COG Operating LLC

Lea County, NM (NAD27 NME)
Eider Federal
101H

OH / 62729

Design: Surveys (Ensign 155)

Standard Survey Report

12 September, 2018

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**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 101H

Well Position	**+N/-S**	0.00 usft	**Northing:**	425,274.00 usft	**Latitude:**	32° 10' 2.46309 N
	+E/-W	0.00 usft	**Easting:**	711,380.40 usft	**Longitude:**	103° 39' 0.76609 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	0.00 usft	**Ground Level:**	3,521.70 usft

Wellbore OH / 62729

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	9/30/2018	6.71	59.85	47,905.92143132

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	354.36

Survey Program **Date** 9/12/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	8,494.00	Scientific Gyro Surveys (OH / 62729)	NS-GYRO-MS	North sensing gyrocompassing m/s
8,600.00	16,504.00	Phoenix MWD Surveys (OH / 62729)	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	0.29	165.18	100.00	-0.24	0.06	-0.25	0.29	0.29	0.00
125.00	0.69	183.08	125.00	-0.46	0.07	-0.46	1.69	1.60	71.60
150.00	0.68	198.09	150.00	-0.75	0.02	-0.75	0.72	-0.04	60.04
175.00	0.85	194.58	174.99	-1.07	-0.07	-1.06	0.71	0.68	-14.04
200.00	0.80	196.21	199.99	-1.41	-0.17	-1.39	0.22	-0.20	6.52
225.00	0.75	200.77	224.99	-1.74	-0.28	-1.70	0.32	-0.20	18.24
250.00	0.78	191.57	249.99	-2.06	-0.37	-2.01	0.51	0.12	-36.80
275.00	0.52	196.80	274.99	-2.33	-0.44	-2.28	1.07	-1.04	20.92
300.00	0.21	237.06	299.99	-2.46	-0.51	-2.40	1.54	-1.24	161.04

Survey Report

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Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	GL+KB @ 3545.70usft (Ensign 155)
Site:	Elder Federal	**MD Reference:**	GL+KB @ 3545.70usft (Ensign 155)
Well:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
325.00	0.53	349.12	324.99	-2.38	-0.57	-2.31	2.56	1.28	448.24
350.00	0.64	353.02	349.98	-2.12	-0.61	-2.05	0.47	0.44	15.60
375.00	0.85	350.22	374.98	-1.80	-0.65	-1.73	0.85	0.84	-11.20
400.00	0.89	354.09	399.98	-1.43	-0.71	-1.35	0.28	0.16	15.48
425.00	0.85	352.90	424.98	-1.05	-0.75	-0.97	0.18	-0.16	-4.76
450.00	0.84	358.51	449.97	-0.68	-0.78	-0.60	0.33	-0.04	22.44
475.00	0.45	49.23	474.97	-0.43	-0.71	-0.36	2.62	-1.56	202.88
500.00	0.77	135.28	499.97	-0.49	-0.51	-0.44	3.46	1.28	344.20
525.00	1.28	141.41	524.97	-0.83	-0.22	-0.80	2.08	2.04	24.52
550.00	1.53	146.60	549.96	-1.32	0.14	-1.33	1.12	1.00	20.76
575.00	1.70	146.67	574.95	-1.91	0.52	-1.95	0.68	0.68	0.28
600.00	1.61	149.05	599.94	-2.52	0.91	-2.60	0.45	-0.36	9.52
625.00	1.20	152.42	624.93	-3.06	1.21	-3.16	1.67	-1.64	13.48
650.00	0.55	167.45	649.93	-3.41	1.36	-3.52	2.74	-2.60	60.12
675.00	0.48	259.35	674.93	-3.54	1.28	-3.65	2.97	-0.28	367.60
700.00	1.34	297.80	699.92	-3.43	0.92	-3.50	4.04	3.44	153.80
725.00	1.51	306.73	724.92	-3.09	0.40	-3.12	1.12	0.68	35.72
750.00	1.55	307.97	749.91	-2.69	-0.13	-2.66	0.21	0.16	4.96
775.00	1.47	306.95	774.90	-2.29	-0.66	-2.21	0.34	-0.32	-4.08
800.00	1.12	298.68	799.89	-1.98	-1.13	-1.86	1.58	-1.40	-33.08
825.00	0.54	281.27	824.89	-1.84	-1.46	-1.68	2.50	-2.32	-69.64
850.00	0.24	207.03	849.89	-1.86	-1.60	-1.69	2.11	-1.20	-296.96
875.00	0.63	146.03	874.89	-2.02	-1.54	-1.86	2.22	1.56	-244.00
900.00	1.04	134.11	899.89	-2.29	-1.30	-2.15	1.77	1.64	-47.68
925.00	1.11	135.27	924.88	-2.62	-0.97	-2.51	0.29	0.28	4.64
950.00	1.18	139.66	949.88	-2.99	-0.63	-2.91	0.45	0.28	17.56
975.00	1.11	145.13	974.87	-3.39	-0.33	-3.34	0.52	-0.28	21.88
1,000.00	1.23	148.30	999.87	-3.81	-0.05	-3.79	0.55	0.48	12.68
1,025.00	1.22	148.29	1,024.86	-4.27	0.23	-4.27	0.04	-0.04	-0.04
1,050.00	1.15	153.31	1,049.86	-4.72	0.48	-4.74	0.50	-0.28	20.08
1,075.00	1.09	153.31	1,074.85	-5.15	0.70	-5.20	0.24	-0.24	0.00
1,100.00	0.95	160.04	1,099.85	-5.56	0.88	-5.62	0.74	-0.56	26.92
1,125.00	1.00	244.40	1,124.84	-5.85	0.76	-5.90	5.24	0.20	337.44
1,150.00	1.52	263.58	1,149.84	-5.98	0.23	-5.98	2.65	2.08	76.72
1,175.00	1.76	267.60	1,174.83	-6.04	-0.48	-5.96	1.06	0.96	16.08
1,200.00	1.83	268.42	1,199.82	-6.06	-1.27	-5.91	0.30	0.28	3.28
1,225.00	1.86	271.84	1,224.80	-6.06	-2.07	-5.83	0.46	0.12	13.68
1,250.00	1.83	269.58	1,249.79	-6.05	-2.88	-5.74	0.31	-0.12	-9.04
1,275.00	1.85	271.38	1,274.78	-6.04	-3.68	-5.65	0.24	0.08	7.20
1,300.00	1.82	266.13	1,299.76	-6.06	-4.48	-5.59	0.68	-0.12	-21.00
1,325.00	1.85	267.90	1,324.75	-6.10	-5.28	-5.55	0.26	0.12	7.08
1,350.00	1.92	269.70	1,349.74	-6.12	-6.10	-5.49	0.37	0.28	7.20
1,375.00	1.80	270.43	1,374.72	-6.12	-6.91	-5.41	0.49	-0.48	2.92

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Well:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,400.00	1.73	271.57	1,399.71	-6.10	-7.68	-5.32	0.31	-0.28	4.56
1,425.00	1.75	275.57	1,424.70	-6.06	-8.44	-5.20	0.49	0.08	16.00
1,450.00	1.83	272.50	1,449.69	-6.00	-9.22	-5.07	0.50	0.32	-12.28
1,475.00	1.74	267.75	1,474.68	-6.00	-9.99	-4.99	0.69	-0.36	-19.00
1,500.00	1.69	274.83	1,499.67	-5.98	-10.74	-4.90	0.87	-0.20	28.32
1,525.00	1.64	269.98	1,524.65	-5.95	-11.47	-4.80	0.60	-0.20	-19.40
1,550.00	1.62	271.46	1,549.64	-5.94	-12.18	-4.72	0.19	-0.08	5.92
1,575.00	1.64	277.80	1,574.63	-5.89	-12.89	-4.59	0.73	0.08	25.36
1,600.00	1.69	276.30	1,599.62	-5.80	-13.61	-4.43	0.27	0.20	-6.00
1,625.00	1.69	280.82	1,624.61	-5.69	-14.33	-4.25	0.53	0.00	18.08
1,650.00	1.62	278.42	1,649.60	-5.57	-15.05	-4.06	0.39	-0.28	-9.60
1,675.00	1.47	276.41	1,674.59	-5.48	-15.71	-3.91	0.64	-0.60	-8.04
1,700.00	1.59	275.67	1,699.58	-5.41	-16.38	-3.77	0.49	0.48	-2.96
1,725.00	1.63	274.00	1,724.58	-5.35	-17.08	-3.65	0.25	0.16	-6.68
1,750.00	1.66	276.54	1,749.56	-5.28	-17.79	-3.51	0.32	0.12	10.16
1,775.00	1.63	275.98	1,774.55	-5.21	-18.51	-3.36	0.14	-0.12	-2.24
1,800.00	1.65	274.44	1,799.54	-5.14	-19.22	-3.23	0.19	0.08	-6.16
1,825.00	1.55	280.57	1,824.53	-5.05	-19.91	-3.07	0.79	-0.40	24.52
1,850.00	1.46	276.67	1,849.53	-4.95	-20.56	-2.91	0.55	-0.36	-15.60
1,875.00	1.49	274.73	1,874.52	-4.89	-21.20	-2.78	0.23	0.12	-7.76
1,900.00	1.54	276.84	1,899.51	-4.82	-21.86	-2.65	0.30	0.20	8.44
1,925.00	1.59	275.36	1,924.50	-4.75	-22.53	-2.51	0.26	0.20	-5.92
1,950.00	1.55	275.03	1,949.49	-4.69	-23.22	-2.38	0.16	-0.16	-1.32
1,975.00	1.51	280.62	1,974.48	-4.60	-23.88	-2.23	0.62	-0.16	22.36
2,000.00	1.28	276.47	1,999.47	-4.50	-24.48	-2.08	1.00	-0.92	-16.60
2,025.00	1.44	274.15	2,024.47	-4.45	-25.07	-1.97	0.68	0.64	-9.28
2,050.00	1.49	277.13	2,049.46	-4.39	-25.71	-1.84	0.36	0.20	11.92
2,075.00	1.51	276.74	2,074.45	-4.31	-26.35	-1.70	0.09	0.08	-1.56
2,100.00	1.45	276.85	2,099.44	-4.23	-27.00	-1.56	0.24	-0.24	0.44
2,125.00	1.46	280.01	2,124.43	-4.14	-27.62	-1.40	0.32	0.04	12.64
2,150.00	1.49	281.16	2,149.43	-4.02	-28.26	-1.22	0.17	0.12	4.60
2,175.00	1.43	275.66	2,174.42	-3.93	-28.89	-1.07	0.61	-0.24	-22.00
2,200.00	1.25	272.62	2,199.41	-3.88	-29.47	-0.97	0.77	-0.72	-12.16
2,225.00	1.05	258.63	2,224.41	-3.92	-29.97	-0.95	1.37	-0.80	-55.96
2,250.00	0.89	250.19	2,249.40	-4.03	-30.37	-1.02	0.86	-0.64	-33.76
2,275.00	0.88	229.12	2,274.40	-4.22	-30.70	-1.18	1.30	-0.04	-84.28
2,300.00	0.98	210.39	2,299.40	-4.53	-30.95	-1.47	1.27	0.40	-74.92
2,325.00	1.05	209.90	2,324.39	-4.91	-31.18	-1.82	0.28	0.28	-1.96
2,350.00	0.93	220.07	2,349.39	-5.27	-31.42	-2.15	0.85	-0.48	40.68
2,375.00	1.02	217.27	2,374.38	-5.60	-31.69	-2.46	0.41	0.36	-11.20
2,400.00	1.14	206.10	2,399.38	-6.00	-31.93	-2.83	0.97	0.48	-44.68
2,425.00	0.99	213.35	2,424.38	-6.40	-32.16	-3.21	0.81	-0.60	29.00
2,450.00	1.06	209.16	2,449.37	-6.78	-32.39	-3.57	0.41	0.28	-16.76

Survey Report

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Site:	Eider Federal	**MD Reference:**	GL+KB @ 3545.70usft (Ensign 155)
Well:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,475.00	1.15	210.22	2,474.37	-7.20	-32.63	-3.96	0.37	0.36	4.24
2,500.00	1.28	201.26	2,499.36	-7.68	-32.86	-4.41	0.92	0.52	-35.84
2,525.00	1.30	206.79	2,524.36	-8.19	-33.09	-4.90	0.50	0.08	22.12
2,550.00	1.13	209.71	2,549.35	-8.66	-33.34	-5.34	0.72	-0.68	11.68
2,575.00	1.05	212.39	2,574.34	-9.07	-33.58	-5.72	0.38	-0.32	10.72
2,600.00	1.37	205.39	2,599.34	-9.53	-33.83	-6.16	1.41	1.28	-28.00
2,625.00	1.28	207.86	2,624.33	-10.05	-34.09	-6.65	0.43	-0.36	9.88
2,650.00	1.23	208.87	2,649.33	-10.53	-34.35	-7.10	0.22	-0.20	4.04
2,675.00	1.21	205.46	2,674.32	-11.00	-34.59	-7.55	0.30	-0.08	-13.64
2,700.00	1.23	208.17	2,699.32	-11.48	-34.83	-8.00	0.24	0.08	10.84
2,725.00	1.28	204.90	2,724.31	-11.97	-35.08	-8.46	0.35	0.20	-13.08
2,750.00	1.37	208.65	2,749.30	-12.48	-35.34	-8.95	0.50	0.36	15.00
2,775.00	1.30	207.79	2,774.30	-13.00	-35.61	-9.43	0.29	-0.28	-3.44
2,800.00	1.26	208.14	2,799.29	-13.49	-35.88	-9.90	0.16	-0.16	1.40
2,825.00	1.26	202.90	2,824.28	-13.99	-36.11	-10.37	0.46	0.00	-20.96
2,850.00	1.25	209.78	2,849.28	-14.48	-36.35	-10.83	0.60	-0.04	27.52
2,875.00	1.42	212.65	2,874.27	-14.97	-36.66	-11.30	0.73	0.68	11.48
2,900.00	1.33	217.90	2,899.26	-15.46	-37.00	-11.75	0.62	-0.36	21.00
2,925.00	1.36	226.50	2,924.26	-15.90	-37.40	-12.14	0.82	0.12	34.40
2,950.00	1.31	231.46	2,949.25	-16.28	-37.83	-12.48	0.50	-0.20	19.84
2,975.00	1.39	229.00	2,974.24	-16.66	-38.29	-12.81	0.40	0.32	-9.84
3,000.00	1.38	227.22	2,999.24	-17.06	-38.74	-13.17	0.18	-0.04	-7.12
3,025.00	1.45	222.02	3,024.23	-17.50	-39.17	-13.56	0.58	0.28	-20.80
3,050.00	1.42	227.65	3,049.22	-17.94	-39.61	-13.96	0.58	-0.12	22.52
3,075.00	1.43	225.12	3,074.21	-18.37	-40.06	-14.35	0.25	0.04	-10.12
3,100.00	1.39	230.11	3,099.21	-18.79	-40.51	-14.71	0.52	-0.16	19.96
3,125.00	1.42	225.66	3,124.20	-19.20	-40.97	-15.08	0.45	0.12	-17.80
3,150.00	1.42	226.68	3,149.19	-19.63	-41.41	-15.46	0.10	0.00	4.08
3,175.00	1.11	250.57	3,174.18	-19.92	-41.87	-15.71	2.42	-1.24	95.56
3,200.00	1.08	269.84	3,199.18	-20.00	-42.33	-15.74	1.47	-0.12	77.08
3,225.00	1.21	283.21	3,224.17	-19.94	-42.83	-15.64	1.18	0.52	53.48
3,250.00	1.22	289.49	3,249.17	-19.79	-43.33	-15.44	0.53	0.04	25.12
3,275.00	1.23	289.84	3,274.16	-19.61	-43.84	-15.21	0.05	0.04	1.40
3,300.00	1.25	293.01	3,299.16	-19.41	-44.34	-14.96	0.29	0.08	12.68
3,325.00	1.23	290.61	3,324.15	-19.21	-44.84	-14.71	0.22	-0.08	-9.60
3,350.00	1.23	292.47	3,349.15	-19.02	-45.34	-14.47	0.16	0.00	7.44
3,375.00	1.15	294.44	3,374.14	-18.81	-45.82	-14.22	0.36	-0.32	7.88
3,400.00	1.09	291.96	3,399.14	-18.62	-46.27	-13.98	0.31	-0.24	-9.92
3,425.00	1.15	285.27	3,424.13	-18.46	-46.73	-13.78	0.58	0.24	-26.76
3,450.00	1.17	292.43	3,449.13	-18.30	-47.21	-13.57	0.58	0.08	28.64
3,475.00	1.21	293.03	3,474.12	-18.10	-47.69	-13.32	0.17	0.16	2.40
3,500.00	1.14	293.51	3,499.11	-17.90	-48.16	-13.08	0.28	-0.28	1.92
3,525.00	1.11	298.16	3,524.11	-17.68	-48.60	-12.82	0.38	-0.12	18.60
3,550.00	1.08	297.56	3,549.11	-17.46	-49.02	-12.56	0.13	-0.12	-2.40

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,575.00	1.04	303.00	3,574.10	-17.23	-49.42	-12.29	0.43	-0.16	21.76
3,600.00	1.00	302.14	3,599.10	-16.99	-49.79	-12.01	0.17	-0.16	-3.44
3,625.00	0.81	319.48	3,624.09	-16.74	-50.09	-11.73	1.32	-0.76	69.36
3,650.00	0.75	319.18	3,649.09	-16.48	-50.32	-11.45	0.24	-0.24	-1.20
3,675.00	0.83	320.58	3,674.09	-16.21	-50.54	-11.17	0.33	0.32	5.60
3,700.00	0.79	319.27	3,699.09	-15.94	-50.77	-10.88	0.18	-0.16	-5.24
3,725.00	0.85	324.16	3,724.08	-15.66	-50.99	-10.58	0.37	0.24	19.56
3,750.00	0.71	319.08	3,749.08	-15.40	-51.20	-10.29	0.62	-0.56	-20.32
3,775.00	0.76	318.90	3,774.08	-15.15	-51.41	-10.03	0.20	0.20	-0.72
3,800.00	0.79	317.71	3,799.08	-14.90	-51.63	-9.75	0.14	0.12	-4.76
3,825.00	0.90	318.06	3,824.08	-14.63	-51.88	-9.46	0.44	0.44	1.40
3,850.00	0.80	317.41	3,849.07	-14.35	-52.13	-9.16	0.40	-0.40	-2.60
3,875.00	0.77	321.37	3,874.07	-14.09	-52.35	-8.88	0.25	-0.12	15.84
3,900.00	0.74	310.71	3,899.07	-13.86	-52.58	-8.62	0.57	-0.12	-42.64
3,925.00	0.77	310.14	3,924.07	-13.64	-52.83	-8.38	0.12	0.12	-2.28
3,950.00	0.73	308.05	3,949.06	-13.44	-53.08	-8.15	0.19	-0.16	-8.36
3,975.00	0.79	308.81	3,974.06	-13.23	-53.34	-7.92	0.24	0.24	3.04
4,000.00	0.77	309.76	3,999.06	-13.01	-53.61	-7.68	0.10	-0.08	3.80
4,025.00	0.71	314.64	4,024.06	-12.80	-53.85	-7.44	0.35	-0.24	19.52
4,050.00	0.67	305.04	4,049.06	-12.61	-54.08	-7.23	0.49	-0.16	-38.40
4,075.00	0.83	294.37	4,074.05	-12.45	-54.36	-7.04	0.85	0.64	-42.68
4,100.00	1.02	274.71	4,099.05	-12.35	-54.75	-6.91	1.47	0.76	-78.64
4,125.00	1.53	263.39	4,124.04	-12.37	-55.30	-6.88	2.27	2.04	-45.28
4,150.00	1.91	257.82	4,149.03	-12.50	-56.04	-6.93	1.66	1.52	-22.28
4,175.00	2.49	250.86	4,174.01	-12.77	-56.96	-7.11	2.55	2.32	-27.84
4,200.00	2.97	251.35	4,198.99	-13.15	-58.09	-7.38	1.92	1.92	1.96
4,225.00	3.74	251.48	4,223.94	-13.62	-59.47	-7.71	3.08	3.08	0.52
4,250.00	4.58	251.32	4,248.88	-14.20	-61.19	-8.11	3.36	3.36	-0.64
4,275.00	5.13	252.37	4,273.79	-14.85	-63.20	-8.57	2.23	2.20	4.20
4,300.00	5.58	252.05	4,298.68	-15.57	-65.42	-9.06	1.80	1.80	-1.28
4,325.00	6.04	252.51	4,323.55	-16.34	-67.83	-9.59	1.85	1.84	1.84
4,350.00	6.35	252.23	4,348.40	-17.15	-70.41	-10.15	1.25	1.24	-1.12
4,375.00	6.29	253.04	4,373.25	-17.98	-73.03	-10.71	0.43	-0.24	3.24
4,400.00	6.24	252.36	4,398.10	-18.79	-75.64	-11.26	0.36	-0.20	-2.72
4,425.00	6.25	250.71	4,422.95	-19.65	-78.22	-11.87	0.72	0.04	-6.60
4,450.00	5.99	249.35	4,447.81	-20.56	-80.72	-12.53	1.19	-1.04	-5.44
4,475.00	5.60	246.56	4,472.68	-21.50	-83.06	-13.24	1.92	-1.56	-11.16
4,500.00	5.43	244.46	4,497.57	-22.50	-85.25	-14.01	1.06	-0.68	-8.40
4,525.00	5.32	243.35	4,522.46	-23.53	-87.35	-14.83	0.61	-0.44	-4.44
4,550.00	5.25	241.88	4,547.35	-24.59	-89.39	-15.68	0.61	-0.28	-5.88
4,575.00	5.36	242.13	4,572.24	-25.67	-91.44	-16.56	0.45	0.44	1.00
4,600.00	5.37	242.78	4,597.13	-26.75	-93.51	-17.43	0.25	0.04	2.60
4,625.00	5.66	246.76	4,622.02	-27.77	-95.68	-18.24	1.92	1.16	15.92

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,650.00	5.96	249.77	4,646.89	-28.71	-98.03	-18.94	1.71	1.20	12.04
4,675.00	6.16	252.23	4,671.75	-29.57	-100.53	-19.55	1.31	0.80	9.84
4,700.00	6.74	255.22	4,696.59	-30.35	-103.22	-20.06	2.68	2.32	11.96
4,725.00	7.19	257.75	4,721.41	-31.06	-106.17	-20.47	2.18	1.80	10.12
4,750.00	7.30	258.97	4,746.21	-31.69	-109.26	-20.80	0.76	0.44	4.88
4,775.00	7.42	259.84	4,771.00	-32.28	-112.41	-21.08	0.66	0.48	3.48
4,800.00	7.38	259.59	4,795.79	-32.86	-115.57	-21.34	0.21	-0.16	-1.00
4,825.00	7.22	259.95	4,820.59	-33.42	-118.70	-21.59	0.67	-0.64	1.44
4,850.00	6.80	259.85	4,845.40	-33.96	-121.70	-21.83	1.68	-1.68	-0.40
4,875.00	6.64	260.06	4,870.23	-34.47	-124.59	-22.06	0.65	-0.64	0.84
4,900.00	6.71	260.30	4,895.06	-34.96	-127.45	-22.27	0.30	0.28	0.96
4,925.00	6.79	260.05	4,919.89	-35.46	-130.34	-22.48	0.34	0.32	-1.00
4,950.00	6.79	259.82	4,944.71	-35.98	-133.25	-22.71	0.11	0.00	-0.92
4,975.00	6.65	260.77	4,969.54	-36.47	-136.14	-22.92	0.72	-0.56	3.80
5,000.00	6.54	260.69	4,994.38	-36.94	-138.97	-23.10	0.44	-0.44	-0.32
5,025.00	6.59	259.53	5,019.21	-37.43	-141.79	-23.31	0.57	0.20	-4.64
5,050.00	6.53	258.33	5,044.05	-37.98	-144.59	-23.58	0.60	-0.24	-4.80
5,075.00	6.44	258.97	5,068.89	-38.53	-147.36	-23.86	0.46	-0.36	2.56
5,100.00	6.36	259.12	5,093.73	-39.06	-150.09	-24.12	0.33	-0.32	0.60
5,125.00	6.43	259.59	5,118.58	-39.58	-152.83	-24.36	0.35	0.28	1.88
5,150.00	6.41	259.35	5,143.42	-40.09	-155.58	-24.60	0.13	-0.08	-0.96
5,175.00	6.36	258.05	5,168.27	-40.63	-158.30	-24.88	0.61	-0.20	-5.20
5,200.00	6.42	258.65	5,193.11	-41.19	-161.03	-25.17	0.36	0.24	2.40
5,225.00	6.39	259.01	5,217.96	-41.73	-163.77	-25.44	0.20	-0.12	1.44
5,250.00	6.44	258.58	5,242.80	-42.28	-166.51	-25.71	0.28	0.20	-1.72
5,275.00	6.58	258.40	5,267.64	-42.84	-169.28	-26.00	0.57	0.56	-0.72
5,300.00	6.44	258.69	5,292.48	-43.40	-172.06	-26.28	0.58	-0.56	1.16
5,325.00	6.54	258.59	5,317.32	-43.96	-174.83	-26.57	0.40	0.40	-0.40
5,350.00	6.58	258.52	5,342.15	-44.53	-177.63	-26.86	0.16	0.16	-0.28
5,375.00	6.61	258.91	5,366.99	-45.09	-180.45	-27.14	0.22	0.12	1.56
5,400.00	6.47	258.28	5,391.82	-45.65	-183.24	-27.42	0.63	-0.56	-2.52
5,425.00	6.40	257.24	5,416.67	-46.25	-185.98	-27.75	0.54	-0.28	-4.16
5,450.00	6.42	257.56	5,441.51	-46.86	-188.70	-28.08	0.16	0.08	1.28
5,475.00	6.34	258.08	5,466.36	-47.44	-191.42	-28.40	0.39	-0.32	2.08
5,500.00	6.44	257.01	5,491.20	-48.04	-194.13	-28.73	0.62	0.40	-4.28
5,525.00	6.31	257.34	5,516.05	-48.66	-196.84	-29.08	0.54	-0.52	1.32
5,550.00	6.25	257.06	5,540.90	-49.26	-199.51	-29.42	0.27	-0.24	-1.12
5,575.00	6.23	257.63	5,565.75	-49.86	-202.16	-29.75	0.26	-0.08	2.28
5,600.00	6.19	256.82	5,590.60	-50.46	-204.79	-30.09	0.39	-0.16	-3.24
5,625.00	6.16	256.58	5,615.46	-51.08	-207.41	-30.44	0.16	-0.12	-0.96
5,650.00	6.02	255.20	5,640.32	-51.72	-209.98	-30.83	0.81	-0.56	-5.52
5,675.00	5.88	255.54	5,665.18	-52.38	-212.49	-31.24	0.58	-0.56	1.36
5,700.00	5.76	254.96	5,690.05	-53.02	-214.94	-31.64	0.53	-0.48	-2.32

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**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)
5,725.00	5.63	254.23	5,714.93	-53.68	-217.33	-32.06	0.60	-0.52	-2.92
5,750.00	5.47	253.46	5,739.81	-54.35	-219.66	-32.50	0.71	-0.64	-3.08
5,775.00	5.21	254.00	5,764.70	-55.01	-221.89	-32.93	1.06	-1.04	2.16
5,800.00	5.42	254.08	5,789.59	-55.64	-224.12	-33.35	0.84	0.84	0.32
5,825.00	5.23	253.47	5,814.49	-56.29	-226.34	-33.77	0.79	-0.76	-2.44
5,850.00	5.33	254.26	5,839.38	-56.93	-228.55	-34.19	0.49	0.40	3.16
5,875.00	5.39	254.79	5,864.27	-57.55	-230.80	-34.59	0.31	0.24	2.12
5,900.00	5.50	255.32	5,889.16	-58.16	-233.10	-34.97	0.48	0.44	2.12
5,925.00	5.72	256.50	5,914.04	-58.76	-235.47	-35.33	0.99	0.88	4.72
5,950.00	5.86	258.12	5,938.91	-59.31	-237.93	-35.64	0.86	0.56	6.48
5,975.00	5.94	258.60	5,963.78	-59.83	-240.44	-35.91	0.38	0.32	1.92
6,000.00	5.82	258.44	5,988.65	-60.34	-242.95	-36.17	0.48	-0.48	-0.64
6,025.00	5.90	258.61	6,013.52	-60.85	-245.46	-36.43	0.33	0.32	0.68
6,050.00	6.00	259.31	6,038.38	-61.34	-248.00	-36.67	0.49	0.40	2.80
6,075.00	5.86	258.47	6,063.25	-61.84	-250.53	-36.92	0.66	-0.56	-3.36
6,100.00	5.85	258.76	6,088.12	-62.34	-253.03	-37.18	0.12	-0.04	1.16
6,125.00	5.94	258.12	6,112.99	-62.86	-255.55	-37.44	0.45	0.36	-2.56
6,150.00	6.01	258.80	6,137.85	-63.38	-258.10	-37.71	0.40	0.28	2.72
6,175.00	6.01	258.33	6,162.71	-63.90	-260.66	-37.97	0.20	0.00	-1.88
6,200.00	6.00	257.80	6,187.58	-64.44	-263.22	-38.26	0.23	-0.04	-2.12
6,225.00	5.98	258.72	6,212.44	-64.97	-265.78	-38.54	0.39	-0.08	3.68
6,250.00	6.05	256.93	6,237.30	-65.52	-268.34	-38.83	0.80	0.28	-7.16
6,275.00	6.12	258.23	6,262.16	-66.09	-270.93	-39.15	0.62	0.28	5.20
6,300.00	6.40	259.53	6,287.01	-66.62	-273.60	-39.41	1.26	1.12	5.20
6,325.00	6.41	259.09	6,311.86	-67.14	-276.34	-39.65	0.20	0.04	-1.76
6,350.00	6.50	259.32	6,336.70	-67.66	-279.10	-39.90	0.37	0.36	0.92
6,375.00	6.45	259.11	6,361.54	-68.19	-281.87	-40.16	0.22	-0.20	-0.84
6,400.00	6.55	260.11	6,386.38	-68.70	-284.65	-40.39	0.60	0.40	4.00
6,425.00	6.53	259.21	6,411.21	-69.21	-287.46	-40.62	0.42	-0.08	-3.60
6,450.00	6.24	259.00	6,436.06	-69.74	-290.19	-40.88	1.16	-1.16	-0.84
6,475.00	6.30	259.41	6,460.91	-70.25	-292.87	-41.12	0.30	0.24	1.64
6,500.00	6.22	259.64	6,485.76	-70.74	-295.55	-41.35	0.34	-0.32	0.92
6,525.00	6.28	259.80	6,510.61	-71.23	-298.23	-41.57	0.25	0.24	0.64
6,550.00	6.39	260.14	6,535.46	-71.71	-300.94	-41.79	0.46	0.44	1.36
6,575.00	6.88	266.48	6,560.29	-72.04	-303.81	-41.83	3.52	1.96	25.36
6,600.00	7.17	270.80	6,585.10	-72.11	-306.86	-41.60	2.41	1.16	17.28
6,625.00	7.43	273.70	6,609.90	-71.98	-310.04	-41.17	1.80	1.04	11.60
6,650.00	7.44	274.50	6,634.69	-71.75	-313.26	-40.62	0.42	0.04	3.20
6,675.00	7.39	274.29	6,659.48	-71.50	-316.48	-40.06	0.23	-0.20	-0.84
6,700.00	7.27	274.55	6,684.28	-71.26	-319.66	-39.50	0.50	-0.48	1.04
6,725.00	7.18	274.55	6,709.08	-71.01	-322.79	-38.94	0.36	-0.36	0.00
6,750.00	7.05	275.60	6,733.89	-70.74	-325.88	-38.37	0.74	-0.52	4.20
6,775.00	6.95	274.88	6,758.70	-70.46	-328.91	-37.79	0.53	-0.40	-2.88
6,800.00	6.95	274.50	6,783.52	-70.21	-331.93	-37.25	0.18	0.00	-1.52

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,825.00	7.09	273.63	6,808.33	-69.99	-334.97	-36.73	0.70	0.56	-3.48
6,850.00	7.09	274.33	6,833.14	-69.78	-338.05	-36.22	0.35	0.00	2.80
6,875.00	7.06	274.16	6,857.95	-69.55	-341.12	-35.69	0.15	-0.12	-0.68
6,900.00	7.15	274.36	6,882.76	-69.32	-344.21	-35.16	0.37	0.36	0.80
6,925.00	7.13	273.18	6,907.56	-69.12	-347.31	-34.65	0.59	-0.08	-4.72
6,950.00	6.84	269.42	6,932.38	-69.05	-350.35	-34.28	2.17	-1.16	-15.04
6,975.00	6.91	264.54	6,957.20	-69.20	-353.33	-34.15	2.35	0.28	-19.52
7,000.00	6.84	264.93	6,982.02	-69.48	-356.31	-34.13	0.34	-0.28	1.56
7,025.00	6.84	264.59	7,006.84	-69.75	-359.28	-34.10	0.16	0.00	-1.36
7,050.00	6.86	264.73	7,031.66	-70.03	-362.25	-34.09	0.10	0.08	0.56
7,075.00	6.87	264.43	7,056.48	-70.31	-365.22	-34.08	0.15	0.04	-1.20
7,100.00	6.79	264.21	7,081.30	-70.61	-368.18	-34.08	0.34	-0.32	-0.88
7,125.00	6.53	264.79	7,106.14	-70.88	-371.06	-34.07	1.07	-1.04	2.32
7,150.00	5.53	264.45	7,131.00	-71.13	-373.68	-34.06	4.00	-4.00	-1.36
7,175.00	5.49	264.02	7,155.88	-71.37	-376.07	-34.07	0.23	-0.16	-1.72
7,200.00	5.24	264.35	7,180.77	-71.61	-378.39	-34.07	1.01	-1.00	1.32
7,225.00	4.85	262.71	7,205.68	-71.85	-380.58	-34.10	1.66	-1.56	-6.56
7,250.00	4.15	254.86	7,230.60	-72.22	-382.50	-34.28	3.72	-2.80	-31.40
7,275.00	3.91	252.76	7,255.54	-72.71	-384.19	-34.60	1.13	-0.96	-8.40
7,300.00	3.49	249.79	7,280.48	-73.23	-385.71	-34.97	1.85	-1.68	-11.88
7,325.00	2.81	242.36	7,305.45	-73.78	-386.97	-35.39	3.17	-2.72	-29.72
7,350.00	2.27	234.85	7,330.42	-74.34	-387.92	-35.86	2.53	-2.16	-30.04
7,375.00	2.20	230.40	7,355.40	-74.94	-388.69	-36.37	0.75	-0.28	-17.80
7,400.00	2.24	228.15	7,380.38	-75.57	-389.43	-36.93	0.38	0.16	-9.00
7,425.00	2.32	229.01	7,405.36	-76.23	-390.17	-37.51	0.35	0.32	3.44
7,450.00	2.32	225.33	7,430.34	-76.91	-390.91	-38.12	0.60	0.00	-14.72
7,475.00	2.26	222.82	7,455.32	-77.63	-391.61	-38.77	0.47	-0.24	-10.04
7,500.00	2.02	225.48	7,480.31	-78.30	-392.26	-39.37	1.04	-0.96	10.64
7,525.00	2.27	229.76	7,505.29	-78.93	-392.95	-39.93	1.19	1.00	17.12
7,550.00	2.31	226.36	7,530.27	-79.60	-393.69	-40.52	0.57	0.16	-13.60
7,575.00	2.29	227.07	7,555.25	-80.29	-394.42	-41.13	0.14	-0.08	2.84
7,600.00	2.02	228.98	7,580.23	-80.91	-395.12	-41.69	1.12	-1.08	7.64
7,625.00	1.66	231.63	7,605.22	-81.43	-395.74	-42.14	1.48	-1.44	10.60
7,650.00	1.37	225.75	7,630.21	-81.86	-396.24	-42.52	1.31	-1.16	-23.52
7,675.00	1.43	228.44	7,655.20	-82.28	-396.68	-42.89	0.36	0.24	10.76
7,700.00	1.41	228.37	7,680.19	-82.69	-397.15	-43.26	0.08	-0.08	-0.28
7,725.00	1.37	227.64	7,705.19	-83.09	-397.60	-43.62	0.17	-0.16	-2.92
7,750.00	1.55	227.69	7,730.18	-83.52	-398.07	-44.00	0.72	0.72	0.20
7,775.00	1.26	237.45	7,755.17	-83.90	-398.55	-44.32	1.50	-1.16	39.04
7,800.00	1.13	266.79	7,780.17	-84.06	-399.03	-44.44	2.47	-0.52	117.36
7,825.00	1.10	280.13	7,805.16	-84.03	-399.51	-44.36	1.04	-0.12	53.36
7,850.00	1.28	289.15	7,830.16	-83.90	-400.01	-44.18	1.04	0.72	36.08
7,875.00	1.34	289.33	7,855.15	-83.71	-400.55	-43.94	0.24	0.24	0.72

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,900.00	1.35	286.38	7,880.14	-83.53	-401.11	-43.71	0.28	0.04	-11.80
7,925.00	1.73	281.81	7,905.13	-83.37	-401.76	-43.48	1.60	1.52	-18.28
7,950.00	2.08	279.94	7,930.12	-83.21	-402.58	-43.25	1.42	1.40	-7.48
7,975.00	2.11	280.18	7,955.10	-83.05	-403.48	-43.00	0.13	0.12	0.96
8,000.00	1.99	275.43	7,980.09	-82.93	-404.36	-42.79	0.83	-0.48	-19.00
8,025.00	1.36	254.14	8,005.08	-82.97	-405.08	-42.76	3.50	-2.52	-85.16
8,050.00	1.20	226.23	8,030.07	-83.23	-405.55	-42.97	2.55	-0.64	-111.64
8,075.00	1.38	221.40	8,055.06	-83.64	-405.94	-43.34	0.84	0.72	-19.32
8,100.00	1.28	211.88	8,080.06	-84.10	-406.29	-43.77	0.97	-0.40	-38.08
8,125.00	1.23	218.12	8,105.05	-84.55	-406.60	-44.18	0.58	-0.20	24.96
8,150.00	1.28	223.32	8,130.05	-84.97	-406.96	-44.56	0.50	0.20	20.80
8,175.00	1.19	248.78	8,155.04	-85.26	-407.39	-44.81	2.21	-0.36	101.84
8,200.00	1.22	259.27	8,180.03	-85.41	-407.90	-44.91	0.89	0.12	41.96
8,225.00	1.32	266.61	8,205.03	-85.47	-408.44	-44.92	0.76	0.40	29.36
8,250.00	1.15	279.56	8,230.02	-85.45	-408.98	-44.84	1.30	-0.68	51.80
8,275.00	1.17	310.27	8,255.02	-85.24	-409.42	-44.59	2.46	0.08	122.84
8,300.00	1.29	323.65	8,280.01	-84.85	-409.78	-44.17	1.24	0.48	53.52
8,325.00	1.42	331.74	8,305.00	-84.35	-410.10	-43.64	0.92	0.52	32.36
8,350.00	1.41	349.58	8,330.00	-83.78	-410.30	-43.05	1.76	-0.04	71.36
8,375.00	1.83	14.69	8,354.99	-83.09	-410.25	-42.37	3.26	1.68	100.44
8,400.00	2.01	21.61	8,379.97	-82.29	-409.99	-41.60	1.17	0.72	27.68
8,425.00	2.17	26.42	8,404.96	-81.46	-409.62	-40.81	0.95	0.64	19.24
8,450.00	2.19	24.06	8,429.94	-80.60	-409.21	-40.00	0.37	0.08	-9.44
8,475.00	2.12	25.49	8,454.92	-79.75	-408.82	-39.18	0.35	-0.28	5.72
8,494.00	2.07	28.11	8,473.91	-79.13	-408.51	-38.60	0.57	-0.26	13.79
Tie In									
8,589.00	2.75	355.79	8,568.83	-75.34	-407.87	-34.89	1.57	0.72	-34.02
First Phoenix MWD Survey									
8,683.00	3.90	339.48	8,662.67	-70.10	-409.15	-29.55	1.57	1.22	-17.36
8,730.00	11.63	327.46	8,709.21	-64.60	-412.26	-23.77	16.72	16.45	-25.57
8,777.00	18.87	328.76	8,754.52	-54.09	-418.76	-12.67	15.42	15.40	2.77
8,824.00	26.07	331.05	8,797.93	-38.53	-427.72	3.69	15.43	15.32	4.87
8,871.00	31.32	333.37	8,839.14	-18.56	-438.20	24.59	11.42	11.17	4.94
8,918.00	36.80	333.88	8,878.06	5.01	-449.88	49.20	11.68	11.66	1.09
8,936.00	38.01	334.08	8,892.36	14.84	-454.68	59.45	6.76	6.72	1.11
8,983.00	41.50	335.39	8,928.49	42.02	-467.49	87.76	7.64	7.43	2.79
9,030.00	44.82	337.13	8,962.77	71.45	-480.42	118.32	7.50	7.06	3.70
9,077.00	49.16	338.19	8,994.82	103.23	-493.47	151.23	9.38	9.23	2.26
9,125.00	53.27	337.51	9,024.88	137.88	-507.58	187.10	8.63	8.56	-1.42
9,172.00	55.96	337.44	9,052.10	173.27	-522.25	223.76	5.72	5.72	-0.15
9,219.00	58.96	337.98	9,077.37	209.93	-537.28	261.71	6.46	6.38	1.15
9,266.00	62.64	338.84	9,100.30	248.07	-552.37	301.16	7.99	7.83	1.83
9,313.00	66.80	339.43	9,120.37	287.78	-567.50	342.16	8.92	8.85	1.26
9,360.00	71.59	339.76	9,137.06	328.94	-582.81	384.63	10.21	10.19	0.70

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,407.00	76.30	340.80	9,150.05	371.45	-598.04	428.43	10.24	10.02	2.21
9,454.00	80.02	342.92	9,159.69	415.16	-612.35	473.33	9.06	7.91	4.51
9,501.00	84.00	345.20	9,166.23	459.90	-625.13	519.11	9.74	8.47	4.85
9,527.00	86.89	346.74	9,168.29	485.04	-631.41	544.75	12.59	11.12	5.92
9,574.00	90.28	348.48	9,169.45	530.92	-641.49	591.40	8.11	7.21	3.70
9,621.00	90.31	350.97	9,169.21	577.17	-649.87	638.24	5.30	0.06	5.30
9,715.00	89.21	354.92	9,169.60	670.43	-661.41	732.19	4.36	-1.17	4.20
9,809.00	89.75	356.05	9,170.46	764.14	-668.81	826.17	1.33	0.57	1.20
9,903.00	90.79	356.53	9,170.01	857.94	-674.90	920.11	1.22	1.11	0.51
9,998.00	89.61	356.75	9,169.68	952.77	-680.46	1,015.03	1.26	-1.24	0.23
10,091.00	88.46	356.54	9,171.25	1,045.60	-685.90	1,107.94	1.26	-1.24	-0.23
10,186.00	88.96	356.97	9,173.39	1,140.42	-691.28	1,202.84	0.69	0.53	0.45
10,279.00	88.57	359.33	9,175.39	1,233.34	-694.28	1,295.60	2.57	-0.42	2.54
10,373.00	89.24	0.15	9,177.19	1,327.32	-694.71	1,389.17	1.13	0.71	0.87
10,467.00	89.80	1.20	9,177.98	1,421.31	-693.60	1,482.60	1.27	0.60	1.12
10,562.00	90.00	0.53	9,178.14	1,516.30	-692.17	1,576.98	0.74	0.21	-0.71
10,656.00	89.50	359.08	9,178.55	1,610.30	-692.49	1,670.56	1.63	-0.53	-1.54
10,749.00	90.03	359.13	9,178.93	1,703.28	-693.94	1,763.24	0.57	0.57	0.05
10,843.00	91.26	359.37	9,177.88	1,797.27	-695.17	1,856.89	1.33	1.31	0.26
10,937.00	89.33	358.89	9,177.39	1,891.25	-696.60	1,950.56	2.12	-2.05	-0.51
11,031.00	89.52	358.99	9,178.33	1,985.23	-698.34	2,044.25	0.23	0.20	0.11
11,125.00	89.83	359.13	9,178.87	2,079.22	-699.88	2,137.93	0.36	0.33	0.15
11,219.00	90.81	358.27	9,178.34	2,173.19	-702.01	2,231.66	1.39	1.04	-0.91
11,313.00	88.82	359.31	9,178.65	2,267.16	-704.00	2,325.37	2.39	-2.12	1.11
11,407.00	88.57	0.32	9,180.79	2,361.13	-704.30	2,418.92	1.11	-0.27	1.07
11,501.00	89.13	0.79	9,182.67	2,455.11	-703.39	2,512.35	0.78	0.60	0.50
11,595.00	89.33	1.49	9,183.94	2,549.08	-701.52	2,605.69	0.77	0.21	0.74
11,690.00	89.41	1.76	9,184.98	2,644.04	-698.82	2,699.92	0.30	0.08	0.28
11,784.00	90.36	2.30	9,185.17	2,737.98	-695.50	2,793.08	1.16	1.01	0.57
11,878.00	90.56	1.69	9,184.42	2,831.92	-692.22	2,886.24	0.68	0.21	-0.65
11,973.00	91.15	0.65	9,183.00	2,926.89	-690.28	2,980.56	1.26	0.62	-1.09
12,067.00	90.73	0.31	9,181.46	3,020.87	-689.50	3,074.01	0.57	-0.45	-0.36
12,160.00	90.03	358.75	9,180.84	3,113.86	-690.26	3,166.62	1.84	-0.75	-1.68
12,254.00	89.24	358.34	9,181.44	3,207.83	-692.65	3,260.37	0.95	-0.84	-0.44
12,348.00	89.91	358.38	9,182.13	3,301.79	-695.34	3,354.14	0.71	0.71	0.04
12,441.00	91.20	359.42	9,181.23	3,394.76	-697.12	3,446.84	1.78	1.39	1.12
12,536.00	88.96	358.53	9,181.10	3,489.74	-698.82	3,541.52	2.54	-2.36	-0.94
12,630.00	88.88	359.22	9,182.87	3,583.70	-700.67	3,635.21	0.74	-0.09	0.73
12,724.00	88.71	359.84	9,184.85	3,677.68	-701.44	3,728.81	0.68	-0.18	0.66
12,818.00	88.82	0.73	9,186.88	3,771.65	-700.97	3,822.29	0.95	0.12	0.95
12,912.00	90.53	2.31	9,187.41	3,865.61	-698.48	3,915.55	2.48	1.82	1.68
13,006.00	90.95	1.78	9,186.20	3,959.55	-695.12	4,008.69	0.72	0.45	-0.56
13,100.00	92.47	0.70	9,183.39	4,053.48	-693.09	4,101.97	1.98	1.62	-1.15

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,194.00	90.87	359.84	9,180.65	4,147.43	-692.65	4,195.43	1.93	-1.70	-0.91
13,287.00	88.07	358.40	9,181.51	4,240.41	-694.07	4,288.09	3.39	-3.01	-1.55
13,382.00	88.51	358.25	9,184.35	4,335.32	-696.85	4,382.82	0.49	0.46	-0.16
13,476.00	88.15	358.79	9,187.09	4,429.25	-699.28	4,476.53	0.69	-0.38	0.57
13,570.00	88.29	359.04	9,190.01	4,523.19	-701.05	4,570.19	0.30	0.15	0.27
13,664.00	88.29	0.36	9,192.81	4,617.14	-701.55	4,663.74	1.40	0.00	1.40
13,758.00	87.71	359.38	9,196.09	4,711.08	-701.76	4,757.25	1.21	-0.62	-1.04
13,852.00	88.32	358.79	9,199.35	4,805.02	-703.26	4,850.87	0.90	0.65	-0.63
13,946.00	91.65	0.48	9,199.37	4,899.00	-703.86	4,944.45	3.97	3.54	1.80
14,040.00	94.12	1.03	9,194.64	4,992.86	-702.62	5,037.74	2.69	2.63	0.59
14,134.00	93.56	0.39	9,188.35	5,086.64	-701.46	5,130.96	0.90	-0.60	-0.68
14,228.00	90.50	359.83	9,185.02	5,180.57	-701.28	5,224.41	3.31	-3.26	-0.60
14,322.00	92.07	1.14	9,182.91	5,274.54	-700.49	5,317.85	2.18	1.67	1.39
14,416.00	91.77	0.43	9,179.76	5,368.48	-699.20	5,411.20	0.82	-0.32	-0.76
14,510.00	88.18	358.02	9,179.80	5,462.45	-700.47	5,504.84	4.60	-3.82	-2.56
14,603.00	88.51	357.27	9,182.49	5,555.33	-704.29	5,597.65	0.88	0.35	-0.81
14,697.00	90.98	357.45	9,182.90	5,649.22	-708.62	5,691.51	2.63	2.63	0.19
14,791.00	90.11	357.36	9,182.01	5,743.12	-712.87	5,785.38	0.93	-0.93	-0.10
14,885.00	87.87	355.68	9,183.67	5,836.92	-718.58	5,879.29	2.98	-2.38	-1.79
14,979.00	89.39	357.93	9,185.91	5,930.74	-723.81	5,973.16	2.89	1.62	2.39
15,074.00	91.09	358.35	9,185.52	6,025.69	-726.90	6,067.95	1.84	1.79	0.44
15,168.00	85.94	355.03	9,187.95	6,119.45	-732.32	6,161.80	6.52	-5.48	-3.53
15,215.00	86.02	354.79	9,191.25	6,166.15	-736.48	6,208.68	0.54	0.17	-0.51
15,262.00	86.86	357.08	9,194.17	6,212.94	-739.80	6,255.57	5.18	1.79	4.87
15,309.00	87.28	358.41	9,196.57	6,259.84	-741.65	6,302.42	2.96	0.89	2.83
15,356.00	88.91	359.74	9,198.13	6,306.81	-742.41	6,349.24	4.48	3.47	2.83
15,403.00	89.69	0.11	9,198.71	6,353.80	-742.47	6,396.01	1.84	1.66	0.79
15,451.00	91.23	1.18	9,198.32	6,401.80	-741.93	6,443.72	3.91	3.21	2.23
15,498.00	91.62	2.29	9,197.15	6,448.76	-740.51	6,490.32	2.50	0.83	2.36
15,545.00	92.24	3.22	9,195.57	6,495.68	-738.25	6,536.79	2.38	1.32	1.98
15,639.00	92.35	1.88	9,191.80	6,589.51	-734.07	6,629.75	1.43	0.12	-1.43
15,732.00	92.75	1.22	9,187.67	6,682.38	-731.56	6,721.93	0.83	0.43	-0.71
15,826.00	90.36	1.59	9,185.12	6,776.31	-729.25	6,815.18	2.57	-2.54	0.39
15,920.00	91.26	2.25	9,183.79	6,870.25	-726.10	6,908.35	1.19	0.96	0.70
16,014.00	90.98	1.10	9,181.95	6,964.19	-723.36	7,001.56	1.26	-0.30	-1.22
16,107.00	90.00	1.44	9,181.15	7,057.16	-721.29	7,093.88	1.12	-1.05	0.37
16,201.00	86.92	1.92	9,183.68	7,151.07	-718.54	7,187.07	3.32	-3.28	0.51
16,295.00	86.95	1.49	9,188.71	7,244.90	-715.75	7,280.17	0.46	0.03	-0.46
16,389.00	88.43	1.42	9,192.49	7,338.79	-713.36	7,373.37	1.58	1.57	-0.07
16,437.00	88.60	1.75	9,193.74	7,386.75	-712.04	7,420.97	0.77	0.35	0.69
Final Phoenix MWD Survey									
16,504.00	88.60	1.75	9,195.38	7,453.70	-709.99	7,487.39	0.00	0.00	0.00
Projection to TD									

Survey Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 101H
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:	101H	**North Reference:**	Grid
Wellbore:	OH / 62729	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Ensign 155)	**Database:**	USA Compass

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
8,494.00	8,473.91	-79.13	-408.51	Tie In
8,589.00	8,568.83	-75.34	-407.87	First Phoenix MWD Survey
16,437.00	9,193.74	7,386.75	-712.04	Final Phoenix MWD Survey
16,504.00	9,195.38	7,453.70	-709.99	Projection to TD

		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	16,400	22	4	16,174	69	4	16,040	23	4	15,847	36	4	15,676	27	4
	16,378	23	4	16,158	16	4	16,018	22	4	15,828	22	4	15,658	23	4
From Bottom to Top	16,355	22	4	16,142	15	4	15,996	23	4	15,806	26	4	15,635	27	4
	16,333	23	4	16,127	16	4	15,973	23	4	15,780	15	4	15,608	17	4
	16,310	22	4	16,111	16	4	15,950		4	15,765	20	4	15,591	23	4
	16,288	23	4	16,095	16	4	15,928	23	4	15,745	21	4	15,568	22	4
	16,265	22	3	16,079	16	3	15,905	22	3	15,724	21	3	15,546	23	3
	16,243		3	16,063		3	15,883		3	15,703		3	15,523		3
	Plug to Plu	92	30	Plug to Plu	56	30	Plug to Plu	76	30	Plug to Plu	76	30	Plug to Plu	77	30
	Frac Plug	16,425	Total Shots	Frac Plug	16,183	Total Shots	Frac Plug	16,049	Total Shots	Frac Plug	15,856	Total Shots	Frac Plug	15,685	Total Shots

		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	15,501	22	4	15,321	22	4	15,132	31	4	14,947	36	4	14,771	32	4
	15,478	22	4	15,298	22	4	15,118	18	4	14,932	16	4	14,759	23	4
From Bottom to Top	15,456	23	4	15,276	23	4	15,100	27	4	14,916	23	4	14,736	22	4
	15,433	22	4	15,253	22	4	15,073	18	4	14,893	22	4	14,714	23	4
	15,411	23	4	15,231	23	4	15,055	27	4	14,871	23	4	14,691	22	4
	15,388	22	4	15,208	21	4	15,028	22	4	14,848	22	4	14,669	23	4
	15,366	23	3	15,187	24	3	15,006	23	3	14,826	23	3	14,646	22	3
	15,343		3	15,163		3	14,983		3	14,803		3	14,624		3
	Plug to Plu	77	30	Plug to Plu	77	30	Plug to Plu	75	30	Plug to Plu	63	30	Plug to Plu	66	30
	Frac Plug	15,510	Total Shots	Frac Plug	15,330	Total Shots	Frac Plug	15,148	Total Shots	Frac Plug	14,956	Total Shots	Frac Plug	14,780	Total Shots

		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	14,593	31	4	14,381	63	4	14,241	23	4	14,061	23	4	13,882	22	4
	14,570	14	4	14,370	12	4	14,219	19	4	14,039	23	4	13,859	22	4
From Bottom to Top	14,556	24	4	14,358	18	4	14,200	26	4	14,016	22	4	13,837	23	4
	14,532	21	4	14,340	15	4	14,174	25	4	13,994	22	4	13,814	21	4
	14,511	22	4	14,325	16	4	14,149	20	4	13,972	23	4	13,793	24	4
	14,489	23	4	14,309	23	4	14,129	23	4	13,949	22	4	13,769	21	4
	14,466	22	3	14,286	22	3	14,106	22	3	13,927	23	3	13,748	24	3
	14,444		3	14,264		3	14,084		3	13,904		3	13,724		3
	Plug to Plu	70	30	Plug to Plu	50	30	Plug to Plu	76	30	Plug to Plu	76	30	Plug to Plu	77	30
	Frac Plug	14,602	Total Shots	Frac Plug	14,390	Total Shots	Frac Plug	14,250	Total Shots	Frac Plug	14,070	Total Shots	Frac Plug	13,891	Total Shots

		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	13,703	21	4	13,522	22	4	13,323	41	4	13,162	25	4	12,982	21	4
	13,679	20	4	13,499	19	4	13,302	12	4	13,143	26	4	12,960	23	4
From Bottom to Top	13,659	25	4	13,480	26	4	13,290	16	4	13,117	24	4	12,937	22	4
	13,634	19	4	13,454	19	4	13,274	22	4	13,093	21	4	12,915	23	4
	13,615	26	4	13,435	26	4	13,252	23	4	13,072	24	4	12,892	22	4
	13,589	19	4	13,409	22	4	13,229	22	4	13,048	21	4	12,870	23	4
	13,570	26	3	13,387	23	3	13,207	20	3	13,027	24	3	12,847	22	3
	13,544		3	13,364		3	13,187		3	13,003		3	12,825		3
	Plug to Plu	78	30	Plug to Plu	77	30	Plug to Plu	58	30	Plug to Plu	78	30	Plug to Plu	76	30
	Frac Plug	13,712	Total Shots	Frac Plug	13,531	Total Shots	Frac Plug	13,332	Total Shots	Frac Plug	13,171	Total Shots	Frac Plug	12,991	Total Shots

		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	12,802	23	4	12,623	22	4	12,429	36	4	12,253	32	4	12,083	28	4
	12,780	23	4	12,600	21	4	12,410	13	4	12,240	22	4	12,060	22	4
From Bottom to Top	12,757	22	4	12,579	24	4	12,397	22	4	12,218	23	4	12,038	23	4
	12,735	22	4	12,555	20	4	12,375	24	4	12,195	22	4	12,015	22	4
	12,713	23	4	12,535	25	4	12,351	21	4	12,173	23	4	11,993	23	4
	12,690	22	4	12,510	24	4	12,330	22	4	12,150	22	4	11,970	22	4
	12,668	23	3	12,486	21	3	12,308	23	3	12,126	17	3	11,948	23	3
	12,646		3	12,465		3	12,285		3	12,111		3	11,925		3
	Plug to Plu	76	30	Plug to Plu	77	30	Plug to Plu	63	30	Plug to Plu	67	30	Plug to Plu	77	30
	Frac Plug	12,811	Total Shots	Frac Plug	12,632	Total Shots	Frac Plug	12,438	Total Shots	Frac Plug	12,262	Total Shots	Frac Plug	12,092	Total Shots

		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	11,903	22	4	11,723	22	4	11,528	38	4	11,349	37	4	11,178	28	4
	11,880	22	4	11,700	22	4	11,515	19	4	11,335	19	4	11,161	23	4
From Bottom to Top	11,858	23	4	11,678	23	4	11,496	20	4	11,316	20	4	11,138	22	4
	11,835	22	4	11,655	25	4	11,476	25	4	11,296	23	4	11,116	23	4
	11,813	23	4	11,630	20	4	11,451	20	4	11,273	22	4	11,093	22	4
	11,790	22	4	11,610	25	4	11,431	24	4	11,251	23	4	11,071	23	4
	11,768	23	3	11,585	19	3	11,407	21	3	11,228	22	3	11,048	22	3
	11,745		3	11,566		3	11,386		3	11,206		3	11,026		3
	Plug to Plu	77	30	Plug to Plu	77	30	Plug to Plu	61	30	Plug to Plu	62	30	Plug to Plu	71	30
	Frac Plug	11,912	Total Shots	Frac Plug	11,732	Total Shots	Frac Plug	11,537	Total Shots	Frac Plug	11,358	Total Shots	Frac Plug	11,187	Total Shots

From Bottom to Top	[redacted]	Distance Between Perfs	Shots	[redacted]	Distance Between Perfs	Shots	[redacted]	Distance Between Perfs	Shots	[redacted]	Distance Between Perfs	Shots	[redacted]	Distance Between Perfs	Shots
	10,999	27	4	10,823	28	4	10,644	23	4	10,447	39	4	10,273	33	4
	10,981	23	4	10,797	19	4	10,621	22	4	10,431	12	4	10,255	16	4
	10,958	22	4	10,778	22	4	10,599	23	4	10,419	23	4	10,239	21	4
	10,936	23	4	10,756	22	4	10,576	21	4	10,396	22	4	10,218	24	4
	10,913	22	4	10,734	23	4	10,555	24	4	10,374	23	4	10,194	25	4
	10,891	23	4	10,711	22	4	10,531	20	4	10,351	22	4	10,169	20	4
	10,868	17	3	10,689	22	3	10,511	25	3	10,329	23	3	10,149	23	3
	10,851		3	10,667		3	10,486		3	10,306		3	10,126		3
	Plug to Plu	72	30	Plug to Plu	76	30	Plug to Plu	77	30	Plug to Plu	60	30	Plug to Plu	64	30
	Frac Plug	11,008	Total Shots	Frac Plug	10,832	Total Shots	Frac Plug	10,653	Total Shots	Frac Plug	10,456	Total Shots	Frac Plug	10,282	Total Shots

From Bottom to Top	[redacted]	Distance Between Perfs	Shots	[redacted]	Distance Between Perfs	Shots	[redacted]	Distance Between Perfs	Shots	[redacted]	Distance Between Perfs	Shots	Stage 40	Distance Between Perfs	Shots
	10,104	22	4	9,917	30	4	9,739	28	4	9,547	40	4		9407	
	10,081	22	4	9,900	27	4	9,722	27	4	9,535	16	4			
	10,059	23	4	9,873	18	4	9,695	18	4	9,519	22	4			
	10,036	22	4	9,855	26	4	9,677	26	4	9,497	23	4			
	10,014	23	4	9,829	19	4	9,651	19	4	9,474	22	4			
	9,991	19	4	9,810	26	4	9,632	26	4	9,452	23	4			
	9,972	25	3	9,784	17	3	9,606	19	3	9,429	22	3			
	9,947		3	9,767		3	9,587		3	9,407		3			
	Plug to Plu	77	30	Plug to Plu	77	30	Plug to Plu	77	30	Plug to Plu	59	30	Plug to Plu	8570	0
	Frac Plug	10,113	Total Shots	Frac Plug	9,932	Total Shots	Frac Plug	9,754	Total Shots	Frac Plug	9,556	Total Shots	Frac Plug	8,570	Total Shots

Eider Federal #101H

Perfs	7 1/2% Acid (Gal)	Sand (#)	Fluid (Gal)
1	1512	361987	288246
2	1512	362825	323064
3	1554	258659	342930
4	1596	304813	295176
5	1512	359352	306306
6	1554	349163	344610
7	1512	361272	400890
8	1512	358436	389172
9	1512	358217	365190
10	1512	360674	313152
11	1470	359163	314034
12	1512	361237	323064
13	1512	357479	311010
14	1512	356641	322476
15	1554	360999	325584
16	1596	357234	307146
17	1554	358836	301686
18	1722	361202	314160
19	1512	358666	302820
20	1596	360373	344358
21	1596	353806	303156
22	1638	356834	450408
23	1512	361077	299880
24	1512	360763	319074
25	1512	360946	294756
26	1512	359189	289128
27	1512	362422	303198
28	1512	360824	291984
29	1512	360034	299418
30	1512	359822	295008
31	1512	355215	390474
32	1512	358269	284634
33	1470	362119	298158
34	1512	359340	290766
35	1512	359664	290682
36	1470	361488	305550
37	1512	361671	299838
38	1554	352540	307440
39	1512	360606	283962
Totals	**59,724**	**11,137,350**	**12,432,588**