

COG Operating LLC

Lea County, NM (NAD27 NME)

Eider Federal

201H

OH / 62731

HOBBS OCD
APR 22 2019
RECEIVED

Design: Surveys (Ensign 155)

Standard Survey Report

20 August, 2018

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 201H
Wellbore: OH / 62731
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 201H
TVD Reference: GL+KB @ 3545.70usft (Ensign 155)
MD Reference: GL+KB @ 3545.70usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Project	Lea County, NM (NAD27 NME)		
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		Eider Federal				
Site Position:		Northing:	425,274.00 usft	Latitude:	32° 10' 2.46309 N	
From:	Map	Easting:	711,380.40 usft	Longitude:	103° 39' 0.76609 W	
Position Uncertainty:		0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.36 °

Well	201H					
Well Position	+N/-S	0.00 usft	Northing:	425,274.20 usft	Latitude:	32° 10' 2.46319 N
	+E/-W	0.00 usft	Easting:	711,410.30 usft	Longitude:	103° 39' 0.41824 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	3,521.70 usft	

Wellbore	OH / 62731				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	8/31/2018	6.72	59.85	47,915.33775444

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	356.65	

Survey Program	Date 8/20/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	8,600.00	Scientific Gyro Surveys (OH / 62731)	NS-GYRO-MS	North sensing gyrocompassing m/s
8,667.00	16,565.00	Phoenix MWD Surveys (OH / 62731)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.71	117.20	100.00	-0.28	0.55	-0.31	0.71	0.71	0.00
125.00	0.86	112.82	125.00	-0.43	0.86	-0.48	0.65	0.60	-17.52
150.00	1.28	112.96	149.99	-0.61	1.29	-0.68	1.68	1.68	0.56
175.00	1.50	109.16	174.98	-0.82	1.86	-0.93	0.95	0.88	-15.20
200.00	1.92	115.25	199.97	-1.11	2.55	-1.26	1.83	1.68	24.36
225.00	2.17	112.66	224.96	-1.47	3.36	-1.67	1.07	1.00	-10.36
250.00	2.47	110.57	249.94	-1.84	4.30	-2.09	1.25	1.20	-8.36
275.00	2.83	108.89	274.91	-2.23	5.39	-2.54	1.47	1.44	-6.72
300.00	2.98	106.59	299.88	-2.62	6.60	-3.00	0.76	0.60	-9.20

Survey Report

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Site:	Eider Federal	MD Reference:	GL+KB @ 3545.70usft (Ensign 155)
Well:	201H	North Reference:	Grid
Wellbore:	OH / 62731	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	3.35	103.72	324.84	-2.98	7.93	-3.43	1.61	1.48	-11.48
350.00	3.56	100.25	349.79	-3.29	9.40	-3.83	1.19	0.84	-13.88
375.00	3.47	95.96	374.75	-3.50	10.92	-4.14	1.11	-0.36	-17.16
400.00	3.59	86.83	399.70	-3.54	12.45	-4.26	2.30	0.48	-36.52
425.00	3.58	77.83	424.65	-3.33	14.00	-4.14	2.25	-0.04	-36.00
450.00	3.65	70.25	449.60	-2.90	15.51	-3.80	1.93	0.28	-30.32
475.00	4.00	61.12	474.55	-2.21	17.02	-3.20	2.81	1.40	-36.52
500.00	4.40	51.20	499.48	-1.19	18.53	-2.27	3.31	1.60	-39.68
525.00	4.55	43.74	524.40	0.13	19.97	-1.04	2.40	0.60	-29.84
550.00	4.77	36.83	549.32	1.68	21.28	0.43	2.41	0.88	-27.64
575.00	4.71	29.19	574.23	3.41	22.40	2.09	2.53	-0.24	-30.56
600.00	4.57	24.05	599.15	5.21	23.31	3.84	1.75	-0.56	-20.56
625.00	4.42	20.77	624.08	7.02	24.05	5.61	1.19	-0.60	-13.12
650.00	3.99	13.22	649.01	8.77	24.59	7.32	2.80	-1.72	-30.20
675.00	3.68	8.77	673.95	10.41	24.91	8.94	1.72	-1.24	-17.80
700.00	3.40	358.23	698.91	11.94	25.01	10.46	2.83	-1.12	-42.16
725.00	3.30	343.46	723.86	13.37	24.79	11.90	3.47	-0.40	-59.08
750.00	3.87	326.12	748.81	14.77	24.11	13.33	4.87	2.28	-69.36
775.00	4.50	316.21	773.75	16.17	22.96	14.80	3.83	2.52	-39.64
800.00	4.89	308.82	798.66	17.55	21.45	16.27	2.88	1.56	-29.56
825.00	5.16	305.55	823.57	18.87	19.71	17.69	1.57	1.08	-13.08
850.00	5.17	305.69	848.47	20.18	17.88	19.10	0.06	0.04	0.56
875.00	4.96	301.98	873.37	21.41	16.05	20.44	1.56	-0.84	-14.84
900.00	4.91	299.55	898.28	22.51	14.20	21.64	0.86	-0.20	-9.72
925.00	4.95	299.11	923.18	23.56	12.33	22.80	0.22	0.16	-1.76
950.00	4.99	297.37	948.09	24.59	10.42	23.94	0.62	0.16	-6.96
975.00	4.98	298.38	973.00	25.60	8.50	25.06	0.35	-0.04	4.04
1,000.00	4.92	298.31	997.90	26.63	6.60	26.20	0.24	-0.24	-0.28
1,025.00	4.85	298.09	1,022.81	27.63	4.72	27.31	0.29	-0.28	-0.88
1,050.00	4.93	295.43	1,047.72	28.59	2.82	28.38	0.96	0.32	-10.64
1,075.00	4.67	291.98	1,072.63	29.44	0.91	29.33	1.55	-1.04	-13.80
1,100.00	4.52	283.11	1,097.55	30.04	-1.00	30.05	2.90	-0.60	-35.48
1,125.00	4.30	280.54	1,122.48	30.43	-2.88	30.55	1.18	-0.88	-10.28
1,150.00	4.31	278.51	1,147.41	30.75	-4.73	30.97	0.61	0.04	-8.12
1,175.00	4.24	272.01	1,172.34	30.92	-6.58	31.25	1.96	-0.28	-26.00
1,200.00	4.18	267.26	1,197.27	30.91	-8.41	31.34	1.41	-0.24	-19.00
1,225.00	4.25	249.96	1,222.21	30.54	-10.19	31.09	5.07	0.28	-69.20
1,250.00	4.48	242.39	1,247.13	29.77	-11.93	30.42	2.48	0.92	-30.28
1,275.00	4.51	241.58	1,272.06	28.85	-13.66	29.60	0.28	0.12	-3.24
1,300.00	4.53	237.62	1,296.98	27.86	-15.36	28.71	1.25	0.08	-15.84
1,325.00	4.56	229.17	1,321.90	26.68	-16.94	27.62	2.68	0.12	-33.80
1,350.00	4.69	222.78	1,346.82	25.28	-18.39	26.31	2.12	0.52	-25.56
1,375.00	4.43	220.08	1,371.74	23.79	-19.70	24.90	1.35	-1.04	-10.80

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1,400.00	3.98	212.97	1,396.67	22.32	-20.80	23.50	2.75	-1.80	-28.44
1,425.00	3.41	200.95	1,421.62	20.90	-21.54	22.12	3.84	-2.28	-48.08
1,450.00	3.17	197.75	1,446.58	19.55	-22.01	20.80	1.21	-0.96	-12.80
1,475.00	3.06	199.67	1,471.54	18.26	-22.45	19.54	0.61	-0.44	7.68
1,500.00	3.19	197.10	1,496.51	16.97	-22.88	18.28	0.76	0.52	-10.28
1,525.00	3.11	197.93	1,521.47	15.66	-23.29	16.99	0.37	-0.32	3.32
1,550.00	3.12	198.52	1,546.43	14.37	-23.72	15.73	0.13	0.04	2.36
1,575.00	3.18	197.41	1,571.39	13.06	-24.14	14.45	0.34	0.24	-4.44
1,600.00	3.23	199.83	1,596.35	11.74	-24.59	13.15	0.58	0.20	9.68
1,625.00	3.13	198.86	1,621.32	10.43	-25.05	11.87	0.45	-0.40	-3.88
1,650.00	3.00	199.89	1,646.28	9.17	-25.49	10.64	0.56	-0.52	4.12
1,675.00	2.92	198.45	1,671.25	7.95	-25.91	9.45	0.44	-0.32	-5.76
1,700.00	2.65	196.18	1,696.22	6.79	-26.28	8.31	1.17	-1.08	-9.08
1,725.00	1.98	190.20	1,721.20	5.81	-26.51	7.35	2.85	-2.68	-23.92
1,750.00	2.01	186.82	1,746.18	4.95	-26.64	6.50	0.49	0.12	-13.52
1,775.00	1.51	175.60	1,771.17	4.19	-26.67	5.74	2.42	-2.00	-44.88
1,800.00	1.54	147.41	1,796.16	3.57	-26.46	5.11	2.97	0.12	-112.76
1,825.00	1.77	113.49	1,821.15	3.14	-25.93	4.65	3.96	0.92	-135.68
1,850.00	1.88	109.91	1,846.14	2.84	-25.19	4.31	0.63	0.44	-14.32
1,875.00	1.89	110.30	1,871.12	2.56	-24.42	3.98	0.07	0.04	1.56
1,900.00	1.86	112.58	1,896.11	2.26	-23.65	3.64	0.32	-0.12	9.12
1,925.00	1.86	111.29	1,921.10	1.96	-22.90	3.29	0.17	0.00	-5.16
1,950.00	1.67	111.25	1,946.09	1.68	-22.18	2.97	0.76	-0.76	-0.16
1,975.00	1.09	112.39	1,971.08	1.46	-21.62	2.72	2.32	-2.32	4.56
2,000.00	0.35	132.41	1,996.08	1.31	-21.35	2.56	3.08	-2.96	80.08
2,025.00	0.11	84.59	2,021.08	1.27	-21.27	2.51	1.15	-0.96	-191.28
2,050.00	0.06	290.94	2,046.08	1.27	-21.26	2.51	0.66	-0.20	-614.60
2,075.00	0.05	121.30	2,071.08	1.27	-21.26	2.51	0.44	-0.04	-678.56
2,100.00	0.01	205.67	2,096.08	1.26	-21.25	2.50	0.20	-0.16	337.48
2,125.00	0.06	80.26	2,121.08	1.26	-21.24	2.50	0.27	0.20	-501.64
2,150.00	0.09	182.89	2,146.08	1.25	-21.23	2.49	0.47	0.12	410.52
2,175.00	0.03	313.49	2,171.08	1.23	-21.23	2.47	0.45	-0.24	522.40
2,200.00	0.05	58.16	2,196.08	1.24	-21.23	2.48	0.26	0.08	418.68
2,225.00	0.15	187.85	2,221.08	1.22	-21.22	2.45	0.74	0.40	518.76
2,250.00	0.09	203.41	2,246.08	1.16	-21.24	2.40	0.27	-0.24	62.24
2,275.00	0.05	152.72	2,271.08	1.14	-21.24	2.38	0.28	-0.16	-202.76
2,300.00	0.10	140.26	2,296.08	1.11	-21.22	2.35	0.21	0.20	-49.84
2,325.00	0.06	235.73	2,321.08	1.09	-21.22	2.32	0.49	-0.16	381.88
2,350.00	0.11	315.79	2,346.08	1.10	-21.24	2.34	0.46	0.20	320.24
2,375.00	0.15	224.14	2,371.08	1.09	-21.28	2.33	0.75	0.16	-366.60
2,400.00	0.14	197.68	2,396.08	1.04	-21.32	2.28	0.27	-0.04	-105.84
2,425.00	0.22	237.24	2,421.08	0.98	-21.36	2.23	0.57	0.32	158.24
2,450.00	0.23	211.77	2,446.08	0.91	-21.43	2.16	0.40	0.04	-101.88

Survey Report

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Wellbore: OH / 62731
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2,475.00	0.14	190.73	2,471.08	0.84	-21.46	2.09	0.45	-0.36	-84.16
2,500.00	0.21	229.32	2,496.08	0.78	-21.50	2.04	0.53	0.28	154.36
2,525.00	0.12	150.90	2,521.08	0.73	-21.53	1.99	0.88	-0.36	-313.68
2,550.00	0.50	100.00	2,546.08	0.69	-21.41	1.94	1.74	1.52	-203.60
2,575.00	0.76	92.98	2,571.07	0.66	-21.13	1.89	1.08	1.04	-28.08
2,600.00	0.78	112.77	2,596.07	0.58	-20.81	1.80	1.06	0.08	79.16
2,625.00	0.74	99.75	2,621.07	0.49	-20.49	1.69	0.71	-0.16	-52.08
2,650.00	0.77	106.75	2,646.07	0.42	-20.17	1.59	0.39	0.12	28.00
2,675.00	0.81	95.79	2,671.06	0.35	-19.84	1.51	0.62	0.16	-43.84
2,700.00	0.89	106.65	2,696.06	0.28	-19.48	1.41	0.72	0.32	43.44
2,725.00	0.77	95.25	2,721.06	0.20	-19.12	1.32	0.81	-0.48	-45.60
2,750.00	0.82	100.91	2,746.06	0.16	-18.78	1.25	0.37	0.20	22.64
2,775.00	0.85	92.07	2,771.05	0.12	-18.42	1.19	0.53	0.12	-35.36
2,800.00	0.83	109.04	2,796.05	0.05	-18.06	1.10	0.99	-0.08	67.88
2,825.00	0.75	100.10	2,821.05	-0.04	-17.73	1.00	0.59	-0.32	-35.76
2,850.00	0.81	112.30	2,846.05	-0.13	-17.41	0.88	0.70	0.24	48.80
2,875.00	0.84	105.61	2,871.04	-0.25	-17.07	0.75	0.40	0.12	-26.76
2,900.00	0.98	98.00	2,896.04	-0.33	-16.68	0.65	0.74	0.56	-30.44
2,925.00	1.02	103.49	2,921.04	-0.41	-16.25	0.54	0.42	0.16	21.96
2,950.00	0.96	114.06	2,946.03	-0.55	-15.84	0.38	0.77	-0.24	42.28
2,975.00	0.90	112.69	2,971.03	-0.71	-15.47	0.20	0.26	-0.24	-5.48
3,000.00	1.09	107.09	2,996.03	-0.86	-15.06	0.03	0.85	0.76	-22.40
3,025.00	0.98	113.17	3,021.02	-1.01	-14.64	-0.15	0.62	-0.44	24.32
3,050.00	1.05	123.64	3,046.02	-1.22	-14.25	-0.39	0.79	0.28	41.88
3,075.00	1.06	123.71	3,071.01	-1.48	-13.87	-0.66	0.04	0.04	0.28
3,100.00	0.98	115.60	3,096.01	-1.70	-13.48	-0.91	0.66	-0.32	-32.44
3,125.00	1.01	116.61	3,121.01	-1.89	-13.09	-1.12	0.14	0.12	4.04
3,150.00	1.00	122.72	3,146.00	-2.10	-12.71	-1.36	0.43	-0.04	24.44
3,175.00	0.98	116.38	3,171.00	-2.32	-12.34	-1.59	0.45	-0.08	-25.36
3,200.00	1.08	119.79	3,196.00	-2.53	-11.94	-1.83	0.47	0.40	13.64
3,225.00	1.08	117.82	3,220.99	-2.76	-11.53	-2.08	0.15	0.00	-7.88
3,250.00	1.04	122.42	3,245.99	-2.99	-11.13	-2.33	0.38	-0.16	18.40
3,275.00	1.06	116.79	3,270.98	-3.21	-10.73	-2.58	0.42	0.08	-22.52
3,300.00	1.05	125.15	3,295.98	-3.45	-10.34	-2.84	0.62	-0.04	33.44
3,325.00	1.03	120.08	3,320.97	-3.69	-9.95	-3.11	0.38	-0.08	-20.28
3,350.00	0.99	119.81	3,345.97	-3.91	-9.57	-3.35	0.16	-0.16	-1.08
3,375.00	0.73	101.32	3,370.97	-4.05	-9.23	-3.51	1.51	-1.04	-73.96
3,400.00	0.84	5.34	3,395.97	-3.90	-9.06	-3.37	4.68	0.44	-383.92
3,425.00	1.31	346.13	3,420.96	-3.44	-9.11	-2.90	2.34	1.88	-76.84
3,450.00	1.30	336.43	3,445.95	-2.90	-9.29	-2.36	0.88	-0.04	-38.80
3,475.00	1.57	341.00	3,470.95	-2.32	-9.51	-1.76	1.17	1.08	18.28
3,500.00	1.56	339.59	3,495.94	-1.68	-9.74	-1.11	0.16	-0.04	-5.64
3,525.00	1.48	339.87	3,520.93	-1.06	-9.97	-0.47	0.32	-0.32	1.12
3,550.00	1.29	337.29	3,545.92	-0.49	-10.19	0.10	0.80	-0.76	-10.32

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Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 201H
Wellbore: OH / 62731
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 201H
TVD Reference: GL+KB @ 3545.70usft (Ensign 155)
MD Reference: GL+KB @ 3545.70usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	1.16	354.25	3,570.92	0.02	-10.33	0.62	1.53	-0.52	67.84
3,600.00	1.22	0.22	3,595.91	0.54	-10.35	1.14	0.55	0.24	23.88
3,625.00	1.24	2.64	3,620.90	1.07	-10.34	1.68	0.22	0.08	9.68
3,650.00	1.04	355.08	3,645.90	1.57	-10.35	2.17	1.00	-0.80	-30.24
3,675.00	1.23	2.41	3,670.90	2.06	-10.35	2.66	0.96	0.76	29.32
3,700.00	1.10	0.35	3,695.89	2.57	-10.34	3.17	0.55	-0.52	-8.24
3,725.00	1.09	358.18	3,720.89	3.05	-10.35	3.65	0.17	-0.04	-8.68
3,750.00	1.12	352.59	3,745.88	3.53	-10.39	4.13	0.45	0.12	-22.36
3,775.00	1.36	333.21	3,770.87	4.04	-10.55	4.65	1.92	0.96	-77.52
3,800.00	1.45	315.57	3,795.87	4.53	-10.91	5.16	1.76	0.36	-70.56
3,825.00	1.67	311.07	3,820.86	4.99	-11.40	5.65	1.01	0.88	-18.00
3,850.00	1.54	314.58	3,845.85	5.47	-11.92	6.15	0.65	-0.52	14.04
3,875.00	1.60	311.33	3,870.84	5.93	-12.42	6.65	0.43	0.24	-13.00
3,900.00	1.54	307.22	3,895.83	6.37	-12.95	7.11	0.51	-0.24	-16.44
3,925.00	1.64	307.09	3,920.82	6.79	-13.50	7.56	0.40	0.40	-0.52
3,950.00	1.48	302.83	3,945.81	7.18	-14.06	7.99	0.79	-0.64	-17.04
3,975.00	1.51	305.44	3,970.80	7.54	-14.60	8.38	0.30	0.12	10.44
4,000.00	1.63	305.65	3,995.79	7.94	-15.15	8.81	0.48	0.48	0.84
4,025.00	1.51	307.82	4,020.78	8.35	-15.70	9.25	0.54	-0.48	8.68
4,050.00	1.41	309.34	4,045.78	8.75	-16.20	9.68	0.43	-0.40	6.08
4,075.00	1.48	304.43	4,070.77	9.12	-16.70	10.09	0.57	0.28	-19.64
4,100.00	1.15	305.02	4,095.76	9.45	-17.18	10.44	1.32	-1.32	2.36
4,125.00	1.23	309.79	4,120.76	9.77	-17.59	10.78	0.51	0.32	19.08
4,150.00	1.26	303.95	4,145.75	10.09	-18.02	11.13	0.52	0.12	-23.36
4,175.00	0.99	304.50	4,170.74	10.37	-18.43	11.43	1.08	-1.08	2.20
4,200.00	1.03	309.13	4,195.74	10.63	-18.78	11.71	0.36	0.16	18.52
4,225.00	1.10	316.48	4,220.74	10.95	-19.12	12.05	0.61	0.28	29.40
4,250.00	0.87	298.11	4,245.73	11.21	-19.45	12.33	1.55	-0.92	-73.48
4,275.00	0.96	290.69	4,270.73	11.37	-19.82	12.51	0.59	0.36	-29.68
4,300.00	0.95	302.66	4,295.73	11.56	-20.19	12.72	0.80	-0.04	47.88
4,325.00	0.86	308.91	4,320.72	11.79	-20.51	12.97	0.53	-0.36	25.00
4,350.00	0.66	315.50	4,345.72	12.01	-20.75	13.20	0.87	-0.80	26.36
4,375.00	0.68	328.35	4,370.72	12.24	-20.93	13.44	0.61	0.08	51.40
4,400.00	0.22	304.38	4,395.72	12.39	-21.05	13.60	1.95	-1.84	-95.88
4,425.00	0.18	274.64	4,420.72	12.42	-21.13	13.64	0.44	-0.16	-118.96
4,450.00	0.21	288.17	4,445.72	12.44	-21.21	13.66	0.22	0.12	54.12
4,475.00	0.19	324.56	4,470.72	12.49	-21.28	13.71	0.51	-0.08	145.56
4,500.00	0.19	337.72	4,495.72	12.56	-21.32	13.79	0.17	0.00	52.64
4,525.00	0.09	313.03	4,520.72	12.61	-21.35	13.84	0.46	-0.40	-98.76
4,550.00	0.29	313.97	4,545.72	12.67	-21.41	13.90	0.80	0.80	3.76
4,575.00	0.46	301.10	4,570.72	12.77	-21.54	14.00	0.75	0.68	-51.48
4,600.00	0.64	297.36	4,595.72	12.88	-21.75	14.13	0.73	0.72	-14.96
4,625.00	0.94	294.60	4,620.71	13.03	-22.06	14.30	1.21	1.20	-11.04

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 201H
 Wellbore: OH / 62731
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 201H
 TVD Reference: GL+KB @ 3545.70usft (Ensign 155)
 MD Reference: GL+KB @ 3545.70usft (Ensign 155)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
4,650.00	1.30	297.48	4,645.71	13.25	-22.50	14.54	1.46	1.44	11.52
4,675.00	1.36	297.34	4,670.70	13.51	-23.01	14.84	0.24	0.24	-0.56
4,700.00	1.28	300.17	4,695.70	13.79	-23.52	15.14	0.41	-0.32	11.32
4,725.00	1.30	299.84	4,720.69	14.07	-24.01	15.45	0.09	0.08	-1.32
4,750.00	1.33	301.25	4,745.68	14.36	-24.50	15.77	0.18	0.12	5.64
4,775.00	1.21	307.12	4,770.68	14.67	-24.96	16.11	0.71	-0.48	23.48
4,800.00	1.21	305.91	4,795.67	14.99	-25.38	16.45	0.10	0.00	-4.84
4,825.00	1.28	301.17	4,820.66	15.29	-25.84	16.77	0.50	0.28	-18.96
4,850.00	1.34	301.60	4,845.66	15.59	-26.32	17.10	0.24	0.24	1.72
4,875.00	1.29	292.59	4,870.65	15.85	-26.83	17.39	0.85	-0.20	-36.04
4,900.00	1.32	296.30	4,895.65	16.08	-27.35	17.65	0.36	0.12	14.84
4,925.00	1.22	295.04	4,920.64	16.32	-27.85	17.92	0.42	-0.40	-5.04
4,950.00	1.28	300.19	4,945.63	16.58	-28.33	18.20	0.51	0.24	20.60
4,975.00	1.18	303.72	4,970.63	16.86	-28.79	18.51	0.50	-0.40	14.12
5,000.00	1.22	299.39	4,995.62	17.13	-29.23	18.81	0.40	0.16	-17.32
5,025.00	1.25	294.15	5,020.62	17.37	-29.71	19.08	0.47	0.12	-20.96
5,050.00	1.25	306.79	5,045.61	17.65	-30.18	19.38	1.10	0.00	50.56
5,075.00	1.25	293.62	5,070.60	17.92	-30.65	19.68	1.15	0.00	-52.68
5,100.00	1.32	295.39	5,095.60	18.15	-31.16	19.94	0.32	0.28	7.08
5,125.00	1.36	293.14	5,120.59	18.40	-31.69	20.22	0.26	0.16	-9.00
5,150.00	1.22	296.42	5,145.58	18.63	-32.20	20.48	0.63	-0.56	13.12
5,175.00	1.32	293.05	5,170.58	18.86	-32.71	20.74	0.50	0.40	-13.48
5,200.00	1.21	305.73	5,195.57	19.13	-33.19	21.03	1.20	-0.44	50.72
5,225.00	1.31	291.09	5,220.57	19.39	-33.67	21.32	1.34	0.40	-58.56
5,250.00	1.33	293.79	5,245.56	19.60	-34.20	21.57	0.26	0.08	10.80
5,275.00	1.31	291.69	5,270.55	19.83	-34.73	21.82	0.21	-0.08	-8.40
5,300.00	1.33	288.39	5,295.55	20.02	-35.27	22.05	0.31	0.08	-13.20
5,325.00	1.35	289.08	5,320.54	20.21	-35.83	22.27	0.10	0.08	2.76
5,350.00	1.35	285.63	5,345.53	20.39	-36.39	22.48	0.33	0.00	-13.80
5,375.00	1.24	290.38	5,370.53	20.56	-36.92	22.68	0.61	-0.44	19.00
5,400.00	1.20	297.26	5,395.52	20.78	-37.41	22.93	0.61	-0.16	27.52
5,425.00	1.33	288.18	5,420.51	20.99	-37.92	23.17	0.95	0.52	-36.32
5,450.00	1.25	293.82	5,445.51	21.19	-38.44	23.40	0.60	-0.32	22.56
5,475.00	1.26	292.24	5,470.50	21.40	-38.95	23.64	0.14	0.04	-6.32
5,500.00	1.29	287.25	5,495.50	21.59	-39.47	23.86	0.46	0.12	-19.96
5,525.00	1.31	289.87	5,520.49	21.77	-40.01	24.07	0.25	0.08	10.48
5,550.00	1.36	291.46	5,545.48	21.97	-40.55	24.31	0.25	0.20	6.36
5,575.00	1.36	289.35	5,570.48	22.18	-41.11	24.55	0.20	0.00	-8.44
5,600.00	1.25	288.71	5,595.47	22.37	-41.65	24.76	0.44	-0.44	-2.56
5,625.00	1.26	291.41	5,620.46	22.56	-42.16	24.98	0.24	0.04	10.80
5,650.00	1.17	289.67	5,645.46	22.74	-42.66	25.20	0.39	-0.36	-6.96
5,675.00	1.19	289.62	5,670.45	22.91	-43.14	25.40	0.08	0.08	-0.20
5,700.00	0.96	294.32	5,695.45	23.09	-43.58	25.59	0.98	-0.92	18.80

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 201H
 Wellbore: OH / 62731
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 201H
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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)
5,725.00	1.03	288.10	5,720.44	23.24	-43.98	25.77	0.51	0.28	-24.88
5,750.00	1.03	281.78	5,745.44	23.36	-44.42	25.92	0.45	0.00	-25.28
5,775.00	0.98	277.33	5,770.44	23.43	-44.85	26.01	0.37	-0.20	-17.80
5,800.00	1.06	281.09	5,795.43	23.50	-45.29	26.11	0.42	0.32	15.04
5,825.00	1.00	288.02	5,820.43	23.62	-45.72	26.25	0.55	-0.24	27.72
5,850.00	0.87	292.48	5,845.43	23.76	-46.10	26.41	0.60	-0.52	17.84
5,875.00	0.87	295.03	5,870.42	23.91	-46.45	26.58	0.15	0.00	10.20
5,900.00	0.89	283.65	5,895.42	24.04	-46.81	26.73	0.70	0.08	-45.52
5,925.00	0.85	292.82	5,920.42	24.15	-47.17	26.87	0.58	-0.16	36.68
5,950.00	0.99	285.10	5,945.41	24.28	-47.55	27.02	0.75	0.56	-30.88
5,975.00	0.97	275.19	5,970.41	24.36	-47.97	27.12	0.68	-0.08	-39.64
6,000.00	0.94	283.72	5,995.41	24.42	-48.38	27.21	0.58	-0.12	34.12
6,025.00	0.91	282.94	6,020.40	24.52	-48.77	27.33	0.13	-0.12	-3.12
6,050.00	0.85	285.96	6,045.40	24.61	-49.15	27.44	0.30	-0.24	12.08
6,075.00	0.82	293.43	6,070.40	24.74	-49.49	27.58	0.45	-0.12	29.88
6,100.00	0.81	283.31	6,095.40	24.85	-49.82	27.72	0.58	-0.04	-40.48
6,125.00	0.85	296.55	6,120.39	24.97	-50.16	27.86	0.78	0.16	52.96
6,150.00	0.98	280.27	6,145.39	25.09	-50.54	28.00	1.16	0.52	-65.12
6,175.00	0.99	283.32	6,170.39	25.18	-50.96	28.11	0.21	0.04	12.20
6,200.00	0.96	285.20	6,195.38	25.28	-51.37	28.24	0.18	-0.12	7.52
6,225.00	1.02	277.62	6,220.38	25.37	-51.79	28.35	0.58	0.24	-30.32
6,250.00	0.99	292.33	6,245.37	25.48	-52.21	28.49	1.04	-0.12	58.84
6,275.00	0.92	295.50	6,270.37	25.65	-52.59	28.68	0.35	-0.28	12.68
6,300.00	1.05	280.34	6,295.37	25.78	-53.00	28.83	1.16	0.52	-60.64
6,325.00	1.01	285.24	6,320.36	25.88	-53.44	28.95	0.39	-0.16	19.60
6,350.00	1.04	275.10	6,345.36	25.95	-53.88	29.06	0.73	0.12	-40.56
6,375.00	1.07	279.62	6,370.36	26.01	-54.33	29.14	0.35	0.12	18.08
6,400.00	0.97	279.58	6,395.35	26.09	-54.77	29.24	0.40	-0.40	-0.16
6,425.00	1.06	273.91	6,420.35	26.14	-55.21	29.32	0.54	0.36	-22.68
6,450.00	1.08	272.69	6,445.34	26.16	-55.68	29.37	0.12	0.08	-4.88
6,475.00	1.09	271.31	6,470.34	26.18	-56.15	29.42	0.11	0.04	-5.52
6,500.00	1.09	275.75	6,495.33	26.21	-56.63	29.47	0.34	0.00	17.76
6,525.00	1.05	281.96	6,520.33	26.28	-57.09	29.57	0.49	-0.16	24.84
6,550.00	1.21	280.24	6,545.32	26.38	-57.57	29.70	0.65	0.64	-6.88
6,575.00	1.26	282.41	6,570.32	26.48	-58.10	29.83	0.27	0.20	8.88
6,600.00	1.32	281.65	6,595.31	26.60	-58.65	29.98	0.25	0.24	-3.04
6,625.00	1.33	280.22	6,620.31	26.71	-59.22	30.12	0.14	0.04	-5.72
6,650.00	1.27	281.51	6,645.30	26.82	-59.77	30.26	0.27	-0.24	5.16
6,675.00	1.31	281.41	6,670.29	26.93	-60.32	30.41	0.16	0.16	-0.40
6,700.00	1.26	285.35	6,695.29	27.06	-60.87	30.57	0.41	-0.20	15.76
6,725.00	1.21	286.57	6,720.28	27.20	-61.39	30.75	0.23	-0.20	4.88
6,750.00	1.16	295.96	6,745.28	27.39	-61.87	30.96	0.80	-0.20	37.56
6,775.00	1.03	307.34	6,770.27	27.64	-62.27	31.23	1.01	-0.52	45.52
6,800.00	1.03	315.80	6,795.27	27.94	-62.61	31.55	0.61	0.00	33.84

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 201H
Wellbore: OH / 62731
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 201H
TVD Reference: GL+KB @ 3545.70usft (Ensign 155)
MD Reference: GL+KB @ 3545.70usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
6,825.00	1.04	324.78	6,820.26	28.28	-62.90	31.91	0.65	0.04	35.92
6,850.00	1.09	318.12	6,845.26	28.64	-63.19	32.29	0.53	0.20	-26.64
6,875.00	1.11	326.69	6,870.25	29.02	-63.48	32.68	0.66	0.08	34.28
6,900.00	1.09	320.50	6,895.25	29.41	-63.76	33.09	0.48	-0.08	-24.76
6,925.00	1.01	326.54	6,920.25	29.78	-64.04	33.47	0.55	-0.32	24.16
6,950.00	1.07	331.51	6,945.24	30.17	-64.27	33.87	0.43	0.24	19.88
6,975.00	0.99	332.63	6,970.24	30.56	-64.48	34.28	0.33	-0.32	4.48
7,000.00	0.92	335.53	6,995.23	30.94	-64.66	34.66	0.34	-0.28	11.60
7,025.00	0.97	322.66	7,020.23	31.29	-64.87	35.03	0.87	0.20	-51.48
7,050.00	0.99	324.20	7,045.23	31.63	-65.13	35.38	0.13	0.08	6.16
7,075.00	0.91	327.13	7,070.22	31.97	-65.36	35.74	0.37	-0.32	11.72
7,100.00	0.97	333.25	7,095.22	32.33	-65.56	36.11	0.47	0.24	24.48
7,125.00	0.94	335.74	7,120.22	32.70	-65.74	36.49	0.20	-0.12	9.96
7,150.00	0.85	335.66	7,145.21	33.06	-65.90	36.86	0.36	-0.36	-0.32
7,175.00	0.93	339.71	7,170.21	33.42	-66.05	37.22	0.41	0.32	16.20
7,200.00	0.84	328.70	7,195.21	33.77	-66.22	37.58	0.77	-0.36	-44.04
7,225.00	0.90	337.44	7,220.20	34.10	-66.39	37.93	0.58	0.24	34.96
7,250.00	0.88	331.19	7,245.20	34.45	-66.56	38.28	0.40	-0.08	-25.00
7,275.00	0.77	340.24	7,270.20	34.78	-66.71	38.62	0.68	-0.44	36.20
7,300.00	0.82	328.31	7,295.20	35.09	-66.86	38.94	0.69	0.20	-47.72
7,325.00	0.84	324.55	7,320.19	35.39	-67.06	39.25	0.23	0.08	-15.04
7,350.00	0.93	314.06	7,345.19	35.68	-67.31	39.56	0.74	0.36	-41.96
7,375.00	1.08	304.10	7,370.19	35.96	-67.65	39.85	0.92	0.60	-39.84
7,400.00	1.20	300.25	7,395.18	36.22	-68.07	40.14	0.57	0.48	-15.40
7,425.00	1.24	299.68	7,420.18	36.49	-68.53	40.43	0.17	0.16	-2.28
7,450.00	1.23	307.46	7,445.17	36.78	-68.98	40.75	0.67	-0.04	31.12
7,475.00	1.25	298.77	7,470.16	37.08	-69.43	41.07	0.76	0.08	-34.76
7,500.00	1.22	302.28	7,495.16	37.35	-69.90	41.37	0.33	-0.12	14.04
7,525.00	1.18	295.47	7,520.15	37.60	-70.35	41.65	0.59	-0.16	-27.24
7,550.00	1.04	300.54	7,545.15	37.83	-70.78	41.90	0.68	-0.56	20.28
7,575.00	1.11	299.38	7,570.14	38.06	-71.19	42.16	0.29	0.28	-4.64
7,600.00	0.94	304.36	7,595.14	38.30	-71.57	42.41	0.77	-0.68	19.92
7,625.00	1.04	286.38	7,620.14	38.48	-71.95	42.62	1.30	0.40	-71.92
7,650.00	1.06	284.97	7,645.13	38.60	-72.40	42.77	0.13	0.08	-5.64
7,675.00	0.97	279.51	7,670.13	38.70	-72.83	42.89	0.53	-0.36	-21.84
7,700.00	0.93	281.07	7,695.13	38.77	-73.24	42.98	0.19	-0.16	6.24
7,725.00	0.99	271.37	7,720.12	38.81	-73.65	43.05	0.69	0.24	-38.80
7,750.00	0.87	270.31	7,745.12	38.82	-74.06	43.08	0.48	-0.48	-4.24
7,775.00	0.90	264.43	7,770.12	38.80	-74.44	43.09	0.38	0.12	-23.52
7,800.00	0.84	265.93	7,795.11	38.77	-74.82	43.08	0.26	-0.24	6.00
7,825.00	0.87	272.65	7,820.11	38.77	-75.19	43.09	0.42	0.12	26.88
7,850.00	1.04	265.83	7,845.11	38.76	-75.61	43.11	0.82	0.68	-27.28
7,875.00	0.94	266.23	7,870.10	38.73	-76.04	43.11	0.40	-0.40	1.60

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 201H
Wellbore: OH / 62731
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 201H
TVD Reference: GL+KB @ 3545.70usft (Ensign 155)
MD Reference: GL+KB @ 3545.70usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
7,900.00	1.03	265.85	7,895.10	38.70	-76.47	43.10	0.36	0.36	-1.52
7,925.00	0.97	304.83	7,920.10	38.80	-76.87	43.23	2.68	-0.24	155.92
7,950.00	1.02	314.33	7,945.09	39.08	-77.20	43.52	0.69	0.20	38.00
7,975.00	1.07	313.29	7,970.09	39.40	-77.53	43.86	0.21	0.20	-4.16
8,000.00	1.14	315.71	7,995.08	39.73	-77.87	44.22	0.34	0.28	9.68
8,025.00	1.13	310.22	8,020.08	40.07	-78.23	44.57	0.44	-0.04	-21.96
8,050.00	1.11	311.68	8,045.07	40.39	-78.60	44.91	0.14	-0.08	5.84
8,075.00	1.07	305.09	8,070.07	40.69	-78.97	45.23	0.53	-0.16	-26.36
8,100.00	1.06	305.02	8,095.06	40.95	-79.35	45.52	0.04	-0.04	-0.28
8,125.00	1.01	302.10	8,120.06	41.20	-79.73	45.79	0.29	-0.20	-11.68
8,150.00	0.97	306.53	8,145.06	41.45	-80.09	46.05	0.35	-0.16	17.72
8,175.00	1.02	302.89	8,170.05	41.69	-80.44	46.32	0.32	0.20	-14.56
8,200.00	1.08	301.37	8,195.05	41.94	-80.83	46.59	0.26	0.24	-6.08
8,225.00	1.11	299.19	8,220.04	42.18	-81.24	46.85	0.21	0.12	-8.72
8,250.00	1.11	294.58	8,245.04	42.40	-81.68	47.10	0.36	0.00	-18.44
8,275.00	1.11	293.25	8,270.03	42.59	-82.12	47.32	0.10	0.00	-5.32
8,300.00	1.14	291.08	8,295.03	42.78	-82.57	47.53	0.21	0.12	-8.68
8,325.00	1.07	292.57	8,320.03	42.96	-83.02	47.73	0.30	-0.28	5.96
8,350.00	1.11	292.02	8,345.02	43.14	-83.46	47.94	0.17	0.16	-2.20
8,375.00	1.07	283.35	8,370.02	43.28	-83.91	48.11	0.68	-0.16	-34.68
8,400.00	1.10	287.81	8,395.01	43.41	-84.37	48.26	0.36	0.12	17.84
8,425.00	1.02	285.93	8,420.01	43.54	-84.81	48.42	0.35	-0.32	-7.52
8,450.00	1.07	282.20	8,445.00	43.65	-85.25	48.56	0.34	0.20	-14.92
8,475.00	1.04	281.06	8,470.00	43.75	-85.70	48.68	0.15	-0.12	-4.56
8,500.00	0.96	283.37	8,495.00	43.84	-86.13	48.80	0.36	-0.32	9.24
8,525.00	0.86	275.03	8,519.99	43.90	-86.52	48.88	0.66	-0.40	-33.36
8,550.00	0.85	273.53	8,544.99	43.93	-86.89	48.93	0.10	-0.04	-6.00
8,575.00	0.92	272.37	8,569.99	43.95	-87.28	48.98	0.29	0.28	-4.64
8,600.00	0.88	264.17	8,594.98	43.94	-87.67	48.99	0.54	-0.16	-32.80
Tie In									
8,667.00	0.95	243.51	8,661.97	43.64	-88.68	48.75	0.50	0.10	-30.84
First Phoenix MWD Survey									
8,702.00	0.97	240.72	8,696.97	43.36	-89.20	48.50	0.15	0.06	-7.97
8,762.00	0.92	248.18	8,756.96	42.94	-90.09	48.13	0.22	-0.08	12.43
8,810.00	2.70	324.62	8,804.94	43.72	-91.10	48.96	5.50	3.71	159.25
8,857.00	9.61	337.58	8,851.64	48.25	-93.24	53.62	14.90	14.70	27.57
8,904.00	14.70	340.48	8,897.57	57.50	-96.73	63.06	10.90	10.83	6.17
8,951.00	17.66	338.66	8,942.71	69.77	-101.32	75.57	6.39	6.30	-3.87
8,997.00	22.73	336.59	8,985.87	84.43	-107.39	90.56	11.13	11.02	-4.50
9,009.00	24.23	336.46	8,996.87	88.82	-109.30	95.05	12.54	12.53	-1.04
FTP: 9009' MD									
9,044.00	28.62	336.17	9,028.21	103.08	-115.55	109.65	12.54	12.53	-0.84
9,092.00	33.84	335.89	9,069.24	125.81	-125.67	132.94	10.88	10.88	-0.58
9,139.00	39.15	335.06	9,107.01	151.23	-137.28	158.99	11.35	11.30	-1.77

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 201H
Wellbore: OH / 62731
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 201H
TVD Reference: GL+KB @ 3545.70usft (Ensign 155)
MD Reference: GL+KB @ 3545.70usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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)
9,186.00	43.01	336.45	9,142.43	179.38	-149.94	187.84	8.44	8.21	2.96
9,233.00	48.47	336.39	9,175.22	210.22	-163.40	219.41	11.62	11.62	-0.13
9,279.00	52.10	338.22	9,204.61	242.87	-177.04	252.80	8.46	7.89	3.98
9,326.00	56.29	340.34	9,232.10	278.51	-190.50	289.17	9.64	8.91	4.51
9,372.00	61.40	339.66	9,255.89	315.49	-203.97	326.87	11.18	11.11	-1.48
9,419.00	67.98	338.06	9,275.98	355.09	-219.30	367.30	14.33	14.00	-3.40
9,466.00	74.28	337.25	9,291.17	396.20	-236.20	409.33	13.50	13.40	-1.72
9,513.00	79.51	336.74	9,301.82	438.32	-254.09	452.42	11.18	11.13	-1.09
9,561.00	83.92	336.06	9,308.74	481.83	-273.10	496.97	9.29	9.19	-1.42
9,608.00	87.64	336.07	9,312.19	524.67	-292.11	540.84	7.91	7.91	0.02
9,654.00	88.99	335.68	9,313.55	566.63	-310.91	583.83	3.05	2.93	-0.85
9,701.00	89.78	335.63	9,314.05	609.45	-330.28	627.71	1.68	1.68	-0.11
9,748.00	89.30	338.28	9,314.43	652.69	-348.68	671.95	5.73	-1.02	5.64
9,795.00	88.61	341.09	9,315.29	696.76	-364.99	716.90	6.16	-1.47	5.98
9,843.00	88.70	343.34	9,316.41	742.45	-379.65	763.36	4.69	0.19	4.69
9,890.00	89.65	345.70	9,317.09	787.74	-392.19	809.31	5.41	2.02	5.02
9,937.00	89.14	348.96	9,317.59	833.58	-402.49	855.68	7.02	-1.09	6.94
9,984.00	88.84	351.90	9,318.42	879.92	-410.31	902.39	6.29	-0.64	6.26
10,031.00	88.41	353.53	9,319.54	926.52	-416.26	949.26	3.59	-0.91	3.47
10,126.00	88.16	358.43	9,322.39	1,021.22	-422.92	1,044.18	5.16	-0.26	5.16
10,219.00	88.27	1.42	9,325.29	1,114.16	-423.04	1,136.98	3.22	0.12	3.22
10,314.00	88.20	2.46	9,328.21	1,209.06	-419.83	1,231.53	1.10	-0.07	1.09
10,408.00	89.59	2.06	9,330.02	1,302.97	-416.12	1,325.06	1.54	1.48	-0.43
10,503.00	90.32	2.71	9,330.10	1,397.88	-412.17	1,419.58	1.03	0.77	0.68
10,597.00	89.68	3.61	9,330.10	1,491.74	-406.99	1,512.97	1.17	-0.68	0.96
10,692.00	87.93	1.06	9,332.08	1,586.63	-403.12	1,607.47	3.25	-1.84	-2.68
10,785.00	88.45	1.53	9,335.02	1,679.56	-401.01	1,700.12	0.75	0.56	0.51
10,879.00	89.31	1.93	9,336.86	1,773.49	-398.18	1,793.73	1.01	0.91	0.43
10,973.00	87.91	358.88	9,339.14	1,867.45	-397.51	1,887.49	3.57	-1.49	-3.24
11,068.00	87.70	358.50	9,342.77	1,962.36	-399.68	1,982.36	0.46	-0.22	-0.40
11,161.00	90.04	0.33	9,344.61	2,055.32	-400.63	2,075.22	3.19	2.52	1.97
11,255.00	90.75	0.59	9,343.96	2,149.32	-399.88	2,169.01	0.80	0.76	0.28
11,350.00	92.54	1.11	9,341.23	2,244.26	-398.47	2,263.71	1.96	1.88	0.55
11,444.00	92.60	0.99	9,337.02	2,338.15	-396.75	2,357.34	0.14	0.06	-0.13
11,539.00	91.22	1.11	9,333.85	2,433.08	-395.01	2,452.01	1.46	-1.45	0.13
11,632.00	91.46	1.64	9,331.68	2,526.03	-392.78	2,544.67	0.63	0.26	0.57
11,726.00	92.17	1.74	9,328.70	2,619.94	-390.01	2,638.25	0.76	0.76	0.11
11,820.00	90.82	1.84	9,326.25	2,713.86	-387.07	2,731.84	1.44	-1.44	0.11
11,914.00	89.62	359.24	9,325.89	2,807.85	-386.18	2,825.62	3.05	-1.28	-2.77
12,008.00	89.99	359.32	9,326.21	2,901.84	-387.37	2,919.52	0.40	0.39	0.09
12,110.00	88.22	357.85	9,327.80	3,003.79	-389.88	3,021.44	2.26	-1.74	-1.44
12,196.00	88.51	358.88	9,330.25	3,089.72	-392.34	3,107.36	1.24	0.34	1.20
12,290.00	88.85	359.30	9,332.42	3,183.68	-393.83	3,201.25	0.57	0.36	0.45

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 201H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL+KB @ 3545.70usft (Ensign 155)
Site:	Eider Federal	MD Reference:	GL+KB @ 3545.70usft (Ensign 155)
Well:	201H	North Reference:	Grid
Wellbore:	OH / 62731	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)
12,384.00	88.70	0.83	9,334.43	3,277.65	-393.72	3,295.06	1.64	-0.16	1.63
12,478.00	87.93	359.57	9,337.19	3,371.61	-393.39	3,388.84	1.57	-0.82	-1.34
12,573.00	88.31	358.86	9,340.31	3,466.55	-394.70	3,483.69	0.85	0.40	-0.75
12,666.00	89.44	358.27	9,342.14	3,559.50	-397.02	3,576.62	1.37	1.22	-0.63
12,760.00	92.00	359.22	9,340.95	3,653.46	-399.08	3,670.54	2.90	2.72	1.01
12,854.00	91.27	358.78	9,338.27	3,747.41	-400.72	3,764.42	0.91	-0.78	-0.47
12,949.00	91.89	358.79	9,335.65	3,842.35	-402.74	3,859.32	0.65	0.65	0.01
13,043.00	92.80	358.69	9,331.81	3,936.25	-404.80	3,953.18	0.97	0.97	-0.11
13,112.00	92.20	359.20	9,328.80	4,005.17	-406.07	4,022.06	1.14	-0.87	0.74
13,206.00	92.01	359.13	9,325.34	4,099.10	-407.44	4,115.90	0.22	-0.20	-0.07
13,300.00	91.55	359.36	9,322.42	4,193.04	-408.68	4,209.76	0.55	-0.49	0.24
13,394.00	90.65	0.17	9,320.62	4,287.02	-409.06	4,303.60	1.29	-0.96	0.86
13,488.00	88.28	0.08	9,321.50	4,381.01	-408.86	4,397.42	2.52	-2.52	-0.10
13,583.00	88.24	359.47	9,324.38	4,475.97	-409.23	4,492.23	0.64	-0.04	-0.64
13,677.00	88.93	0.53	9,326.70	4,569.94	-409.23	4,586.04	1.35	0.73	1.13
13,771.00	88.67	1.02	9,328.67	4,663.91	-407.96	4,679.78	0.59	-0.28	0.52
13,864.00	88.20	1.27	9,331.21	4,756.85	-406.10	4,772.46	0.57	-0.51	0.27
13,958.00	89.44	1.04	9,333.15	4,850.81	-404.21	4,866.14	1.34	1.32	-0.24
14,053.00	90.08	359.36	9,333.55	4,945.81	-403.88	4,960.96	1.89	0.67	-1.77
14,146.00	91.59	359.56	9,332.19	5,038.79	-404.75	5,053.83	1.64	1.62	0.22
14,240.00	92.06	359.58	9,329.20	5,132.74	-405.46	5,147.66	0.50	0.50	0.02
14,334.00	92.72	0.14	9,325.28	5,226.66	-405.69	5,241.43	0.92	0.70	0.60
14,428.00	93.46	0.76	9,320.21	5,320.52	-404.95	5,335.09	1.03	0.79	0.66
14,521.00	93.99	1.36	9,314.17	5,413.30	-403.23	5,427.62	0.86	0.57	0.65
14,615.00	91.84	1.57	9,309.39	5,507.15	-400.83	5,521.16	2.30	-2.29	0.22
14,709.00	90.55	0.24	9,307.43	5,601.11	-399.35	5,614.87	1.97	-1.37	-1.41
14,803.00	88.64	358.30	9,308.09	5,695.09	-400.55	5,708.76	2.90	-2.03	-2.06
14,898.00	88.25	357.16	9,310.67	5,789.98	-404.31	5,803.71	1.27	-0.41	-1.20
14,992.00	88.00	357.39	9,313.75	5,883.82	-408.77	5,897.66	0.36	-0.27	0.24
15,086.00	88.98	358.69	9,316.22	5,977.73	-411.99	5,991.59	1.73	1.04	1.38
15,181.00	90.18	357.51	9,316.92	6,072.67	-415.14	6,086.56	1.77	1.26	-1.24
15,275.00	91.05	359.60	9,315.91	6,166.63	-417.51	6,180.49	2.41	0.93	2.22
15,369.00	91.13	0.20	9,314.12	6,260.61	-417.67	6,274.32	0.64	0.09	0.64
15,462.00	91.36	359.86	9,312.10	6,353.59	-417.62	6,367.14	0.44	0.25	-0.37
15,556.00	92.24	359.19	9,309.15	6,447.54	-418.40	6,460.97	1.18	0.94	-0.71
15,650.00	91.01	2.60	9,306.48	6,541.48	-416.93	6,554.66	3.85	-1.31	3.63
15,744.00	90.04	3.35	9,305.62	6,635.34	-412.06	6,648.08	1.30	-1.03	0.80
15,839.00	89.13	1.78	9,306.31	6,730.24	-407.80	6,742.57	1.91	-0.96	-1.65
15,933.00	88.81	359.50	9,308.00	6,824.22	-406.75	6,836.32	2.45	-0.34	-2.43
16,028.00	88.28	357.70	9,310.41	6,919.15	-409.07	6,931.23	1.97	-0.56	-1.89
16,122.00	87.91	357.51	9,313.54	7,013.02	-413.00	7,025.17	0.44	-0.39	-0.20
16,216.00	87.18	357.48	9,317.56	7,106.84	-417.10	7,119.07	0.78	-0.78	-0.03
16,311.00	86.80	357.43	9,322.55	7,201.62	-421.32	7,213.93	0.40	-0.40	-0.05

Survey Report

Company: COG Operating LLC	Local Co-ordinate Reference: Well 201H
Project: Lea County, NM (NAD27 NME)	TVD Reference: GL+KB @ 3545.70usft (Ensign 155)
Site: Eider Federal	MD Reference: GL+KB @ 3545.70usft (Ensign 155)
Well: 201H	North Reference: Grid
Wellbore: OH / 62731	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)
16,405.00	86.46	358.51	9,328.08	7,295.39	-424.64	7,307.74	1.20	-0.36	1.15
16,465.00	86.09	358.84	9,331.98	7,355.25	-426.03	7,367.58	0.83	-0.62	0.55
LTP: 16465' MD									
16,498.00	85.88	359.02	9,334.29	7,388.16	-426.64	7,400.47	0.83	-0.62	0.55
16,507.00	85.84	359.06	9,334.94	7,397.14	-426.79	7,409.44	0.63	-0.44	0.44
Final Phoenix MWD Survey									
16,565.00	85.84	359.06	9,339.15	7,454.98	-427.74	7,467.23	0.00	0.00	0.00
Projection to TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8,600.00	8,594.98	43.94	-87.67	Tie In
8,667.00	8,661.97	43.64	-88.68	First Phoenix MWD Survey
9,009.00	8,996.87	88.82	-109.30	FTP: 9009' MD
16,465.00	9,331.98	7,355.25	-426.03	LTP: 16465' MD
16,507.00	9,334.94	7,397.14	-426.79	Final Phoenix MWD Survey
16,565.00	9,339.15	7,454.98	-427.74	Projection to TD