

COG Operating LLC

Lea County, NM (NAD27 NME)

Eider Federal

301H

OH / 62733

Design: Surveys (Ensign 155)

Standard Survey Report

29 May, 2018

HOBBS OCD
APR 22 2019
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Survey Report

Company: COG Operating LLC	Local Co-ordinate Reference: Well 301H	
Project: Lea County, NM (NAD27 NME)	TVD Reference: RKB @ 3545.30usft (Ensign 155)	
Site: Eider Federal	MD Reference: RKB @ 3545.30usft (Ensign 155)	
Well: 301H	North Reference: Grid	
Wellbore: OH / 62733	Survey Calculation Method: Minimum Curvature	
Design: Surveys (Ensign 155)	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	301H					
Well Position	+N/-S	0.00 usft	Northing:	425,243.90 usft	Latitude:	32° 10' 2.16522 N
	+E/-W	0.00 usft	Easting:	711,380.60 usft	Longitude:	103° 39' 0.76599 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	3,521.30 usft

Wellbore	OH / 62733				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	5/4/2018	6.75	59.86	47,952.75418629

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 5/29/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	9,034.00	Scientific Gyro Surveys (OH / 62733)	Scientific Gyro	Scientific Drilling Intl. Standard Wireline Keeper
9,129.00	17,104.00	Phoenix MWD Surveys (OH / 62733)	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	0.03	149.88	100.00	-0.02	0.01	-0.02	0.03	0.03	0.00
125.00	0.06	154.76	125.00	-0.04	0.02	-0.04	0.12	0.12	19.52
150.00	0.11	258.70	150.00	-0.06	0.00	-0.06	0.55	0.20	415.76
175.00	0.08	253.07	175.00	-0.07	-0.04	-0.07	0.13	-0.12	-22.52
200.00	0.10	249.69	200.00	-0.08	-0.07	-0.08	0.08	0.08	-13.52
225.00	0.21	253.64	225.00	-0.10	-0.14	-0.10	0.44	0.44	15.80
250.00	0.29	225.73	250.00	-0.16	-0.23	-0.16	0.57	0.32	-111.64
275.00	0.34	210.98	275.00	-0.26	-0.31	-0.26	0.38	0.20	-59.00
300.00	0.35	208.80	300.00	-0.39	-0.39	-0.39	0.07	0.04	-8.72

Survey Report

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 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 301H
 Wellbore: OH / 62733
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
 TVD Reference: RKB @ 3545.30usft (Ensign 155)
 MD Reference: RKB @ 3545.30usft (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)
325.00	0.44	214.47	325.00	-0.54	-0.48	-0.54	0.39	0.36	22.68
350.00	0.46	213.26	350.00	-0.70	-0.59	-0.70	0.09	0.08	-4.84
375.00	0.59	217.88	375.00	-0.89	-0.72	-0.89	0.55	0.52	18.48
400.00	0.84	215.14	399.99	-1.14	-0.90	-1.14	1.01	1.00	-10.96
425.00	0.99	212.35	424.99	-1.47	-1.13	-1.47	0.63	0.60	-11.16
450.00	1.30	211.13	449.99	-1.90	-1.39	-1.89	1.24	1.24	-4.88
475.00	1.52	212.46	474.98	-2.42	-1.71	-2.41	0.89	0.88	5.32
500.00	1.75	211.53	499.97	-3.03	-2.09	-3.01	0.93	0.92	-3.72
525.00	1.85	209.74	524.96	-3.70	-2.49	-3.69	0.46	0.40	-7.16
550.00	1.83	211.12	549.94	-4.39	-2.90	-4.38	0.19	-0.08	5.52
575.00	1.79	209.38	574.93	-5.08	-3.29	-5.06	0.27	-0.16	-6.96
600.00	1.80	208.78	599.92	-5.76	-3.67	-5.74	0.09	0.04	-2.40
625.00	1.66	209.64	624.91	-6.42	-4.04	-6.39	0.57	-0.56	3.44
650.00	1.73	206.16	649.90	-7.07	-4.39	-7.05	0.50	0.28	-13.92
675.00	1.69	205.60	674.88	-7.74	-4.71	-7.71	0.17	-0.16	-2.24
700.00	1.64	203.92	699.87	-8.40	-5.02	-8.37	0.28	-0.20	-6.72
725.00	1.19	199.03	724.87	-8.98	-5.25	-8.94	1.86	-1.80	-19.56
750.00	0.95	200.07	749.86	-9.42	-5.40	-9.38	0.96	-0.96	4.16
775.00	0.87	199.53	774.86	-9.79	-5.54	-9.76	0.32	-0.32	-2.16
800.00	0.81	194.38	799.86	-10.14	-5.65	-10.10	0.39	-0.24	-20.60
825.00	0.84	193.23	824.85	-10.49	-5.73	-10.45	0.14	0.12	-4.60
850.00	0.98	192.29	849.85	-10.88	-5.82	-10.84	0.56	0.56	-3.76
875.00	1.04	197.15	874.85	-11.30	-5.93	-11.27	0.42	0.24	19.44
900.00	1.23	197.49	899.84	-11.77	-6.08	-11.74	0.76	0.76	1.36
925.00	1.57	194.20	924.83	-12.36	-6.24	-12.32	1.40	1.36	-13.16
950.00	1.87	194.77	949.82	-13.09	-6.43	-13.05	1.20	1.20	2.28
975.00	1.89	198.59	974.81	-13.87	-6.67	-13.83	0.51	0.08	15.28
1,000.00	2.01	196.57	999.80	-14.69	-6.92	-14.64	0.55	0.48	-8.08
1,025.00	2.12	194.72	1,024.78	-15.55	-7.17	-15.51	0.51	0.44	-7.40
1,050.00	2.27	195.90	1,049.76	-16.48	-7.42	-16.43	0.63	0.60	4.72
1,075.00	2.26	195.99	1,074.74	-17.43	-7.69	-17.38	0.04	-0.04	0.36
1,100.00	2.22	197.20	1,099.72	-18.36	-7.97	-18.31	0.25	-0.16	4.84
1,125.00	2.23	197.21	1,124.70	-19.29	-8.26	-19.24	0.04	0.04	0.04
1,150.00	2.28	196.98	1,149.68	-20.23	-8.55	-20.18	0.20	0.20	-0.92
1,175.00	2.13	197.61	1,174.67	-21.15	-8.83	-21.09	0.61	-0.60	2.52
1,200.00	1.83	196.65	1,199.65	-21.97	-9.09	-21.92	1.21	-1.20	-3.84
1,225.00	1.43	195.27	1,224.64	-22.66	-9.28	-22.60	1.61	-1.60	-5.52
1,250.00	1.06	195.29	1,249.63	-23.18	-9.43	-23.12	1.48	-1.48	0.08
1,275.00	0.80	190.36	1,274.63	-23.58	-9.52	-23.52	1.09	-1.04	-19.72
1,300.00	0.67	167.95	1,299.63	-23.89	-9.52	-23.83	1.25	-0.52	-89.64
1,325.00	0.52	136.79	1,324.63	-24.12	-9.41	-24.06	1.40	-0.60	-124.64
1,350.00	0.45	98.24	1,349.63	-24.21	-9.24	-24.16	1.31	-0.28	-154.20
1,375.00	0.77	81.54	1,374.63	-24.20	-8.97	-24.15	1.45	1.28	-66.80

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1,400.00	1.14	70.13	1,399.62	-24.09	-8.57	-24.04	1.66	1.48	-45.64
1,425.00	1.35	65.25	1,424.62	-23.88	-8.07	-23.84	0.94	0.84	-19.52
1,450.00	1.44	64.98	1,449.61	-23.63	-7.52	-23.58	0.36	0.36	-1.08
1,475.00	1.48	62.89	1,474.60	-23.35	-6.95	-23.31	0.27	0.16	-8.36
1,500.00	1.58	59.01	1,499.59	-23.02	-6.36	-22.98	0.58	0.40	-15.52
1,525.00	1.48	61.58	1,524.58	-22.69	-5.79	-22.66	0.49	-0.40	10.28
1,550.00	1.43	62.12	1,549.57	-22.39	-5.23	-22.36	0.21	-0.20	2.16
1,575.00	1.45	56.91	1,574.57	-22.08	-4.68	-22.05	0.53	0.08	-20.84
1,600.00	1.56	57.88	1,599.56	-21.72	-4.13	-21.70	0.45	0.44	3.88
1,625.00	1.54	59.01	1,624.55	-21.37	-3.56	-21.35	0.15	-0.08	4.52
1,650.00	1.53	50.49	1,649.54	-20.98	-3.01	-20.96	0.91	-0.04	-34.08
1,675.00	1.66	40.04	1,674.53	-20.49	-2.52	-20.48	1.27	0.52	-41.80
1,700.00	1.82	32.42	1,699.52	-19.88	-2.07	-19.87	1.12	0.64	-30.48
1,725.00	1.86	27.42	1,724.51	-19.19	-1.67	-19.17	0.66	0.16	-20.00
1,750.00	1.89	27.77	1,749.49	-18.46	-1.30	-18.45	0.13	0.12	1.40
1,775.00	2.06	24.77	1,774.48	-17.69	-0.91	-17.68	0.80	0.68	-12.00
1,800.00	2.06	27.64	1,799.46	-16.88	-0.52	-16.88	0.41	0.00	11.48
1,825.00	2.02	28.52	1,824.45	-16.10	-0.10	-16.10	0.20	-0.16	3.52
1,850.00	2.05	21.58	1,849.43	-15.29	0.28	-15.29	0.99	0.12	-27.76
1,875.00	2.09	24.07	1,874.41	-14.46	0.63	-14.46	0.39	0.16	9.96
1,900.00	2.18	25.59	1,899.40	-13.62	1.02	-13.62	0.43	0.36	6.08
1,925.00	2.16	25.77	1,924.38	-12.76	1.43	-12.77	0.08	-0.08	0.72
1,950.00	2.07	24.39	1,949.36	-11.93	1.82	-11.94	0.41	-0.36	-5.52
1,975.00	2.22	20.66	1,974.34	-11.06	2.18	-11.08	0.82	0.60	-14.92
2,000.00	2.28	25.02	1,999.32	-10.16	2.56	-10.17	0.73	0.24	17.44
2,025.00	2.31	25.48	2,024.30	-9.25	2.98	-9.27	0.14	0.12	1.84
2,050.00	2.26	22.81	2,049.28	-8.34	3.39	-8.37	0.47	-0.20	-10.68
2,075.00	2.24	21.32	2,074.27	-7.44	3.76	-7.46	0.25	-0.08	-5.96
2,100.00	2.31	23.82	2,099.25	-6.52	4.14	-6.54	0.49	0.28	10.00
2,125.00	2.13	16.88	2,124.23	-5.61	4.48	-5.64	1.29	-0.72	-27.76
2,150.00	2.01	10.10	2,149.21	-4.74	4.69	-4.77	1.09	-0.48	-27.12
2,175.00	1.84	5.14	2,174.20	-3.91	4.81	-3.94	0.95	-0.68	-19.84
2,200.00	1.61	1.37	2,199.19	-3.16	4.85	-3.18	1.03	-0.92	-15.08
2,225.00	1.43	345.32	2,224.18	-2.50	4.78	-2.53	1.84	-0.72	-64.20
2,250.00	1.41	326.30	2,249.17	-1.94	4.53	-1.97	1.88	-0.08	-76.08
2,275.00	1.38	318.88	2,274.16	-1.46	4.16	-1.49	0.73	-0.12	-29.68
2,300.00	1.31	314.98	2,299.15	-1.03	3.76	-1.06	0.46	-0.28	-15.60
2,325.00	1.30	305.32	2,324.15	-0.67	3.33	-0.69	0.88	-0.04	-38.64
2,350.00	1.52	302.16	2,349.14	-0.33	2.81	-0.34	0.93	0.88	-12.64
2,375.00	1.53	306.24	2,374.13	0.05	2.26	0.03	0.44	0.04	16.32
2,400.00	1.65	301.05	2,399.12	0.43	1.69	0.42	0.75	0.48	-20.76
2,425.00	1.90	290.23	2,424.11	0.76	0.99	0.75	1.67	1.00	-43.28
2,450.00	2.26	281.84	2,449.09	1.00	0.12	1.00	1.88	1.44	-33.56

Survey Report

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 Site: Eider Federal
 Well: 301H
 Wellbore: OH / 62733
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Local Co-ordinate Reference: Well 301H
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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	2.23	279.60	2,474.07	1.19	-0.84	1.19	0.37	-0.12	-8.96
2,500.00	2.39	278.22	2,499.05	1.34	-1.84	1.35	0.68	0.64	-5.52
2,525.00	2.38	278.30	2,524.03	1.49	-2.87	1.51	0.04	-0.04	0.32
2,550.00	2.34	276.89	2,549.01	1.63	-3.89	1.65	0.28	-0.16	-5.64
2,575.00	2.33	274.74	2,573.99	1.73	-4.90	1.76	0.35	-0.04	-8.60
2,600.00	2.28	269.46	2,598.97	1.77	-5.91	1.80	0.87	-0.20	-21.12
2,625.00	2.45	260.10	2,623.95	1.67	-6.93	1.71	1.69	0.68	-37.44
2,650.00	2.52	256.58	2,648.93	1.45	-7.99	1.50	0.67	0.28	-14.08
2,675.00	2.53	250.40	2,673.90	1.14	-9.04	1.19	1.09	0.04	-24.72
2,700.00	2.68	249.07	2,698.88	0.74	-10.11	0.81	0.65	0.60	-5.32
2,725.00	2.74	247.26	2,723.85	0.30	-11.21	0.37	0.42	0.24	-7.24
2,750.00	2.77	249.84	2,748.82	-0.13	-12.33	-0.06	0.51	0.12	10.32
2,775.00	2.64	252.06	2,773.79	-0.52	-13.44	-0.44	0.67	-0.52	8.88
2,800.00	2.59	251.31	2,798.77	-0.88	-14.52	-0.79	0.24	-0.20	-3.00
2,825.00	2.70	248.84	2,823.74	-1.27	-15.61	-1.18	0.63	0.44	-9.88
2,850.00	2.55	246.13	2,848.71	-1.71	-16.67	-1.61	0.78	-0.60	-10.84
2,875.00	2.51	242.90	2,873.69	-2.18	-17.66	-2.08	0.59	-0.16	-12.92
2,900.00	2.27	241.79	2,898.67	-2.67	-18.58	-2.55	0.98	-0.96	-4.44
2,925.00	2.03	237.19	2,923.65	-3.14	-19.39	-3.02	1.18	-0.96	-18.40
2,950.00	2.10	236.83	2,948.63	-3.63	-20.15	-3.51	0.28	0.28	-1.44
2,975.00	2.15	237.58	2,973.62	-4.13	-20.93	-4.01	0.23	0.20	3.00
3,000.00	2.08	235.54	2,998.60	-4.64	-21.70	-4.51	0.41	-0.28	-8.16
3,025.00	1.99	234.23	3,023.58	-5.15	-22.42	-5.02	0.41	-0.36	-5.24
3,050.00	1.99	231.22	3,048.57	-5.68	-23.11	-5.54	0.42	0.00	-12.04
3,075.00	2.11	232.55	3,073.55	-6.23	-23.82	-6.08	0.52	0.48	5.32
3,100.00	2.09	237.10	3,098.53	-6.76	-24.57	-6.61	0.67	-0.08	18.20
3,125.00	2.06	232.46	3,123.52	-7.28	-25.31	-7.12	0.68	-0.12	-18.56
3,150.00	2.01	231.68	3,148.50	-7.82	-26.01	-7.67	0.23	-0.20	-3.12
3,175.00	2.12	243.58	3,173.49	-8.30	-26.76	-8.14	1.77	0.44	47.60
3,200.00	2.14	249.70	3,198.47	-8.67	-27.62	-8.50	0.91	0.08	24.48
3,225.00	2.08	253.29	3,223.45	-8.96	-28.49	-8.79	0.58	-0.24	14.36
3,250.00	1.98	252.61	3,248.44	-9.22	-29.33	-9.04	0.41	-0.40	-2.72
3,275.00	2.06	249.09	3,273.42	-9.51	-30.17	-9.33	0.59	0.32	-14.08
3,300.00	2.14	250.84	3,298.40	-9.82	-31.03	-9.63	0.41	0.32	7.00
3,325.00	2.04	253.18	3,323.39	-10.11	-31.89	-9.91	0.53	-0.40	9.36
3,350.00	2.00	245.16	3,348.37	-10.42	-32.72	-10.22	1.14	-0.16	-32.08
3,375.00	1.86	237.63	3,373.36	-10.82	-33.45	-10.61	1.16	-0.56	-30.12
3,400.00	1.69	233.83	3,398.35	-11.25	-34.09	-11.05	0.83	-0.68	-15.20
3,425.00	1.59	230.88	3,423.34	-11.69	-34.66	-11.48	0.52	-0.40	-11.80
3,450.00	1.41	232.85	3,448.33	-12.09	-35.18	-11.88	0.75	-0.72	7.88
3,475.00	1.43	230.47	3,473.32	-12.48	-35.66	-12.26	0.25	0.08	-9.52
3,500.00	1.39	234.33	3,498.31	-12.85	-36.15	-12.63	0.41	-0.16	15.44
3,525.00	1.29	235.01	3,523.30	-13.19	-36.63	-12.97	0.41	-0.40	2.72
3,550.00	1.17	239.76	3,548.30	-13.48	-37.08	-13.26	0.63	-0.48	19.00

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 301H
 Wellbore: OH / 62733
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
 TVD Reference: RKB @ 3545.30usft (Ensign 155)
 MD Reference: RKB @ 3545.30usft (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	0.91	250.90	3,573.29	-13.68	-37.48	-13.45	1.31	-1.04	44.56
3,600.00	0.68	265.59	3,598.29	-13.75	-37.82	-13.52	1.22	-0.92	58.76
3,625.00	0.71	264.22	3,623.29	-13.78	-38.12	-13.55	0.14	0.12	-5.48
3,650.00	0.66	265.86	3,648.29	-13.81	-38.42	-13.57	0.21	-0.20	6.56
3,675.00	0.69	257.39	3,673.29	-13.85	-38.71	-13.61	0.42	0.12	-33.88
3,700.00	0.78	264.59	3,698.29	-13.90	-39.03	-13.66	0.52	0.36	28.80
3,725.00	0.71	267.39	3,723.28	-13.92	-39.35	-13.68	0.32	-0.28	11.20
3,750.00	0.65	259.43	3,748.28	-13.95	-39.64	-13.71	0.45	-0.24	-31.84
3,775.00	0.79	264.79	3,773.28	-14.00	-39.96	-13.75	0.62	0.56	21.44
3,800.00	0.94	263.79	3,798.28	-14.03	-40.33	-13.79	0.60	0.60	-4.00
3,825.00	0.90	273.80	3,823.27	-14.04	-40.73	-13.79	0.66	-0.16	40.04
3,850.00	0.67	268.81	3,848.27	-14.03	-41.07	-13.78	0.96	-0.92	-19.96
3,875.00	0.74	260.35	3,873.27	-14.06	-41.38	-13.81	0.50	0.28	-33.84
3,900.00	0.85	269.74	3,898.27	-14.09	-41.72	-13.83	0.68	0.44	37.56
3,925.00	0.77	264.79	3,923.26	-14.11	-42.08	-13.85	0.42	-0.32	-19.80
3,950.00	0.81	254.96	3,948.26	-14.17	-42.41	-13.91	0.56	0.16	-39.32
3,975.00	0.79	270.23	3,973.26	-14.21	-42.76	-13.95	0.85	-0.08	61.08
4,000.00	0.68	263.43	3,998.26	-14.23	-43.08	-13.97	0.56	-0.44	-27.20
4,025.00	0.65	254.08	4,023.26	-14.28	-43.36	-14.02	0.45	-0.12	-37.40
4,050.00	0.76	255.84	4,048.25	-14.36	-43.66	-14.10	0.45	0.44	7.04
4,075.00	0.64	254.49	4,073.25	-14.44	-43.95	-14.17	0.48	-0.48	-5.40
4,100.00	0.47	240.17	4,098.25	-14.53	-44.18	-14.26	0.87	-0.68	-57.28
4,125.00	0.46	224.16	4,123.25	-14.65	-44.33	-14.38	0.52	-0.04	-64.04
4,150.00	0.47	218.07	4,148.25	-14.81	-44.47	-14.53	0.20	0.04	-24.36
4,175.00	0.57	223.12	4,173.25	-14.98	-44.62	-14.70	0.44	0.40	20.20
4,200.00	0.65	238.49	4,198.25	-15.14	-44.82	-14.87	0.73	0.32	61.48
4,225.00	0.75	243.77	4,223.24	-15.29	-45.09	-15.01	0.48	0.40	21.12
4,250.00	0.99	245.40	4,248.24	-15.45	-45.43	-15.17	0.96	0.96	6.52
4,275.00	1.11	252.10	4,273.24	-15.62	-45.86	-15.33	0.69	0.48	26.80
4,300.00	1.05	255.26	4,298.23	-15.75	-46.31	-15.46	0.34	-0.24	12.64
4,325.00	1.11	249.72	4,323.23	-15.89	-46.76	-15.60	0.48	0.24	-22.16
4,350.00	1.16	245.99	4,348.22	-16.08	-47.22	-15.79	0.36	0.20	-14.92
4,375.00	1.08	241.46	4,373.22	-16.29	-47.66	-16.00	0.48	-0.32	-18.12
4,400.00	0.98	229.24	4,398.22	-16.54	-48.03	-16.25	0.96	-0.40	-48.88
4,425.00	1.03	214.68	4,423.21	-16.87	-48.32	-16.57	1.04	0.20	-58.24
4,450.00	1.08	204.39	4,448.21	-17.27	-48.54	-16.97	0.78	0.20	-41.16
4,475.00	1.23	201.65	4,473.20	-17.73	-48.74	-17.43	0.64	0.60	-10.96
4,500.00	1.30	197.50	4,498.20	-18.25	-48.92	-17.95	0.46	0.28	-16.60
4,525.00	1.11	199.06	4,523.19	-18.75	-49.09	-18.45	0.77	-0.76	6.24
4,550.00	1.14	192.32	4,548.19	-19.22	-49.22	-18.92	0.54	0.12	-26.96
4,575.00	1.32	193.41	4,573.18	-19.75	-49.34	-19.44	0.73	0.72	4.36
4,600.00	1.26	200.27	4,598.17	-20.28	-49.50	-19.98	0.66	-0.24	27.44
4,625.00	1.22	200.45	4,623.17	-20.79	-49.69	-20.49	0.16	-0.16	0.72

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 301H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3545.30usft (Ensign 155)
Site:	Eider Federal	MD Reference:	RKB @ 3545.30usft (Ensign 155)
Well:	301H	North Reference:	Grid
Wellbore:	OH / 62733	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)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
4,650.00	1.10	211.69	4,648.16	-21.25	-49.91	-20.94	1.03	-0.48	44.96
4,675.00	1.07	213.94	4,673.16	-21.64	-50.16	-21.34	0.21	-0.12	9.00
4,700.00	1.19	206.53	4,698.15	-22.07	-50.41	-21.76	0.76	0.48	-29.64
4,725.00	1.15	208.00	4,723.15	-22.52	-50.64	-22.21	0.20	-0.16	5.88
4,750.00	1.11	217.57	4,748.14	-22.94	-50.91	-22.63	0.77	-0.16	38.28
4,775.00	1.02	218.42	4,773.14	-23.30	-51.19	-22.99	0.37	-0.36	3.40
4,800.00	1.06	210.61	4,798.13	-23.68	-51.45	-23.36	0.59	0.16	-31.24
4,825.00	1.18	217.59	4,823.13	-24.08	-51.73	-23.76	0.73	0.48	27.92
4,850.00	1.08	217.01	4,848.13	-24.47	-52.02	-24.15	0.40	-0.40	-2.32
4,875.00	1.19	217.71	4,873.12	-24.86	-52.32	-24.54	0.44	0.44	2.80
4,900.00	1.17	224.10	4,898.11	-25.25	-52.66	-24.93	0.53	-0.08	25.56
4,925.00	1.26	229.36	4,923.11	-25.62	-53.05	-25.29	0.57	0.36	21.04
4,950.00	1.52	237.74	4,948.10	-25.97	-53.54	-25.64	1.32	1.04	33.52
4,975.00	1.73	241.92	4,973.09	-26.33	-54.15	-25.99	0.96	0.84	16.72
5,000.00	2.36	246.36	4,998.08	-26.71	-54.95	-26.37	2.60	2.52	17.76
5,025.00	2.85	251.41	5,023.05	-27.11	-56.01	-26.77	2.16	1.96	20.20
5,050.00	3.30	251.78	5,048.01	-27.54	-57.29	-27.19	1.80	1.80	1.48
5,075.00	3.62	250.23	5,072.97	-28.03	-58.71	-27.67	1.33	1.28	-6.20
5,100.00	3.83	250.78	5,097.92	-28.57	-60.24	-28.20	0.85	0.84	2.20
5,125.00	3.83	251.31	5,122.86	-29.11	-61.82	-28.74	0.14	0.00	2.12
5,150.00	3.93	252.16	5,147.80	-29.64	-63.43	-29.26	0.46	0.40	3.40
5,175.00	3.92	252.02	5,172.74	-30.17	-65.06	-29.77	0.06	-0.04	-0.56
5,200.00	4.07	249.37	5,197.68	-30.75	-66.70	-30.34	0.95	0.60	-10.60
5,225.00	4.58	251.07	5,222.61	-31.38	-68.48	-30.96	2.10	2.04	6.80
5,250.00	5.00	253.79	5,247.52	-32.01	-70.47	-31.58	1.91	1.68	10.88
5,275.00	5.05	252.71	5,272.43	-32.64	-72.56	-32.20	0.43	0.20	-4.32
5,300.00	5.07	250.50	5,297.33	-33.34	-74.66	-32.88	0.78	0.08	-8.84
5,325.00	5.06	253.07	5,322.23	-34.03	-76.75	-33.56	0.91	-0.04	10.28
5,350.00	5.02	253.15	5,347.14	-34.67	-78.85	-34.18	0.16	-0.16	0.32
5,375.00	5.05	252.31	5,372.04	-35.32	-80.95	-34.82	0.32	0.12	-3.36
5,400.00	5.02	251.47	5,396.94	-36.00	-83.03	-35.49	0.32	-0.12	-3.36
5,425.00	5.01	251.68	5,421.85	-36.69	-85.11	-36.17	0.08	-0.04	0.84
5,450.00	5.03	252.47	5,446.75	-37.36	-87.19	-36.83	0.29	0.08	3.16
5,475.00	5.09	252.05	5,471.65	-38.04	-89.29	-37.49	0.28	0.24	-1.68
5,500.00	5.12	252.44	5,496.56	-38.71	-91.41	-38.15	0.18	0.12	1.56
5,525.00	5.09	252.13	5,521.46	-39.39	-93.53	-38.82	0.16	-0.12	-1.24
5,550.00	5.04	252.95	5,546.36	-40.05	-95.63	-39.47	0.35	-0.20	3.28
5,575.00	5.11	253.50	5,571.26	-40.69	-97.75	-40.09	0.34	0.28	2.20
5,600.00	5.08	252.90	5,596.16	-41.33	-99.87	-40.72	0.24	-0.12	-2.40
5,625.00	5.05	253.00	5,621.06	-41.98	-101.98	-41.36	0.13	-0.12	0.40
5,650.00	5.00	252.49	5,645.97	-42.63	-104.08	-41.99	0.27	-0.20	-2.04
5,675.00	4.90	251.36	5,670.87	-43.30	-106.13	-42.65	0.56	-0.40	-4.52
5,700.00	4.80	252.94	5,695.79	-43.95	-108.14	-43.28	0.67	-0.40	6.32

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 301H
 Wellbore: OH / 62733
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
 TVD Reference: RKB @ 3545.30usft (Ensign 155)
 MD Reference: RKB @ 3545.30usft (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	4.67	252.53	5,720.70	-44.56	-110.11	-43.89	0.54	-0.52	-1.64
5,750.00	4.60	252.49	5,745.62	-45.17	-112.04	-44.48	0.28	-0.28	-0.16
5,775.00	4.66	251.70	5,770.54	-45.79	-113.96	-45.09	0.35	0.24	-3.16
5,800.00	4.67	251.96	5,795.45	-46.42	-115.89	-45.71	0.09	0.04	1.04
5,825.00	4.65	251.71	5,820.37	-47.05	-117.82	-46.33	0.11	-0.08	-1.00
5,850.00	4.75	251.44	5,845.29	-47.70	-119.76	-46.97	0.41	0.40	-1.08
5,875.00	4.92	252.36	5,870.20	-48.36	-121.76	-47.61	0.75	0.68	3.68
5,900.00	5.02	253.32	5,895.10	-48.99	-123.83	-48.24	0.52	0.40	3.84
5,925.00	5.29	252.90	5,920.00	-49.65	-125.98	-48.88	1.09	1.08	-1.68
5,950.00	5.39	251.91	5,944.89	-50.35	-128.20	-49.57	0.54	0.40	-3.96
5,975.00	5.41	250.58	5,969.78	-51.11	-130.43	-50.31	0.51	0.08	-5.32
6,000.00	5.34	252.21	5,994.67	-51.85	-132.65	-51.04	0.67	-0.28	6.52
6,025.00	5.45	253.36	6,019.56	-52.55	-134.89	-51.72	0.62	0.44	4.60
6,050.00	5.45	254.32	6,044.45	-53.21	-137.17	-52.37	0.36	0.00	3.84
6,075.00	5.50	252.99	6,069.34	-53.88	-139.46	-53.03	0.55	0.20	-5.32
6,100.00	5.46	251.97	6,094.22	-54.60	-141.74	-53.73	0.42	-0.16	-4.08
6,125.00	5.50	251.31	6,119.11	-55.35	-144.00	-54.47	0.30	0.16	-2.64
6,150.00	5.61	252.32	6,143.99	-56.11	-146.30	-55.21	0.59	0.44	4.04
6,175.00	5.61	253.53	6,168.87	-56.83	-148.64	-55.92	0.47	0.00	4.84
6,200.00	5.62	253.94	6,193.75	-57.51	-150.99	-56.59	0.17	0.04	1.64
6,225.00	5.60	253.49	6,218.63	-58.20	-153.33	-57.26	0.19	-0.08	-1.80
6,250.00	5.68	254.97	6,243.51	-58.86	-155.70	-57.91	0.66	0.32	5.92
6,275.00	5.68	255.15	6,268.39	-59.50	-158.09	-58.53	0.07	0.00	0.72
6,300.00	5.60	254.12	6,293.27	-60.15	-160.46	-59.17	0.52	-0.32	-4.12
6,325.00	5.69	254.27	6,318.14	-60.82	-162.82	-59.83	0.36	0.36	0.60
6,350.00	5.52	254.28	6,343.03	-61.48	-165.17	-60.47	0.68	-0.68	0.04
6,375.00	5.48	253.99	6,367.91	-62.14	-167.48	-61.11	0.19	-0.16	-1.16
6,400.00	5.46	252.19	6,392.80	-62.83	-169.76	-61.79	0.69	-0.08	-7.20
6,425.00	5.68	251.98	6,417.68	-63.58	-172.07	-62.53	0.88	0.88	-0.84
6,450.00	5.73	254.33	6,442.55	-64.30	-174.45	-63.23	0.96	0.20	9.40
6,475.00	5.69	254.48	6,467.43	-64.97	-176.84	-63.88	0.17	-0.16	0.60
6,500.00	5.74	255.58	6,492.31	-65.61	-179.25	-64.51	0.48	0.20	4.40
6,525.00	5.71	256.20	6,517.18	-66.22	-181.66	-65.11	0.27	-0.12	2.48
6,550.00	5.69	255.79	6,542.06	-66.82	-184.07	-65.69	0.18	-0.08	-1.64
6,575.00	5.71	256.60	6,566.93	-67.41	-186.48	-66.27	0.33	0.08	3.24
6,600.00	5.68	256.56	6,591.81	-67.99	-188.90	-66.83	0.12	-0.12	-0.16
6,625.00	5.77	256.66	6,616.69	-68.56	-191.32	-67.39	0.36	0.36	0.40
6,650.00	5.81	257.26	6,641.56	-69.13	-193.78	-67.95	0.29	0.16	2.40
6,675.00	5.82	257.89	6,666.43	-69.68	-196.25	-68.48	0.26	0.04	2.52
6,700.00	5.82	257.80	6,691.30	-70.21	-198.73	-69.00	0.04	0.00	-0.36
6,725.00	5.88	257.22	6,716.17	-70.76	-201.22	-69.53	0.34	0.24	-2.32
6,750.00	5.81	258.60	6,741.04	-71.30	-203.71	-70.05	0.63	-0.28	5.52
6,775.00	5.76	258.57	6,765.91	-71.79	-206.18	-70.53	0.20	-0.20	-0.12
6,800.00	5.72	258.74	6,790.79	-72.29	-208.63	-71.01	0.17	-0.16	0.68

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 301H
Wellbore: OH / 62733
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
TVD Reference: RKB @ 3545.30usft (Ensign 155)
MD Reference: RKB @ 3545.30usft (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	5.75	260.20	6,815.66	-72.74	-211.09	-71.45	0.60	0.12	5.84
6,850.00	5.67	259.40	6,840.54	-73.18	-213.54	-71.88	0.45	-0.32	-3.20
6,875.00	5.75	259.14	6,865.41	-73.65	-215.98	-72.33	0.34	0.32	-1.04
6,900.00	5.76	260.45	6,890.29	-74.09	-218.45	-72.75	0.53	0.04	5.24
6,925.00	5.82	260.46	6,915.16	-74.51	-220.93	-73.16	0.24	0.24	0.04
6,950.00	5.86	261.50	6,940.03	-74.91	-223.45	-73.54	0.45	0.16	4.16
6,975.00	5.73	259.23	6,964.90	-75.33	-225.93	-73.95	1.05	-0.52	-9.08
7,000.00	5.64	259.41	6,989.78	-75.79	-228.37	-74.39	0.37	-0.36	0.72
7,025.00	5.68	258.98	7,014.66	-76.25	-230.79	-74.84	0.23	0.16	-1.72
7,050.00	5.70	259.21	7,039.54	-76.72	-233.22	-75.29	0.12	0.08	0.92
7,075.00	5.65	260.00	7,064.41	-77.17	-235.65	-75.72	0.37	-0.20	3.16
7,100.00	5.87	256.43	7,089.29	-77.68	-238.11	-76.22	1.68	0.88	-14.28
7,125.00	6.26	253.02	7,114.15	-78.38	-240.66	-76.91	2.12	1.56	-13.64
7,150.00	6.46	252.61	7,138.99	-79.20	-243.30	-77.71	0.82	0.80	-1.64
7,175.00	6.49	251.67	7,163.83	-80.06	-245.98	-78.56	0.44	0.12	-3.76
7,200.00	6.52	250.23	7,188.67	-80.98	-248.66	-79.46	0.66	0.12	-5.76
7,225.00	6.44	250.30	7,213.51	-81.94	-251.32	-80.40	0.32	-0.32	0.28
7,250.00	6.40	250.10	7,238.36	-82.88	-253.95	-81.33	0.18	-0.16	-0.80
7,275.00	6.33	249.37	7,263.20	-83.84	-256.55	-82.28	0.43	-0.28	-2.92
7,300.00	6.43	249.69	7,288.05	-84.82	-259.15	-83.23	0.42	0.40	1.28
7,325.00	6.50	250.33	7,312.89	-85.78	-261.80	-84.18	0.40	0.28	2.56
7,350.00	6.41	250.34	7,337.73	-86.72	-264.44	-85.11	0.36	-0.36	0.04
7,375.00	6.27	250.51	7,362.58	-87.65	-267.04	-86.02	0.57	-0.56	0.68
7,400.00	6.08	249.99	7,387.43	-88.56	-269.57	-86.91	0.79	-0.76	-2.08
7,425.00	5.88	248.96	7,412.30	-89.47	-272.01	-87.81	0.91	-0.80	-4.12
7,450.00	5.86	248.53	7,437.17	-90.40	-274.40	-88.72	0.19	-0.08	-1.72
7,475.00	5.79	249.50	7,462.04	-91.31	-276.76	-89.61	0.48	-0.28	3.88
7,500.00	5.69	249.16	7,486.91	-92.19	-279.10	-90.48	0.42	-0.40	-1.36
7,525.00	5.52	249.71	7,511.79	-93.05	-281.39	-91.33	0.71	-0.68	2.20
7,550.00	5.24	249.59	7,536.68	-93.86	-283.59	-92.13	1.12	-1.12	-0.48
7,575.00	5.13	250.56	7,561.58	-94.63	-285.71	-92.88	0.56	-0.44	3.88
7,600.00	4.95	250.00	7,586.48	-95.37	-287.78	-93.61	0.75	-0.72	-2.24
7,625.00	4.92	249.88	7,611.39	-96.11	-289.80	-94.34	0.13	-0.12	-0.48
7,650.00	5.01	250.54	7,636.30	-96.84	-291.84	-95.06	0.43	0.36	2.64
7,675.00	5.19	250.52	7,661.20	-97.58	-293.93	-95.79	0.72	0.72	-0.08
7,700.00	5.37	251.11	7,686.09	-98.34	-296.10	-96.53	0.75	0.72	2.36
7,725.00	5.40	250.88	7,710.98	-99.10	-298.32	-97.28	0.15	0.12	-0.92
7,750.00	5.62	250.90	7,735.86	-99.89	-300.59	-98.05	0.88	0.88	0.08
7,775.00	6.01	249.99	7,760.74	-100.74	-302.98	-98.88	1.60	1.56	-3.64
7,800.00	6.20	250.03	7,785.59	-101.65	-305.48	-99.78	0.76	0.76	0.16
7,825.00	6.22	249.96	7,810.45	-102.57	-308.02	-100.69	0.09	0.08	-0.28
7,850.00	6.06	251.30	7,835.30	-103.46	-310.54	-101.56	0.86	-0.64	5.36
7,875.00	5.75	253.03	7,860.17	-104.25	-312.99	-102.33	1.43	-1.24	6.92

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 301H
Wellbore: OH / 62733
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
TVD Reference: RKB @ 3545.30usft (Ensign 155)
MD Reference: RKB @ 3545.30usft (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)
7,900.00	5.51	254.30	7,885.05	-104.94	-315.34	-103.01	1.08	-0.96	5.08
7,925.00	5.36	254.75	7,909.94	-105.57	-317.62	-103.63	0.62	-0.60	1.80
7,950.00	5.19	255.58	7,934.83	-106.16	-319.84	-104.20	0.75	-0.68	3.32
7,975.00	4.72	256.28	7,959.74	-106.68	-321.94	-104.71	1.90	-1.88	2.80
8,000.00	4.48	257.09	7,984.66	-107.15	-323.89	-105.16	0.99	-0.96	3.24
8,025.00	4.77	257.32	8,009.58	-107.59	-325.85	-105.60	1.16	1.16	0.92
8,050.00	5.29	257.10	8,034.48	-108.08	-327.99	-106.07	2.08	2.08	-0.88
8,075.00	5.65	255.71	8,059.37	-108.64	-330.31	-106.62	1.53	1.44	-5.56
8,100.00	5.80	256.79	8,084.24	-109.23	-332.73	-107.20	0.74	0.60	4.32
8,125.00	5.78	256.25	8,109.11	-109.82	-335.18	-107.77	0.23	-0.08	-2.16
8,150.00	5.59	255.93	8,133.99	-110.41	-337.59	-108.35	0.77	-0.76	-1.28
8,175.00	5.44	255.61	8,158.88	-111.00	-339.92	-108.93	0.61	-0.60	-1.28
8,200.00	5.59	255.49	8,183.76	-111.60	-342.24	-109.51	0.60	0.60	-0.48
8,225.00	5.96	255.35	8,208.63	-112.24	-344.68	-110.13	1.48	1.48	-0.56
8,250.00	6.51	255.72	8,233.49	-112.92	-347.31	-110.79	2.21	2.20	1.48
8,275.00	6.73	255.76	8,258.32	-113.62	-350.10	-111.48	0.88	0.88	0.16
8,300.00	6.80	255.34	8,283.14	-114.36	-352.95	-112.20	0.34	0.28	-1.68
8,325.00	6.71	254.95	8,307.97	-115.11	-355.79	-112.94	0.40	-0.36	-1.56
8,350.00	6.49	254.00	8,332.81	-115.88	-358.56	-113.69	0.98	-0.88	-3.80
8,375.00	6.27	253.87	8,357.65	-116.65	-361.23	-114.44	0.88	-0.88	-0.52
8,400.00	6.11	254.04	8,382.50	-117.40	-363.82	-115.17	0.64	-0.64	0.68
8,425.00	6.00	253.38	8,407.37	-118.14	-366.35	-115.90	0.52	-0.44	-2.64
8,450.00	6.05	253.68	8,432.23	-118.88	-368.87	-116.62	0.24	0.20	1.20
8,475.00	6.00	252.94	8,457.09	-119.63	-371.38	-117.36	0.37	-0.20	-2.96
8,500.00	6.15	252.52	8,481.95	-120.42	-373.91	-118.13	0.63	0.60	-1.68
8,525.00	6.66	249.29	8,506.79	-121.33	-376.54	-119.03	2.50	2.04	-12.92
8,550.00	6.94	247.72	8,531.62	-122.42	-379.30	-120.10	1.34	1.12	-6.28
8,575.00	6.80	247.82	8,556.44	-123.55	-382.06	-121.21	0.56	-0.56	0.40
8,600.00	6.62	248.05	8,581.27	-124.65	-384.77	-122.30	0.73	-0.72	0.92
8,625.00	6.45	247.50	8,606.10	-125.72	-387.41	-123.35	0.72	-0.68	-2.20
8,650.00	6.18	247.95	8,630.95	-126.77	-389.95	-124.38	1.10	-1.08	1.80
8,675.00	6.15	248.10	8,655.81	-127.77	-392.44	-125.37	0.14	-0.12	0.60
8,700.00	5.96	248.48	8,680.67	-128.75	-394.89	-126.33	0.78	-0.76	1.52
8,725.00	5.69	248.50	8,705.54	-129.68	-397.25	-127.25	1.08	-1.08	0.08
8,750.00	5.53	247.99	8,730.42	-130.58	-399.52	-128.14	0.67	-0.64	-2.04
8,775.00	5.26	248.16	8,755.31	-131.46	-401.70	-129.00	1.08	-1.08	0.68
8,800.00	4.68	248.97	8,780.21	-132.25	-403.72	-129.78	2.34	-2.32	3.24
8,825.00	4.16	248.75	8,805.14	-132.95	-405.51	-130.47	2.08	-2.08	-0.88
8,850.00	4.03	249.47	8,830.08	-133.58	-407.18	-131.09	0.56	-0.52	2.88
8,875.00	3.77	247.53	8,855.02	-134.21	-408.76	-131.71	1.17	-1.04	-7.76
8,900.00	3.11	246.00	8,879.97	-134.80	-410.14	-132.29	2.67	-2.64	-6.12
8,925.00	2.60	244.15	8,904.94	-135.32	-411.27	-132.80	2.07	-2.04	-7.40
8,950.00	2.21	243.55	8,929.92	-135.78	-412.21	-133.26	1.56	-1.56	-2.40

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 301H
 Wellbore: OH / 62733
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
 TVD Reference: RKB @ 3545.30usft (Ensign 155)
 MD Reference: RKB @ 3545.30usft (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)
8,975.00	1.60	251.83	8,954.91	-136.10	-412.98	-133.58	2.67	-2.44	33.12
9,000.00	0.87	275.60	8,979.90	-136.20	-413.50	-133.67	3.51	-2.92	95.08
9,025.00	0.68	315.19	9,004.90	-136.07	-413.79	-133.54	2.22	-0.76	158.36
9,034.00	0.63	328.10	9,013.90	-135.99	-413.86	-133.46	1.73	-0.56	143.44
Tie In									
9,129.00	1.63	307.19	9,108.88	-134.73	-415.21	-132.19	1.12	1.05	-22.01
First Phoenix MWD Survey									
9,176.00	5.47	350.79	9,155.78	-132.11	-416.10	-129.57	9.43	8.17	92.77
9,223.00	11.45	357.49	9,202.25	-125.24	-416.66	-122.69	12.87	12.72	14.26
9,270.00	17.15	356.87	9,247.78	-113.65	-417.25	-111.10	12.13	12.13	-1.32
9,317.00	19.97	351.66	9,292.33	-98.78	-418.79	-96.22	6.96	6.00	-11.09
9,364.00	22.85	344.07	9,336.09	-82.06	-422.46	-79.48	8.49	6.13	-16.15
9,411.00	26.17	336.87	9,378.86	-63.74	-429.04	-61.12	9.49	7.06	-15.32
9,458.00	29.34	333.83	9,420.45	-43.87	-438.19	-41.20	7.38	6.74	-6.47
9,503.00	33.80	335.66	9,458.78	-22.56	-448.22	-19.82	10.14	9.91	4.07
9,550.00	38.73	337.00	9,496.67	2.90	-459.36	5.70	10.62	10.49	2.85
9,597.00	43.40	340.78	9,532.10	31.70	-470.43	34.57	11.25	9.94	8.04
9,644.00	49.33	342.71	9,564.52	64.00	-481.05	66.93	12.96	12.62	4.11
9,692.00	54.77	343.21	9,594.03	100.17	-492.13	103.18	11.36	11.33	1.04
9,711.00	56.98	344.79	9,604.68	115.29	-496.46	118.32	13.52	11.65	8.29
FTP									
9,723.00	58.39	345.74	9,611.10	125.10	-499.04	128.14	13.52	11.73	7.95
9,754.00	63.92	346.64	9,626.05	151.46	-505.52	154.54	18.02	17.84	2.90
9,784.00	68.77	346.53	9,638.08	178.18	-511.89	181.30	16.17	16.17	-0.37
9,816.00	74.21	345.93	9,648.24	207.64	-519.11	210.81	17.09	17.00	-1.88
9,847.00	79.86	345.73	9,655.19	236.92	-526.50	240.13	18.24	18.23	-0.65
9,905.00	88.88	344.47	9,660.87	292.64	-541.34	295.94	15.70	15.55	-2.17
10,000.00	89.10	344.24	9,662.55	384.10	-566.95	387.56	0.34	0.23	-0.24
10,094.00	91.83	347.02	9,661.79	475.14	-590.27	478.74	4.14	2.90	2.96
10,188.00	91.07	347.37	9,659.41	566.77	-611.10	570.50	0.89	-0.81	0.37
10,282.00	90.15	348.79	9,658.41	658.74	-630.51	662.58	1.80	-0.98	1.51
10,376.00	88.82	348.52	9,659.25	750.90	-649.00	754.85	1.44	-1.41	-0.29
10,470.00	88.33	349.17	9,661.59	843.09	-667.18	847.15	0.87	-0.52	0.69
10,564.00	88.98	351.88	9,663.80	935.77	-682.65	939.93	2.96	0.69	2.88
10,658.00	89.45	356.26	9,665.08	1,029.24	-692.36	1,033.45	4.69	0.50	4.66
10,752.00	89.48	358.46	9,665.96	1,123.13	-696.69	1,127.36	2.34	0.03	2.34
10,846.00	88.67	0.61	9,667.48	1,217.11	-697.45	1,221.35	2.44	-0.86	2.29
10,940.00	88.54	1.17	9,669.77	1,311.07	-695.99	1,315.30	0.61	-0.14	0.60
11,034.00	90.32	1.38	9,670.70	1,405.04	-693.90	1,409.25	1.91	1.89	0.22
11,128.00	89.87	0.73	9,670.55	1,499.02	-692.17	1,503.22	0.84	-0.48	-0.69
11,222.00	88.91	359.50	9,671.55	1,593.01	-691.98	1,597.21	1.66	-1.02	-1.31
11,316.00	89.68	359.83	9,672.70	1,687.00	-692.53	1,691.20	0.89	0.82	0.35
11,411.00	89.53	0.06	9,673.36	1,782.00	-692.62	1,786.20	0.29	-0.16	0.24
11,505.00	89.24	359.99	9,674.37	1,875.99	-692.58	1,880.19	0.32	-0.31	-0.07

Survey Report

Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 301H
 Wellbore: OH / 62733
 Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
 TVD Reference: RKB @ 3545.30usft (Ensign 155)
 MD Reference: RKB @ 3545.30usft (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)
11,599.00	91.72	358.90	9,673.58	1,969.98	-693.49	1,974.18	2.88	2.64	-1.16
11,694.00	91.87	359.06	9,670.61	2,064.92	-695.18	2,069.12	0.23	0.16	0.17
11,788.00	89.71	359.45	9,669.31	2,158.89	-696.40	2,163.11	2.34	-2.30	0.41
11,882.00	90.70	359.87	9,668.97	2,252.89	-696.96	2,257.10	1.14	1.05	0.45
11,976.00	90.24	0.79	9,668.20	2,346.88	-696.42	2,351.09	1.09	-0.49	0.98
12,070.00	87.25	359.91	9,670.26	2,440.85	-695.85	2,445.05	3.32	-3.18	-0.94
12,164.00	87.40	0.51	9,674.65	2,534.74	-695.50	2,538.94	0.66	0.16	0.64
12,258.00	87.42	0.85	9,678.90	2,628.64	-694.39	2,632.83	0.36	0.02	0.36
12,352.00	87.48	1.23	9,683.08	2,722.53	-692.68	2,726.71	0.41	0.06	0.40
12,445.00	87.53	359.94	9,687.13	2,815.44	-691.73	2,819.61	1.39	0.05	-1.39
12,539.00	88.10	359.15	9,690.71	2,909.36	-692.48	2,913.54	1.04	0.61	-0.84
12,633.00	88.07	359.50	9,693.85	3,003.31	-693.59	3,007.49	0.37	-0.03	0.37
12,727.00	91.24	358.44	9,694.42	3,097.28	-695.28	3,101.46	3.56	3.37	-1.13
12,821.00	91.19	358.62	9,692.42	3,191.22	-697.69	3,195.43	0.20	-0.05	0.19
12,915.00	90.62	359.20	9,690.94	3,285.19	-699.48	3,289.41	0.87	-0.61	0.62
13,009.00	90.15	358.69	9,690.31	3,379.18	-701.21	3,383.40	0.74	-0.50	-0.54
13,104.00	88.36	359.05	9,691.54	3,474.14	-703.08	3,478.37	1.92	-1.88	0.38
13,198.00	89.42	358.93	9,693.36	3,568.11	-704.74	3,572.35	1.13	1.13	-0.13
13,292.00	89.45	358.94	9,694.29	3,662.09	-706.48	3,666.34	0.03	0.03	0.01
13,386.00	89.21	359.17	9,695.39	3,756.07	-708.03	3,760.33	0.35	-0.26	0.24
13,480.00	89.25	0.47	9,696.65	3,850.06	-708.33	3,854.32	1.38	0.04	1.38
13,574.00	89.25	0.54	9,697.88	3,944.05	-707.50	3,948.30	0.07	0.00	0.07
13,668.00	88.78	1.47	9,699.50	4,038.02	-705.85	4,042.26	1.11	-0.50	0.99
13,762.00	89.90	2.23	9,700.58	4,131.96	-702.82	4,136.18	1.44	1.19	0.81
13,856.00	90.72	1.19	9,700.07	4,225.92	-700.01	4,230.11	1.41	0.87	-1.11
13,951.00	90.82	0.63	9,698.80	4,320.89	-698.50	4,325.08	0.60	0.11	-0.59
14,045.00	90.16	0.00	9,697.99	4,414.89	-697.99	4,419.07	0.97	-0.70	-0.67
14,139.00	89.50	359.27	9,698.27	4,508.89	-698.59	4,513.07	1.05	-0.70	-0.78
14,234.00	90.84	359.36	9,697.99	4,603.88	-699.72	4,608.06	1.41	1.41	0.09
14,328.00	90.64	359.64	9,696.78	4,697.86	-700.54	4,702.06	0.37	-0.21	0.30
14,422.00	89.84	358.41	9,696.38	4,791.85	-702.14	4,796.05	1.56	-0.85	-1.31
14,516.00	88.74	358.81	9,697.55	4,885.81	-704.42	4,890.02	1.25	-1.17	0.43
14,610.00	89.98	358.69	9,698.60	4,979.78	-706.47	4,984.00	1.33	1.32	-0.13
14,704.00	90.25	358.60	9,698.41	5,073.75	-708.70	5,077.99	0.30	0.29	-0.10
14,798.00	91.58	359.13	9,696.91	5,167.72	-710.56	5,171.97	1.52	1.41	0.56
14,892.00	92.95	0.19	9,693.19	5,261.64	-711.11	5,265.89	1.84	1.46	1.13
14,986.00	90.67	359.69	9,690.22	5,355.59	-711.21	5,359.83	2.48	-2.43	-0.53
15,080.00	91.69	0.08	9,688.29	5,449.57	-711.40	5,453.81	1.16	1.09	0.41
15,174.00	91.53	1.07	9,685.65	5,543.52	-710.46	5,547.76	1.07	-0.17	1.05
15,267.00	89.87	1.50	9,684.51	5,636.49	-708.37	5,640.71	1.84	-1.78	0.46
15,361.00	87.37	0.93	9,686.77	5,730.43	-706.38	5,734.64	2.73	-2.66	-0.61
15,455.00	89.05	0.32	9,689.71	5,824.38	-705.36	5,828.58	1.90	1.79	-0.65
15,549.00	89.04	358.08	9,691.28	5,918.35	-706.67	5,922.56	2.38	-0.01	-2.38

Survey Report

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 301H
Wellbore: OH / 62733
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 301H
TVD Reference: RKB @ 3545.30usft (Ensign 155)
MD Reference: RKB @ 3545.30usft (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)
15,643.00	89.76	358.08	9,692.26	6,012.29	-709.82	6,016.52	0.77	0.77	0.00
15,736.00	90.45	358.20	9,692.09	6,105.24	-712.84	6,109.48	0.75	0.74	0.13
15,831.00	90.67	358.14	9,691.16	6,200.19	-715.87	6,204.45	0.24	0.23	-0.06
15,924.00	90.27	358.88	9,690.40	6,293.15	-718.29	6,297.43	0.90	-0.43	0.80
16,018.00	91.13	358.74	9,689.25	6,387.13	-720.24	6,391.41	0.93	0.91	-0.15
16,112.00	89.99	0.22	9,688.33	6,481.11	-721.09	6,485.40	1.99	-1.21	1.57
16,207.00	88.62	0.65	9,689.49	6,576.10	-720.37	6,580.38	1.51	-1.44	0.45
16,302.00	89.18	0.38	9,691.31	6,671.08	-719.52	6,675.35	0.65	0.59	-0.28
16,395.00	91.42	0.96	9,690.82	6,764.07	-718.43	6,768.33	2.49	2.41	0.62
16,489.00	92.00	1.05	9,688.02	6,858.01	-716.78	6,862.26	0.62	0.62	0.10
16,584.00	91.06	359.19	9,685.48	6,952.97	-716.58	6,957.22	2.19	-0.99	-1.96
16,678.00	89.67	358.00	9,684.88	7,046.94	-718.89	7,051.20	1.95	-1.48	-1.27
16,772.00	90.56	358.42	9,684.69	7,140.89	-721.83	7,145.16	1.05	0.95	0.45
16,865.00	88.71	358.95	9,685.29	7,233.86	-723.96	7,238.15	2.07	-1.99	0.57
16,960.00	87.28	359.03	9,688.61	7,328.78	-725.63	7,333.08	1.51	-1.51	0.08
17,003.00	88.29	359.50	9,690.27	7,371.75	-726.18	7,376.04	2.59	2.35	1.10
LTP									
17,041.00	89.18	359.92	9,691.11	7,409.74	-726.37	7,414.03	2.59	2.35	1.10
Final Phoenix MWD Survey									
17,104.00	89.18	359.92	9,692.02	7,472.73	-726.46	7,477.03	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)	
9,034.00	9,013.90	-135.99	-413.86	Tie In
9,129.00	9,108.88	-134.73	-415.21	First Phoenix MWD Survey
9,711.00	9,604.68	115.29	-496.46	FTP
17,003.00	9,690.27	7,371.75	-726.18	LTP
17,041.00	9,691.11	7,409.74	-726.37	Final Phoenix MWD Survey
17,104.00	9,692.02	7,472.73	-726.46	Projection to TD