	-119.52	7,488.97	0.00	0.00	0.00

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.40usft (Ensign 155)
Well:	302H	North Reference:	Grid
Wellbore:	OH / 62734	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Ensign 155)	Database:	USA Compass

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)
Projection to TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8,444.44	8,441.45	-106.09	-59.76	Tie In
8,461.00	8,458.01	-106.25	-59.92	First Phoenix MWD Survey
9,469.00	9,396.18	118.73	-96.33	FTP: 9469' MD, 330' FSL & 367 FEL
16,778.00	9,558.60	7,387.11	-121.02	LTP: 16778' MD, 320 FNL & 349' FEL
16,822.00	9,557.13	7,431.08	-120.44	Final Phoenix MWD Survey
16,879.00	9,555.01	7,488.03	-119.52	Projection to TD