

COG Operating LLC

Lea County, NM (NAD27 NME)

Eider Federal

202H

OH / 62732

Design: Surveys (Ensign 155)

Standard Survey Report

08 July, 2018

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 202H
Wellbore: OH / 62732
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (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	202H					
Well Position	+N/-S	0.00 usft	Northing:	425,244.50 usft	Latitude:	32° 10' 2.16739 N
	+E/-W	0.00 usft	Easting:	711,440.50 usft	Longitude:	103° 39' 0.06910 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,522.30 usft

Wellbore	OH / 62732				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	6/23/2018	6.73	59.86	47,936.94965578

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	359.65	

Survey Program	Date 7/8/2018				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	8,600.00	Scientific Gyro Surveys (OH / 62732)	NS-GYRO-MS	North sensing gyrocompassing m/s	
8,600.00	16,787.00	Phoneix MWD Survey (OH / 62732)	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	0.06	341.14	100.00	0.05	-0.02	0.05	0.06	0.06	0.00
125.00	0.17	20.22	125.00	0.10	-0.01	0.10	0.52	0.44	156.32
150.00	0.04	48.29	150.00	0.14	0.01	0.14	0.54	-0.52	112.28
175.00	0.19	43.09	175.00	0.17	0.05	0.17	0.60	0.60	-20.80
200.00	0.20	32.40	200.00	0.24	0.10	0.24	0.15	0.04	-42.76
225.00	0.14	0.24	225.00	0.31	0.12	0.31	0.44	-0.24	-128.64
250.00	0.20	334.72	250.00	0.38	0.10	0.38	0.38	0.24	-102.08
275.00	0.14	235.59	275.00	0.40	0.06	0.40	1.05	-0.24	-396.52
300.00	0.09	24.04	300.00	0.40	0.04	0.40	0.89	-0.20	593.80

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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)
325.00	0.08	49.41	325.00	0.43	0.06	0.43	0.15	-0.04	101.48
350.00	0.10	127.88	350.00	0.43	0.09	0.43	0.46	0.08	313.88
375.00	0.08	75.92	375.00	0.42	0.13	0.42	0.32	-0.08	-207.84
400.00	0.22	227.94	400.00	0.39	0.11	0.39	1.17	0.56	608.08
425.00	0.22	218.21	425.00	0.32	0.04	0.32	0.15	0.00	-38.92
450.00	0.40	195.73	450.00	0.20	-0.01	0.20	0.86	0.72	-89.92
475.00	0.64	218.73	475.00	0.01	-0.12	0.01	1.25	0.96	92.00
500.00	0.73	203.49	500.00	-0.25	-0.27	-0.25	0.81	0.36	-60.96
525.00	0.83	200.17	524.99	-0.56	-0.40	-0.56	0.44	0.40	-13.28
550.00	0.84	205.07	549.99	-0.90	-0.54	-0.90	0.29	0.04	19.60
575.00	0.79	209.21	574.99	-1.22	-0.70	-1.21	0.31	-0.20	16.56
600.00	0.93	209.43	599.99	-1.54	-0.88	-1.54	0.56	0.56	0.88
625.00	1.09	201.69	624.98	-1.94	-1.07	-1.94	0.84	0.64	-30.96
650.00	1.12	201.80	649.98	-2.39	-1.25	-2.38	0.12	0.12	0.44
675.00	1.39	201.11	674.97	-2.90	-1.45	-2.89	1.08	1.08	-2.76
700.00	1.22	201.30	699.96	-3.43	-1.66	-3.42	0.68	-0.68	0.76
725.00	1.37	196.57	724.96	-3.96	-1.84	-3.95	0.74	0.60	-18.92
750.00	1.30	195.40	749.95	-4.52	-2.00	-4.51	0.30	-0.28	-4.68
775.00	1.34	193.37	774.94	-5.08	-2.14	-5.07	0.25	0.16	-8.12
800.00	1.36	193.76	799.94	-5.65	-2.28	-5.64	0.09	0.08	1.56
825.00	1.34	190.74	824.93	-6.23	-2.40	-6.22	0.30	-0.08	-12.08
850.00	1.56	188.74	849.92	-6.85	-2.51	-6.84	0.90	0.88	-8.00
875.00	1.89	189.62	874.91	-7.60	-2.63	-7.58	1.32	1.32	3.52
900.00	1.99	187.81	899.90	-8.43	-2.76	-8.42	0.47	0.40	-7.24
925.00	1.98	188.44	924.88	-9.29	-2.88	-9.27	0.10	-0.04	2.52
950.00	2.14	189.28	949.87	-10.18	-3.02	-10.16	0.65	0.64	3.36
975.00	2.24	185.87	974.85	-11.12	-3.14	-11.11	0.66	0.40	-13.64
1,000.00	2.07	184.02	999.83	-12.06	-3.23	-12.04	0.73	-0.68	-7.40
1,025.00	2.04	185.42	1,024.81	-12.95	-3.30	-12.93	0.23	-0.12	5.60
1,050.00	2.17	186.93	1,049.80	-13.87	-3.40	-13.85	0.57	0.52	6.04
1,075.00	2.23	189.10	1,074.78	-14.82	-3.53	-14.80	0.41	0.24	8.68
1,100.00	1.74	185.78	1,099.76	-15.68	-3.65	-15.65	2.01	-1.96	-13.28
1,125.00	1.18	174.69	1,124.76	-16.31	-3.66	-16.29	2.50	-2.24	-44.36
1,150.00	0.92	174.56	1,149.75	-16.77	-3.62	-16.74	1.04	-1.04	-0.52
1,175.00	0.80	161.86	1,174.75	-17.13	-3.55	-17.11	0.90	-0.48	-50.80
1,200.00	0.16	109.60	1,199.75	-17.31	-3.46	-17.29	2.85	-2.56	-209.04
1,225.00	1.09	354.66	1,224.75	-17.08	-3.45	-17.06	4.67	3.72	-459.76
1,250.00	1.41	348.23	1,249.74	-16.55	-3.53	-16.52	1.40	1.28	-25.72
1,275.00	1.38	352.72	1,274.73	-15.95	-3.63	-15.92	0.45	-0.12	17.96
1,300.00	1.36	350.59	1,299.73	-15.35	-3.72	-15.33	0.22	-0.08	-8.52
1,325.00	1.27	352.44	1,324.72	-14.79	-3.81	-14.76	0.40	-0.36	7.40
1,350.00	1.39	350.18	1,349.71	-14.21	-3.89	-14.19	0.52	0.48	-9.04
1,375.00	1.34	347.74	1,374.71	-13.63	-4.01	-13.60	0.31	-0.20	-9.76

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 202H
Wellbore: OH / 62732
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (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)
1,400.00	1.34	349.00	1,399.70	-13.06	-4.13	-13.03	0.12	0.00	5.04
1,425.00	1.38	348.34	1,424.69	-12.48	-4.24	-12.45	0.17	0.16	-2.64
1,450.00	1.43	347.86	1,449.68	-11.88	-4.37	-11.85	0.21	0.20	-1.92
1,475.00	1.52	349.71	1,474.68	-11.24	-4.49	-11.22	0.41	0.36	7.40
1,500.00	1.49	349.40	1,499.67	-10.60	-4.61	-10.57	0.12	-0.12	-1.24
1,525.00	1.51	349.60	1,524.66	-9.95	-4.73	-9.93	0.08	0.08	0.80
1,550.00	1.40	345.30	1,549.65	-9.34	-4.87	-9.31	0.62	-0.44	-17.20
1,575.00	1.44	347.84	1,574.64	-8.73	-5.01	-8.70	0.30	0.16	10.16
1,600.00	1.38	347.48	1,599.63	-8.13	-5.14	-8.10	0.24	-0.24	-1.44
1,625.00	1.48	344.70	1,624.63	-7.53	-5.29	-7.49	0.49	0.40	-11.12
1,650.00	1.39	342.65	1,649.62	-6.93	-5.47	-6.89	0.41	-0.36	-8.20
1,675.00	1.40	349.54	1,674.61	-6.34	-5.62	-6.30	0.67	0.04	27.56
1,700.00	1.43	346.58	1,699.60	-5.73	-5.74	-5.70	0.32	0.12	-11.84
1,725.00	1.42	348.77	1,724.60	-5.13	-5.88	-5.09	0.22	-0.04	8.76
1,750.00	1.43	3.93	1,749.59	-4.51	-5.92	-4.47	1.50	0.04	60.64
1,775.00	1.61	17.51	1,774.58	-3.86	-5.79	-3.83	1.61	0.72	54.32
1,800.00	1.70	26.49	1,799.57	-3.20	-5.52	-3.16	1.10	0.36	35.92
1,825.00	1.66	34.89	1,824.56	-2.57	-5.14	-2.54	1.00	-0.16	33.60
1,850.00	2.21	51.42	1,849.54	-1.97	-4.56	-1.94	3.11	2.20	66.12
1,875.00	2.55	65.17	1,874.52	-1.44	-3.68	-1.41	2.65	1.36	55.00
1,900.00	2.74	72.29	1,899.50	-1.02	-2.61	-1.01	1.52	0.76	28.48
1,925.00	2.98	76.09	1,924.47	-0.68	-1.41	-0.67	1.22	0.96	15.20
1,950.00	2.98	84.46	1,949.43	-0.46	-0.13	-0.46	1.74	0.00	33.48
1,975.00	3.01	92.70	1,974.40	-0.43	1.17	-0.44	1.72	0.12	32.96
2,000.00	3.03	93.36	1,999.36	-0.50	2.49	-0.52	0.16	0.08	2.64
2,025.00	2.80	97.46	2,024.33	-0.62	3.75	-0.64	1.24	-0.92	16.40
2,050.00	2.41	109.74	2,049.31	-0.88	4.86	-0.91	2.71	-1.56	49.12
2,075.00	1.94	124.56	2,074.29	-1.29	5.70	-1.33	2.92	-1.88	59.28
2,100.00	2.07	127.47	2,099.27	-1.81	6.41	-1.85	0.66	0.52	11.64
2,125.00	2.04	126.84	2,124.26	-2.35	7.12	-2.39	0.15	-0.12	-2.52
2,150.00	2.10	127.02	2,149.24	-2.89	7.84	-2.94	0.24	0.24	0.72
2,175.00	2.14	131.20	2,174.22	-3.48	8.56	-3.53	0.64	0.16	16.72
2,200.00	1.91	124.40	2,199.21	-4.02	9.25	-4.08	1.33	-0.92	-27.20
2,225.00	2.06	128.59	2,224.19	-4.53	9.95	-4.60	0.83	0.60	16.76
2,250.00	2.25	133.07	2,249.17	-5.15	10.66	-5.22	1.02	0.76	17.92
2,275.00	2.29	136.71	2,274.15	-5.85	11.36	-5.92	0.60	0.16	14.56
2,300.00	2.38	137.38	2,299.13	-6.59	12.05	-6.67	0.38	0.36	2.68
2,325.00	2.23	130.09	2,324.11	-7.29	12.78	-7.37	1.32	-0.60	-29.16
2,350.00	2.26	133.80	2,349.09	-7.94	13.50	-8.03	0.59	0.12	14.84
2,375.00	2.35	132.67	2,374.07	-8.63	14.24	-8.72	0.40	0.36	-4.52
2,400.00	2.39	131.05	2,399.05	-9.32	15.01	-9.41	0.31	0.16	-6.48
2,425.00	2.34	135.36	2,424.03	-10.03	15.76	-10.12	0.74	-0.20	17.24
2,450.00	2.37	134.51	2,449.01	-10.75	16.49	-10.85	0.18	0.12	-3.40

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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)
2,475.00	2.34	135.92	2,473.99	-11.48	17.21	-11.59	0.26	-0.12	5.64
2,500.00	2.32	140.06	2,498.97	-12.24	17.89	-12.35	0.68	-0.08	16.56
2,525.00	2.09	145.98	2,523.95	-13.00	18.47	-13.12	1.29	-0.92	23.68
2,550.00	1.86	156.45	2,548.94	-13.75	18.89	-13.87	1.71	-0.92	41.88
2,575.00	1.84	154.50	2,573.92	-14.49	19.22	-14.60	0.26	-0.08	-7.80
2,600.00	1.82	158.47	2,598.91	-15.22	19.54	-15.34	0.51	-0.08	15.88
2,625.00	1.77	159.39	2,623.90	-15.95	19.82	-16.07	0.23	-0.20	3.68
2,650.00	1.75	160.98	2,648.89	-16.67	20.08	-16.79	0.21	-0.08	6.36
2,675.00	1.63	166.67	2,673.88	-17.38	20.29	-17.50	0.82	-0.48	22.76
2,700.00	1.77	168.44	2,698.86	-18.10	20.45	-18.23	0.60	0.56	7.08
2,725.00	1.18	178.26	2,723.86	-18.74	20.53	-18.86	2.56	-2.36	39.28
2,750.00	1.11	187.12	2,748.85	-19.24	20.51	-19.36	0.76	-0.28	35.44
2,775.00	0.94	195.12	2,773.85	-19.67	20.43	-19.80	0.89	-0.68	32.00
2,800.00	0.69	213.99	2,798.84	-20.00	20.29	-20.12	1.45	-1.00	75.48
2,825.00	0.44	277.06	2,823.84	-20.11	20.11	-20.23	2.51	-1.00	252.28
2,850.00	0.60	295.68	2,848.84	-20.04	19.90	-20.16	0.92	0.64	74.48
2,875.00	0.67	310.60	2,873.84	-19.89	19.67	-20.01	0.72	0.28	59.68
2,900.00	0.45	348.67	2,898.84	-19.70	19.54	-19.82	1.68	-0.88	152.28
2,925.00	0.19	70.17	2,923.84	-19.59	19.56	-19.71	1.85	-1.04	326.00
2,950.00	0.32	93.09	2,948.84	-19.58	19.67	-19.70	0.65	0.52	91.68
2,975.00	0.30	101.03	2,973.84	-19.59	19.80	-19.71	0.19	-0.08	31.76
3,000.00	0.34	93.23	2,998.84	-19.61	19.94	-19.73	0.24	0.16	-31.20
3,025.00	0.28	97.66	3,023.84	-19.62	20.07	-19.74	0.26	-0.24	17.72
3,050.00	0.35	106.75	3,048.84	-19.65	20.21	-19.78	0.34	0.28	36.36
3,075.00	0.41	106.59	3,073.84	-19.70	20.37	-19.82	0.24	0.24	-0.64
3,100.00	0.26	134.13	3,098.84	-19.77	20.49	-19.89	0.86	-0.60	110.16
3,125.00	0.16	150.78	3,123.84	-19.84	20.55	-19.96	0.46	-0.40	66.60
3,150.00	0.40	93.78	3,148.84	-19.87	20.65	-20.00	1.36	0.96	-228.00
3,175.00	0.45	101.92	3,173.84	-19.90	20.84	-20.02	0.31	0.20	32.56
3,200.00	0.38	122.75	3,198.83	-19.96	21.00	-20.09	0.66	-0.28	83.32
3,225.00	0.40	122.23	3,223.83	-20.05	21.15	-20.18	0.08	0.08	-2.08
3,250.00	0.29	107.55	3,248.83	-20.12	21.28	-20.25	0.56	-0.44	-58.72
3,275.00	0.37	108.28	3,273.83	-20.16	21.42	-20.29	0.32	0.32	2.92
3,300.00	0.71	110.70	3,298.83	-20.24	21.64	-20.38	1.36	1.36	9.68
3,325.00	0.43	113.66	3,323.83	-20.34	21.87	-20.47	1.13	-1.12	11.84
3,350.00	0.12	120.88	3,348.83	-20.39	21.98	-20.52	1.25	-1.24	28.88
3,375.00	0.35	109.62	3,373.83	-20.43	22.07	-20.56	0.93	0.92	-45.04
3,400.00	0.48	96.38	3,398.83	-20.46	22.25	-20.60	0.64	0.52	-52.96
3,425.00	0.54	97.95	3,423.83	-20.49	22.47	-20.63	0.25	0.24	6.28
3,450.00	0.48	115.18	3,448.83	-20.55	22.68	-20.69	0.66	-0.24	68.92
3,475.00	0.47	118.05	3,473.83	-20.65	22.87	-20.78	0.10	-0.04	11.48
3,500.00	0.47	106.63	3,498.83	-20.72	23.05	-20.86	0.37	0.00	-45.68
3,525.00	0.64	106.17	3,523.82	-20.79	23.29	-20.93	0.68	0.68	-1.84
3,550.00	0.62	112.87	3,548.82	-20.88	23.55	-21.03	0.31	-0.08	26.80

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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	0.73	108.01	3,573.82	-20.98	23.82	-21.13	0.50	0.44	-19.44
3,600.00	0.77	106.76	3,598.82	-21.08	24.13	-21.23	0.17	0.16	-5.00
3,625.00	0.93	101.15	3,623.82	-21.17	24.49	-21.32	0.72	0.64	-22.44
3,650.00	0.96	105.91	3,648.81	-21.27	24.89	-21.42	0.34	0.12	19.04
3,675.00	1.01	102.19	3,673.81	-21.37	25.31	-21.52	0.32	0.20	-14.88
3,700.00	1.10	104.83	3,698.81	-21.48	25.76	-21.64	0.41	0.36	10.56
3,725.00	1.22	105.66	3,723.80	-21.61	26.25	-21.77	0.48	0.48	3.32
3,750.00	1.72	104.86	3,748.79	-21.78	26.87	-21.94	2.00	2.00	-3.20
3,775.00	1.09	93.99	3,773.78	-21.89	27.47	-22.06	2.73	-2.52	-43.48
3,800.00	1.21	106.48	3,798.78	-21.98	27.96	-22.15	1.11	0.48	49.96
3,825.00	1.09	108.32	3,823.77	-22.13	28.43	-22.31	0.50	-0.48	7.36
3,850.00	1.03	111.19	3,848.77	-22.29	28.87	-22.47	0.32	-0.24	11.48
3,875.00	1.14	108.12	3,873.77	-22.45	29.32	-22.63	0.50	0.44	-12.28
3,900.00	1.18	109.34	3,898.76	-22.61	29.80	-22.79	0.19	0.16	4.88
3,925.00	1.20	118.55	3,923.76	-22.82	30.27	-23.01	0.77	0.08	36.84
3,950.00	1.15	117.01	3,948.75	-23.06	30.72	-23.25	0.24	-0.20	-6.16
3,975.00	1.23	115.99	3,973.74	-23.29	31.19	-23.48	0.33	0.32	-4.08
4,000.00	1.26	113.84	3,998.74	-23.52	31.68	-23.71	0.22	0.12	-8.60
4,025.00	1.46	115.86	4,023.73	-23.77	32.22	-23.97	0.82	0.80	8.08
4,050.00	1.51	120.97	4,048.72	-24.08	32.79	-24.28	0.57	0.20	20.44
4,075.00	1.70	118.57	4,073.71	-24.43	33.39	-24.63	0.81	0.76	-9.60
4,100.00	2.01	121.38	4,098.70	-24.83	34.09	-25.04	1.29	1.24	11.24
4,125.00	2.27	120.13	4,123.68	-25.31	34.90	-25.52	1.06	1.04	-5.00
4,150.00	2.33	118.84	4,148.66	-25.80	35.77	-26.02	0.32	0.24	-5.16
4,175.00	2.62	119.98	4,173.64	-26.33	36.71	-26.56	1.18	1.16	4.56
4,200.00	2.73	118.91	4,198.61	-26.91	37.73	-27.14	0.48	0.44	-4.28
4,225.00	2.67	117.61	4,223.58	-27.46	38.76	-27.70	0.34	-0.24	-5.20
4,250.00	2.70	119.50	4,248.56	-28.02	39.79	-28.27	0.37	0.12	7.56
4,275.00	2.76	120.10	4,273.53	-28.61	40.82	-28.86	0.27	0.24	2.40
4,300.00	2.49	127.64	4,298.50	-29.25	41.78	-29.50	1.75	-1.08	30.16
4,325.00	2.32	134.36	4,323.48	-29.93	42.57	-30.19	1.32	-0.68	26.88
4,350.00	2.04	144.28	4,348.46	-30.65	43.19	-30.91	1.88	-1.12	39.68
4,375.00	2.16	149.22	4,373.45	-31.41	43.69	-31.68	0.87	0.48	19.76
4,400.00	2.26	145.97	4,398.43	-32.23	44.21	-32.50	0.64	0.40	-13.00
4,425.00	2.40	146.85	4,423.41	-33.07	44.77	-33.35	0.58	0.56	3.52
4,450.00	2.62	145.12	4,448.38	-33.98	45.38	-34.26	0.93	0.88	-6.92
4,475.00	2.73	144.81	4,473.35	-34.94	46.05	-35.22	0.44	0.44	-1.24
4,500.00	2.87	144.80	4,498.33	-35.94	46.76	-36.22	0.56	0.56	-0.04
4,525.00	2.88	145.08	4,523.29	-36.96	47.48	-37.25	0.07	0.04	1.12
4,550.00	2.81	144.10	4,548.26	-37.97	48.19	-38.27	0.34	-0.28	-3.92
4,575.00	2.78	143.06	4,573.23	-38.95	48.92	-39.25	0.24	-0.12	-4.16
4,600.00	2.23	136.64	4,598.21	-39.79	49.62	-40.09	2.47	-2.20	-25.68
4,625.00	1.34	112.18	4,623.20	-40.26	50.22	-40.56	4.61	-3.56	-97.84

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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	1.15	81.36	4,648.19	-40.33	50.74	-40.64	2.75	-0.76	-123.28
4,675.00	1.14	69.29	4,673.19	-40.20	51.22	-40.52	0.96	-0.04	-48.28
4,700.00	1.29	67.84	4,698.18	-40.01	51.71	-40.32	0.61	0.60	-5.80
4,725.00	1.23	71.58	4,723.17	-39.82	52.23	-40.14	0.41	-0.24	14.96
4,750.00	1.29	70.28	4,748.17	-39.64	52.75	-39.96	0.27	0.24	-5.20
4,775.00	1.14	68.59	4,773.16	-39.45	53.25	-39.78	0.62	-0.60	-6.76
4,800.00	1.01	64.23	4,798.16	-39.27	53.68	-39.59	0.61	-0.52	-17.44
4,825.00	1.07	66.61	4,823.15	-39.08	54.09	-39.41	0.30	0.24	9.52
4,850.00	1.09	62.80	4,848.15	-38.88	54.51	-39.21	0.30	0.08	-15.24
4,875.00	1.01	73.29	4,873.15	-38.70	54.94	-39.04	0.83	-0.32	41.96
4,900.00	1.12	71.11	4,898.14	-38.56	55.38	-38.90	0.47	0.44	-8.72
4,925.00	0.98	66.46	4,923.14	-38.40	55.81	-38.74	0.66	-0.56	-18.60
4,950.00	1.05	60.52	4,948.13	-38.20	56.20	-38.54	0.51	0.28	-23.76
4,975.00	1.18	72.29	4,973.13	-38.01	56.65	-38.35	1.05	0.52	47.08
5,000.00	0.97	71.18	4,998.12	-37.86	57.09	-38.21	0.84	-0.84	-4.44
5,025.00	1.19	96.99	5,023.12	-37.82	57.55	-38.18	2.11	0.88	103.24
5,050.00	1.30	119.05	5,048.11	-37.99	58.05	-38.35	1.95	0.44	88.24
5,075.00	1.64	138.91	5,073.11	-38.40	58.54	-38.76	2.43	1.36	79.44
5,100.00	2.09	139.74	5,098.09	-39.02	59.07	-39.38	1.80	1.80	3.32
5,125.00	2.16	140.16	5,123.08	-39.73	59.66	-40.09	0.29	0.28	1.68
5,150.00	2.03	141.31	5,148.06	-40.44	60.24	-40.80	0.55	-0.52	4.60
5,175.00	2.17	139.32	5,173.04	-41.14	60.83	-41.51	0.63	0.56	-7.96
5,200.00	2.16	141.28	5,198.02	-41.87	61.43	-42.24	0.30	-0.04	7.84
5,225.00	2.23	137.59	5,223.01	-42.59	62.05	-42.97	0.63	0.28	-14.76
5,250.00	2.35	139.56	5,247.99	-43.34	62.71	-43.73	0.57	0.48	7.88
5,275.00	2.19	139.72	5,272.97	-44.10	63.36	-44.48	0.64	-0.64	0.64
5,300.00	2.43	137.35	5,297.95	-44.85	64.02	-45.24	1.03	0.96	-9.48
5,325.00	2.73	135.74	5,322.92	-45.67	64.80	-46.06	1.23	1.20	-6.44
5,350.00	3.32	135.83	5,347.89	-46.61	65.72	-47.01	2.36	2.36	0.36
5,375.00	4.01	133.99	5,372.83	-47.74	66.85	-48.15	2.80	2.76	-7.36
5,400.00	4.32	134.66	5,397.77	-49.01	68.15	-49.42	1.26	1.24	2.68
5,425.00	4.32	134.84	5,422.70	-50.33	69.49	-50.76	0.05	0.00	0.72
5,450.00	4.37	132.77	5,447.63	-51.65	70.85	-52.08	0.66	0.20	-8.28
5,475.00	4.52	134.59	5,472.55	-52.98	72.25	-53.42	0.82	0.60	7.28
5,500.00	4.53	135.22	5,497.47	-54.38	73.65	-54.83	0.20	0.04	2.52
5,525.00	4.53	133.66	5,522.39	-55.76	75.06	-56.22	0.49	0.00	-6.24
5,550.00	4.45	133.83	5,547.32	-57.11	76.48	-57.58	0.32	-0.32	0.68
5,575.00	4.77	135.03	5,572.24	-58.52	77.91	-58.99	1.34	1.28	4.80
5,600.00	4.73	134.43	5,597.15	-59.98	79.38	-60.46	0.26	-0.16	-2.40
5,625.00	4.73	133.46	5,622.07	-61.41	80.86	-61.90	0.32	0.00	-3.88
5,650.00	4.73	134.93	5,646.98	-62.84	82.34	-63.35	0.48	0.00	5.88
5,675.00	4.89	135.51	5,671.89	-64.33	83.82	-64.84	0.67	0.64	2.32
5,700.00	4.78	135.33	5,696.80	-65.83	85.30	-66.35	0.44	-0.44	-0.72

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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)
5,725.00	4.49	134.42	5,721.72	-67.26	86.73	-67.79	1.20	-1.16	-3.64
5,750.00	4.56	135.80	5,746.64	-68.66	88.12	-69.19	0.52	0.28	5.52
5,775.00	4.50	136.01	5,771.57	-70.07	89.49	-70.62	0.25	-0.24	0.84
5,800.00	4.57	135.26	5,796.49	-71.49	90.88	-72.04	0.37	0.28	-3.00
5,825.00	4.48	133.97	5,821.41	-72.87	92.28	-73.43	0.54	-0.36	-5.16
5,850.00	4.56	135.20	5,846.33	-74.25	93.68	-74.83	0.50	0.32	4.92
5,875.00	4.62	134.80	5,871.25	-75.67	95.10	-76.25	0.27	0.24	-1.60
5,900.00	4.57	134.21	5,896.17	-77.07	96.53	-77.66	0.28	-0.20	-2.36
5,925.00	4.70	134.22	5,921.09	-78.48	97.97	-79.08	0.52	0.52	0.04
5,950.00	4.69	133.63	5,946.01	-79.90	99.45	-80.51	0.20	-0.04	-2.36
5,975.00	4.61	134.26	5,970.92	-81.31	100.91	-81.92	0.38	-0.32	2.52
6,000.00	4.72	133.92	5,995.84	-82.72	102.37	-83.35	0.45	0.44	-1.36
6,025.00	4.63	134.28	6,020.76	-84.14	103.83	-84.77	0.38	-0.36	1.44
6,050.00	4.80	132.36	6,045.67	-85.55	105.33	-86.19	0.93	0.68	-7.68
6,075.00	4.46	127.93	6,070.59	-86.85	106.87	-87.50	1.97	-1.36	-17.72
6,100.00	4.31	125.95	6,095.52	-88.00	108.39	-88.66	0.85	-0.60	-7.92
6,125.00	4.31	127.21	6,120.45	-89.12	109.90	-89.79	0.38	0.00	5.04
6,150.00	4.23	125.84	6,145.38	-90.23	111.40	-90.91	0.52	-0.32	-5.48
6,175.00	4.41	125.83	6,170.31	-91.33	112.92	-92.02	0.72	0.72	-0.04
6,200.00	4.42	125.69	6,195.23	-92.46	114.49	-93.15	0.06	0.04	-0.56
6,225.00	4.34	125.65	6,220.16	-93.57	116.04	-94.28	0.32	-0.32	-0.16
6,250.00	4.16	127.96	6,245.09	-94.68	117.52	-95.39	0.99	-0.72	9.24
6,275.00	3.58	133.08	6,270.03	-95.77	118.81	-96.49	2.70	-2.32	20.48
6,300.00	2.90	140.52	6,294.99	-96.79	119.78	-97.52	3.19	-2.72	29.76
6,325.00	2.51	144.33	6,319.97	-97.72	120.50	-98.46	1.72	-1.56	15.24
6,350.00	2.45	143.51	6,344.94	-98.60	121.14	-99.34	0.28	-0.24	-3.28
6,375.00	2.50	145.67	6,369.92	-99.48	121.76	-100.22	0.42	0.20	8.64
6,400.00	2.44	145.73	6,394.90	-100.37	122.37	-101.11	0.24	-0.24	0.24
6,425.00	2.58	144.13	6,419.87	-101.26	123.00	-102.01	0.63	0.56	-6.40
6,450.00	2.57	135.65	6,444.85	-102.12	123.72	-102.87	1.52	-0.04	-33.92
6,475.00	3.22	126.50	6,469.82	-102.94	124.68	-103.70	3.18	2.60	-36.60
6,500.00	3.38	124.21	6,494.77	-103.77	125.85	-104.54	0.83	0.64	-9.16
6,525.00	3.35	123.14	6,519.73	-104.58	127.07	-105.36	0.28	-0.12	-4.28
6,550.00	3.40	120.71	6,544.69	-105.36	128.32	-106.14	0.61	0.20	-9.72
6,575.00	3.39	121.76	6,569.64	-106.13	129.59	-106.92	0.25	-0.04	4.20
6,600.00	3.32	120.37	6,594.60	-106.88	130.84	-107.68	0.43	-0.28	-5.56
6,625.00	3.59	124.13	6,619.56	-107.69	132.11	-108.49	1.41	1.08	15.04
6,650.00	3.27	119.84	6,644.51	-108.48	133.38	-109.30	1.64	-1.28	-17.16
6,675.00	3.19	120.32	6,669.47	-109.19	134.60	-110.01	0.34	-0.32	1.92
6,700.00	3.15	120.95	6,694.43	-109.89	135.79	-110.72	0.21	-0.16	2.52
6,725.00	3.10	119.40	6,719.40	-110.58	136.96	-111.41	0.39	-0.20	-6.20
6,750.00	3.02	119.54	6,744.36	-111.24	138.13	-112.08	0.32	-0.32	0.56
6,775.00	3.04	121.10	6,769.32	-111.90	139.27	-112.75	0.34	0.08	6.24
6,800.00	3.10	119.96	6,794.29	-112.58	140.42	-113.44	0.34	0.24	-4.56

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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)
6,825.00	3.01	123.63	6,819.25	-113.28	141.55	-114.15	0.86	-0.36	14.68
6,850.00	2.94	125.52	6,844.22	-114.02	142.62	-114.89	0.48	-0.28	7.56
6,875.00	3.05	122.27	6,869.19	-114.75	143.70	-115.62	0.81	0.44	-13.00
6,900.00	2.95	127.21	6,894.15	-115.49	144.78	-116.37	1.11	-0.40	19.76
6,925.00	3.02	124.10	6,919.12	-116.25	145.84	-117.14	0.71	0.28	-12.44
6,950.00	3.10	125.85	6,944.08	-117.02	146.93	-117.91	0.49	0.32	7.00
6,975.00	3.07	127.42	6,969.05	-117.82	148.01	-118.72	0.36	-0.12	6.28
7,000.00	3.16	126.21	6,994.01	-118.63	149.10	-119.54	0.45	0.36	-4.84
7,025.00	3.11	125.78	7,018.97	-119.44	150.20	-120.35	0.22	-0.20	-1.72
7,050.00	3.21	124.48	7,043.93	-120.23	151.33	-121.15	0.49	0.40	-5.20
7,075.00	3.27	125.60	7,068.89	-121.04	152.49	-121.97	0.35	0.24	4.48
7,100.00	3.25	127.43	7,093.85	-121.89	153.63	-122.82	0.42	-0.08	7.32
7,125.00	3.80	120.50	7,118.81	-122.74	154.91	-123.68	2.78	2.20	-27.72
7,150.00	4.10	120.00	7,143.75	-123.60	156.39	-124.56	1.21	1.20	-2.00
7,175.00	4.43	119.02	7,168.68	-124.52	158.01	-125.48	1.35	1.32	-3.92
7,200.00	4.77	119.91	7,193.60	-125.51	159.76	-126.48	1.39	1.36	3.56
7,225.00	5.06	120.78	7,218.50	-126.59	161.61	-127.57	1.20	1.16	3.48
7,250.00	5.16	121.46	7,243.40	-127.74	163.51	-128.74	0.47	0.40	2.72
7,275.00	5.26	121.48	7,268.30	-128.92	165.45	-129.93	0.40	0.40	0.08
7,300.00	5.45	123.47	7,293.19	-130.18	167.42	-131.20	1.06	0.76	7.96
7,325.00	5.42	123.64	7,318.08	-131.49	169.39	-132.52	0.14	-0.12	0.68
7,350.00	5.58	124.42	7,342.96	-132.83	171.37	-133.87	0.71	0.64	3.12
7,375.00	5.51	124.92	7,367.85	-134.20	173.36	-135.26	0.34	-0.28	2.00
7,400.00	5.09	122.81	7,392.74	-135.49	175.28	-136.56	1.85	-1.68	-8.44
7,425.00	4.33	118.71	7,417.66	-136.54	177.04	-137.62	3.32	-3.04	-16.40
7,450.00	4.20	116.50	7,442.59	-137.41	178.68	-138.49	0.84	-0.52	-8.84
7,475.00	4.11	116.37	7,467.52	-138.21	180.31	-139.31	0.36	-0.36	-0.52
7,500.00	4.11	116.90	7,492.46	-139.02	181.91	-140.12	0.15	0.00	2.12
7,525.00	4.10	115.89	7,517.39	-139.81	183.51	-140.93	0.29	-0.04	-4.04
7,550.00	4.03	118.97	7,542.33	-140.63	185.08	-141.75	0.92	-0.28	12.32
7,575.00	3.93	121.39	7,567.27	-141.50	186.58	-142.64	0.78	-0.40	9.68
7,600.00	4.00	122.78	7,592.21	-142.42	188.05	-143.56	0.48	0.28	5.56
7,625.00	4.05	124.99	7,617.15	-143.39	189.50	-144.55	0.65	0.20	8.84
7,650.00	4.04	127.65	7,642.09	-144.44	190.93	-145.60	0.75	-0.04	10.64
7,675.00	4.17	129.76	7,667.02	-145.56	192.32	-146.73	0.80	0.52	8.44
7,700.00	4.07	129.66	7,691.96	-146.71	193.70	-147.89	0.40	-0.40	-0.40
7,725.00	4.11	131.94	7,716.89	-147.87	195.05	-149.06	0.67	0.16	9.12
7,750.00	4.17	132.81	7,741.83	-149.09	196.39	-150.28	0.35	0.24	3.48
7,775.00	4.11	133.33	7,766.76	-150.32	197.70	-151.52	0.28	-0.24	2.08
7,800.00	4.12	134.10	7,791.70	-151.56	199.00	-152.77	0.22	0.04	3.08
7,825.00	4.06	133.72	7,816.64	-152.80	200.29	-154.02	0.26	-0.24	-1.52
7,850.00	4.23	134.57	7,841.57	-154.05	201.58	-155.28	0.72	0.68	3.40
7,875.00	4.28	134.12	7,866.50	-155.35	202.91	-156.59	0.24	0.20	-1.80

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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)
7,900.00	4.23	133.56	7,891.43	-156.64	204.25	-157.88	0.26	-0.20	-2.24
7,925.00	4.07	134.37	7,916.37	-157.89	205.55	-159.14	0.68	-0.64	3.24
7,950.00	4.12	133.61	7,941.30	-159.13	206.83	-160.39	0.30	0.20	-3.04
7,975.00	3.53	127.66	7,966.25	-160.22	208.09	-161.49	2.84	-2.36	-23.80
8,000.00	2.99	120.64	7,991.21	-161.02	209.26	-162.30	2.68	-2.16	-28.08
8,025.00	2.74	122.72	8,016.18	-161.68	210.33	-162.96	1.08	-1.00	8.32
8,050.00	2.23	120.45	8,041.15	-162.25	211.25	-163.54	2.08	-2.04	-9.08
8,075.00	0.91	115.53	8,066.14	-162.58	211.85	-163.87	5.30	-5.28	-19.68
8,100.00	0.35	70.23	8,091.14	-162.64	212.10	-163.93	2.84	-2.24	-181.20
8,125.00	0.18	25.54	8,116.14	-162.58	212.19	-163.87	1.02	-0.68	-178.76
8,150.00	0.21	22.37	8,141.14	-162.50	212.22	-163.79	0.13	0.12	-12.68
8,175.00	0.21	40.62	8,166.14	-162.42	212.27	-163.72	0.27	0.00	73.00
8,200.00	0.25	41.20	8,191.14	-162.35	212.33	-163.64	0.16	0.16	2.32
8,225.00	0.31	71.38	8,216.14	-162.29	212.43	-163.58	0.63	0.24	120.72
8,250.00	0.35	50.71	8,241.14	-162.22	212.56	-163.51	0.50	0.16	-82.68
8,275.00	0.26	66.37	8,266.14	-162.14	212.67	-163.44	0.49	-0.36	62.64
8,300.00	0.22	105.90	8,291.14	-162.14	212.77	-163.43	0.67	-0.16	158.12
8,325.00	0.35	133.05	8,316.14	-162.20	212.87	-163.50	0.74	0.52	108.60
8,350.00	0.43	151.86	8,341.14	-162.34	212.97	-163.63	0.60	0.32	75.24
8,375.00	0.45	165.07	8,366.14	-162.51	213.04	-163.81	0.41	0.08	52.84
8,400.00	0.55	165.76	8,391.14	-162.72	213.09	-164.02	0.40	0.40	2.76
8,425.00	0.52	172.33	8,416.13	-162.95	213.14	-164.25	0.27	-0.12	26.28
8,450.00	0.59	194.56	8,441.13	-163.19	213.12	-164.49	0.90	0.28	88.92
8,475.00	0.77	179.72	8,466.13	-163.48	213.09	-164.78	1.00	0.72	-59.36
8,500.00	0.78	166.21	8,491.13	-163.82	213.13	-165.11	0.73	0.04	-54.04
8,525.00	0.79	184.69	8,516.13	-164.15	213.16	-165.45	1.01	0.04	73.92
8,550.00	0.95	182.83	8,541.12	-164.53	213.13	-165.83	0.65	0.64	-7.44
8,575.00	1.21	185.63	8,566.12	-165.00	213.10	-166.30	1.06	1.04	11.20
8,600.00	1.07	196.13	8,591.11	-165.49	213.01	-166.79	1.00	-0.56	42.00
Tie In									
8,648.00	0.89	201.61	8,639.11	-166.27	212.74	-167.56	0.42	-0.38	11.42
First Phoenix MWD Survey									
8,693.00	0.97	188.24	8,684.10	-166.97	212.56	-168.26	0.51	0.18	-29.71
8,756.00	1.02	188.40	8,747.09	-168.05	212.40	-169.34	0.08	0.08	0.25
8,803.00	0.81	67.61	8,794.09	-168.34	212.65	-169.63	3.39	-0.45	-257.00
8,850.00	4.70	30.03	8,841.03	-166.54	213.92	-167.85	8.70	8.28	-79.96
8,897.00	9.93	22.37	8,887.63	-161.12	216.43	-162.44	11.30	11.13	-16.30
8,944.00	15.22	19.11	8,933.49	-151.54	219.99	-152.88	11.35	11.26	-6.94
8,991.00	20.13	21.78	8,978.26	-138.19	225.02	-139.56	10.59	10.45	5.68
9,038.00	25.55	21.39	9,021.55	-121.23	231.72	-122.65	11.54	11.53	-0.83
9,085.00	29.83	15.20	9,063.17	-100.50	238.48	-101.95	10.96	9.11	-13.17
9,131.00	33.50	7.21	9,102.33	-76.85	243.08	-78.33	12.10	7.98	-17.37
9,178.00	36.93	0.50	9,140.74	-49.84	244.83	-51.34	10.99	7.30	-14.28
9,226.00	42.09	358.69	9,177.76	-19.32	244.59	-20.81	11.01	10.75	-3.77

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 202H
Wellbore: OH / 62732
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (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)
9,273.00	47.06	359.23	9,211.23	13.65	244.00	12.16	10.61	10.57	1.15
9,319.00	51.43	2.85	9,241.26	48.47	244.67	46.98	11.21	9.50	7.87
9,366.00	58.12	4.65	9,268.36	86.76	247.20	85.25	14.57	14.23	3.83
9,406.92	63.97	5.79	9,288.16	122.40	250.47	120.87	14.50	14.30	2.79
FTP: 9407' MD, 11' FEL & 330' FSL									
9,413.00	64.84	5.95	9,290.78	127.85	251.03	126.32	14.50	14.31	2.62
9,460.00	71.53	7.04	9,308.24	171.18	255.97	169.61	14.40	14.23	2.32
9,508.00	77.52	7.18	9,321.04	217.06	261.70	215.46	12.48	12.48	0.29
9,555.00	81.68	5.78	9,329.52	262.99	266.91	261.35	9.32	8.85	-2.98
9,602.00	86.89	2.48	9,334.20	309.61	270.27	307.95	13.10	11.09	-7.02
9,696.00	92.96	357.96	9,334.33	403.54	270.63	401.88	8.05	6.46	-4.81
9,735.00	94.88	357.86	9,331.66	442.42	269.21	440.77	4.93	4.92	-0.26
9,830.00	92.20	356.43	9,325.80	537.11	264.49	535.48	3.20	-2.82	-1.51
9,924.00	90.59	356.59	9,323.51	630.90	258.76	629.31	1.72	-1.71	0.17
10,018.00	87.76	356.06	9,324.86	724.69	252.74	723.13	3.06	-3.01	-0.56
10,112.00	87.28	356.37	9,328.93	818.40	246.54	816.88	0.61	-0.51	0.33
10,206.00	87.51	356.70	9,333.20	912.13	240.87	910.64	0.43	0.24	0.35
10,301.00	88.04	356.27	9,336.89	1,006.88	235.05	1,005.42	0.72	0.56	-0.45
10,395.00	88.68	355.94	9,339.58	1,100.62	228.66	1,099.21	0.77	0.68	-0.35
10,489.00	89.07	356.67	9,341.42	1,194.41	222.61	1,193.03	0.88	0.41	0.78
10,574.00	89.04	357.28	9,342.83	1,279.28	218.12	1,277.92	0.72	-0.04	0.72
10,668.00	88.81	359.79	9,344.59	1,373.22	215.72	1,371.88	2.68	-0.24	2.67
10,762.00	89.68	0.05	9,345.83	1,467.21	215.59	1,465.87	0.97	0.93	0.28
10,855.00	90.50	1.00	9,345.68	1,560.21	216.44	1,558.86	1.35	0.88	1.02
10,949.00	91.21	2.43	9,344.28	1,654.15	219.25	1,652.78	1.70	0.76	1.52
11,042.00	90.55	1.51	9,342.85	1,747.09	222.45	1,745.69	1.22	-0.71	-0.99
11,136.00	89.27	0.41	9,343.00	1,841.07	224.02	1,839.67	1.80	-1.36	-1.17
11,230.00	89.75	0.61	9,343.80	1,935.06	224.86	1,933.65	0.55	0.51	0.21
11,324.00	90.16	1.29	9,343.88	2,029.05	226.42	2,027.63	0.84	0.44	0.72
11,418.00	90.02	1.66	9,343.73	2,123.02	228.84	2,121.58	0.42	-0.15	0.39
11,512.00	88.98	0.71	9,344.55	2,216.99	230.78	2,215.54	1.50	-1.11	-1.01
11,607.00	88.70	0.71	9,346.47	2,311.96	231.96	2,310.50	0.29	-0.29	0.00
11,702.00	89.36	0.95	9,348.08	2,406.94	233.34	2,405.47	0.74	0.69	0.25
11,796.00	91.44	358.79	9,347.43	2,500.93	233.12	2,499.45	3.19	2.21	-2.30
11,890.00	92.98	359.50	9,343.80	2,594.84	231.72	2,593.38	1.80	1.64	0.76
11,984.00	93.11	358.70	9,338.81	2,688.70	230.25	2,687.24	0.86	0.14	-0.85
12,078.00	92.38	358.12	9,334.31	2,782.55	227.64	2,781.11	0.99	-0.78	-0.62
12,172.00	93.14	358.02	9,329.78	2,876.39	224.48	2,874.96	0.82	0.81	-0.11
12,266.00	91.26	358.62	9,326.17	2,970.27	221.73	2,968.86	2.10	-2.00	0.64
12,360.00	89.36	359.30	9,325.66	3,064.25	220.02	3,062.85	2.15	-2.02	0.72
12,454.00	87.43	359.01	9,328.29	3,158.20	218.63	3,156.81	2.08	-2.05	-0.31
12,548.00	87.54	359.30	9,332.42	3,252.10	217.25	3,250.71	0.33	0.12	0.31
12,642.00	87.73	0.43	9,336.30	3,346.02	217.03	3,344.63	1.22	0.20	1.20

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH / 62732
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (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)
12,736.00	86.57	0.27	9,340.97	3,439.90	217.60	3,438.50	1.25	-1.23	-0.17
12,830.00	87.77	0.69	9,345.61	3,533.78	218.39	3,532.38	1.35	1.28	0.45
12,924.00	89.11	359.55	9,348.17	3,627.74	218.59	3,626.34	1.87	1.43	-1.21
13,018.00	89.51	358.99	9,349.30	3,721.72	217.39	3,720.33	0.73	0.43	-0.60
13,112.00	90.08	359.97	9,349.64	3,815.72	216.53	3,814.32	1.21	0.61	1.04
13,206.00	90.58	0.42	9,349.10	3,909.72	216.85	3,908.32	0.72	0.53	0.48
13,300.00	90.19	359.60	9,348.47	4,003.71	216.87	4,002.31	0.97	-0.41	-0.87
13,395.00	88.54	359.09	9,349.52	4,098.70	215.79	4,097.30	1.82	-1.74	-0.54
13,488.00	88.45	358.99	9,351.96	4,191.65	214.23	4,190.27	0.14	-0.10	-0.11
13,582.00	88.50	359.30	9,354.46	4,285.61	212.83	4,284.23	0.33	0.05	0.33
13,676.00	88.45	359.19	9,356.97	4,379.57	211.59	4,378.19	0.13	-0.05	-0.12
13,770.00	88.39	358.66	9,359.56	4,473.51	209.82	4,472.15	0.57	-0.06	-0.56
13,864.00	89.10	358.27	9,361.62	4,567.46	207.31	4,566.11	0.86	0.76	-0.41
13,958.00	89.67	358.27	9,362.63	4,661.41	204.47	4,660.07	0.61	0.61	0.00
14,052.00	91.12	358.99	9,361.98	4,755.38	202.22	4,754.05	1.72	1.54	0.77
14,146.00	91.89	359.53	9,359.51	4,849.34	201.01	4,848.02	1.00	0.82	0.57
14,240.00	91.09	0.39	9,357.06	4,943.30	200.94	4,941.98	1.25	-0.85	0.91
14,334.00	89.42	359.86	9,356.65	5,037.30	201.15	5,035.97	1.86	-1.78	-0.56
14,427.00	89.07	359.71	9,357.87	5,130.29	200.80	5,128.97	0.41	-0.38	-0.16
14,521.00	88.74	359.64	9,359.67	5,224.27	200.27	5,222.95	0.36	-0.35	-0.07
14,615.00	88.53	0.02	9,361.91	5,318.24	199.99	5,316.92	0.46	-0.22	0.40
14,709.00	89.42	0.29	9,363.59	5,412.23	200.24	5,410.90	0.99	0.95	0.29
14,803.00	89.65	1.02	9,364.35	5,506.22	201.32	5,504.88	0.81	0.24	0.78
14,897.00	90.27	1.27	9,364.42	5,600.20	203.19	5,598.85	0.71	0.66	0.27
14,991.00	90.21	1.66	9,364.02	5,694.16	205.60	5,692.80	0.42	-0.06	0.41
15,085.00	91.15	1.82	9,362.91	5,788.11	208.45	5,786.73	1.01	1.00	0.17
15,179.00	91.26	1.03	9,360.93	5,882.06	210.79	5,880.67	0.85	0.12	-0.84
15,273.00	89.76	359.72	9,360.09	5,976.05	211.40	5,974.65	2.12	-1.60	-1.39
15,367.00	88.98	358.35	9,361.13	6,070.03	209.82	6,068.64	1.68	-0.83	-1.46
15,461.00	89.35	358.84	9,362.50	6,163.99	207.52	6,162.61	0.65	0.39	0.52
15,555.00	89.68	358.98	9,363.29	6,257.97	205.73	6,256.60	0.38	0.35	0.15
15,649.00	90.13	358.92	9,363.45	6,351.95	204.01	6,350.59	0.48	0.48	-0.06
15,743.00	90.35	358.85	9,363.06	6,445.94	202.18	6,444.58	0.25	0.23	-0.07
15,837.00	90.42	359.17	9,362.42	6,539.92	200.55	6,538.57	0.35	0.07	0.34
15,931.00	91.04	359.55	9,361.23	6,633.91	199.50	6,632.56	0.77	0.66	0.40
16,025.00	89.73	358.47	9,360.59	6,727.89	197.88	6,726.55	1.81	-1.39	-1.15
16,119.00	89.45	358.49	9,361.27	6,821.85	195.38	6,820.53	0.30	-0.30	0.02
16,213.00	90.21	358.99	9,361.55	6,915.83	193.32	6,914.52	0.97	0.81	0.53
16,307.00	90.92	359.64	9,360.62	7,009.81	192.19	7,008.51	1.02	0.76	0.69
16,401.00	89.96	358.44	9,359.90	7,103.80	190.62	7,102.50	1.63	-1.02	-1.28
16,496.00	90.18	357.98	9,359.78	7,198.75	187.65	7,197.47	0.54	0.23	-0.48
16,589.00	90.12	357.66	9,359.54	7,291.68	184.11	7,290.42	0.35	-0.06	-0.34
16,683.00	91.44	357.80	9,358.26	7,385.60	180.39	7,384.36	1.41	1.40	0.15

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 202H
Wellbore: OH / 62732
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (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)
16,686.96	91.49	357.79	9,358.16	7,389.55	180.24	7,388.31	1.18	1.15	-0.23
LTP: 16687' MD, 16' FEL & 322 FNL									
16,722.00	91.89	357.71	9,357.13	7,424.55	178.86	7,423.32	1.18	1.15	-0.23
Final Phoenix MWD Survey									
16,787.00	91.89	357.71	9,354.99	7,489.46	176.28	7,488.24	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	8,591.11	-165.49	213.01	Tie In
8,648.00	8,639.11	-166.27	212.74	First Phoenix MWD Survey
9,406.92	9,288.16	122.40	250.47	FTP: 9407' MD, 11' FEL & 330' FSL
16,686.96	9,358.16	7,389.55	180.24	LTP: 16687' MD, 16' FEL & 322 FNL
16,722.00	9,357.13	7,424.55	178.86	Final Phoenix MWD Survey
16,787.00	9,354.99	7,489.46	176.28	Projection to TD