



COG Operating, LLC

Lea County, NM

Sec 13, T24-S, R34-E

Sombrero Federal Com 4H

Side Track #1

Design: Side Track #1

Survey Report - Geographic

16 January, 2017





Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Sombrero Federal Com 4H
Project:	Lea County, NM	TVD Reference:	Well @ 3503.5usft (Noram #21)
Site:	Sec 13, T24-S R34-E	MD Reference:	Well @ 3503.5usft (Noram #21)
Well:	Sombrero Federal Com 4H	North Reference:	Grid
Wellbore:	Side Track #1	Survey Calculation Method:	Minimum Curvature
Design:	Side Track #1	Database:	EDM5002

Project	Lea County, NM		
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	Sec 13, T24-S, R34-E		
Site Position:		Northing:	441,802.50 usft
From:	Map	Easting:	779,235.60 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 12' 41.070 N
		Longitude:	103° 25' 49.787 W
		Grid Convergence:	0.48 "

Well	Sombrero Federal Com 4H		
Well Position	+N-S	0.0 usft	Northing: 441,802.50 usft
	+E-W	0.0 usft	Easting: 779,235.60 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 12' 41.070 N
		Longitude:	103° 25' 49.787 W
		Ground Level:	3,474.5 usft

Wellbore	Side Track #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2015	12/27/2016	(°)
			6.94
			Dip Angle
			(°)
			60.08
			Field Strength
			(nT)
			47,994

Design	Side Track #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	5,300.0
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			359.51

Survey Program	Date 1/18/2017		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	5,300.0	Gyro (Pilot Hole)	Good_gyro
5,415.0	16,640.0	MWD Surveys (Side Track #1)	MWD default
			Description
			Good Gyro
			MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N-S	+E-W	Map	Map			
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting	Latitude	Longitude	
(usft)			(usft)			(usft)	(usft)			
0.0	0.00	0.00	0.0	0.0	0.0	441,802.50	779,235.60	32° 12' 41.070 N	103° 25' 49.787 W	
100.0	0.45	119.25	100.0	-0.2	0.3	441,802.31	779,235.94	32° 12' 41.068 N	103° 25' 49.783 W	
125.0	0.45	120.12	125.0	-0.3	0.5	441,802.21	779,236.11	32° 12' 41.067 N	103° 25' 49.781 W	
150.0	0.51	119.91	150.0	-0.4	0.7	441,802.11	779,236.29	32° 12' 41.066 N	103° 25' 49.779 W	
175.0	0.51	108.27	175.0	-0.5	0.9	441,802.02	779,236.49	32° 12' 41.065 N	103° 25' 49.777 W	
200.0	0.56	102.30	200.0	-0.5	1.1	441,801.95	779,236.72	32° 12' 41.064 N	103° 25' 49.774 W	
225.0	0.53	90.35	225.0	-0.6	1.4	441,801.93	779,236.95	32° 12' 41.064 N	103° 25' 49.772 W	
250.0	0.57	101.38	250.0	-0.6	1.6	441,801.90	779,237.19	32° 12' 41.064 N	103° 25' 49.769 W	
275.0	0.63	85.77	275.0	-0.6	1.9	441,801.89	779,237.45	32° 12' 41.063 N	103° 25' 49.766 W	
300.0	0.64	88.72	300.0	-0.6	2.1	441,801.90	779,237.73	32° 12' 41.064 N	103° 25' 49.763 W	
325.0	0.64	95.44	325.0	-0.6	2.4	441,801.89	779,238.01	32° 12' 41.063 N	103° 25' 49.759 W	

Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 13, T24-S, R34-E
Well: Sombrero Federal Com 4H
Wellbore: Side Track #1
Design: Side Track #1

Local Co-ordinate Reference: Well Sombrero Federal Com 4H
TVD Reference: Well @ 3503.5usft (Noram #21)
MD Reference: Well @ 3503.5usft (Noram #21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM5002

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
350.0	0.66	90.79	350.0	-0.6	2.7	441,801.88	779,238.29	32° 12' 41.063 N	103° 25' 49.756 W
375.0	0.63	99.79	375.0	-0.6	3.0	441,801.85	779,238.57	32° 12' 41.063 N	103° 25' 49.753 W
400.0	0.78	100.58	400.0	-0.7	3.3	441,801.80	779,238.87	32° 12' 41.062 N	103° 25' 49.749 W
425.0	0.88	92.43	425.0	-0.7	3.6	441,801.76	779,239.23	32° 12' 41.062 N	103° 25' 49.745 W
450.0	0.92	92.47	450.0	-0.8	4.0	441,801.74	779,239.62	32° 12' 41.062 N	103° 25' 49.741 W
475.0	1.06	85.26	475.0	-0.7	4.5	441,801.75	779,240.05	32° 12' 41.062 N	103° 25' 49.736 W
500.0	1.08	80.03	500.0	-0.7	4.9	441,801.81	779,240.52	32° 12' 41.062 N	103° 25' 49.730 W
525.0	1.15	81.26	525.0	-0.6	5.4	441,801.89	779,241.00	32° 12' 41.063 N	103° 25' 49.725 W
550.0	1.16	82.07	550.0	-0.5	5.9	441,801.96	779,241.49	32° 12' 41.064 N	103° 25' 49.719 W
575.0	1.31	79.67	575.0	-0.5	6.4	441,802.05	779,242.03	32° 12' 41.065 N	103° 25' 49.713 W
600.0	1.43	83.43	599.9	-0.4	7.0	441,802.14	779,242.62	32° 12' 41.065 N	103° 25' 49.706 W
625.0	1.46	82.78	624.9	-0.3	7.6	441,802.21	779,243.24	32° 12' 41.066 N	103° 25' 49.698 W
650.0	1.51	80.90	649.9	-0.2	8.3	441,802.30	779,243.88	32° 12' 41.067 N	103° 25' 49.691 W
675.0	1.50	82.67	674.9	-0.1	8.9	441,802.40	779,244.53	32° 12' 41.068 N	103° 25' 49.683 W
700.0	1.61	81.23	699.9	0.0	9.6	441,802.49	779,245.21	32° 12' 41.069 N	103° 25' 49.676 W
725.0	1.74	81.47	724.9	0.1	10.3	441,802.60	779,245.93	32° 12' 41.070 N	103° 25' 49.667 W
750.0	1.83	78.22	749.9	0.2	11.1	441,802.74	779,246.69	32° 12' 41.071 N	103° 25' 49.658 W
775.0	1.81	75.75	774.9	0.4	11.9	441,802.92	779,247.47	32° 12' 41.073 N	103° 25' 49.649 W
800.0	1.76	73.71	799.9	0.6	12.6	441,803.12	779,248.22	32° 12' 41.075 N	103° 25' 49.640 W
825.0	1.93	71.04	824.9	0.9	13.4	441,803.37	779,248.99	32° 12' 41.077 N	103° 25' 49.631 W
850.0	1.96	72.75	849.8	1.1	14.2	441,803.63	779,249.79	32° 12' 41.080 N	103° 25' 49.622 W
875.0	2.04	73.05	874.8	1.4	15.0	441,803.89	779,250.63	32° 12' 41.082 N	103° 25' 49.612 W
900.0	2.14	70.66	899.8	1.7	15.9	441,804.17	779,251.49	32° 12' 41.085 N	103° 25' 49.602 W
925.0	2.42	70.85	924.8	2.0	16.6	441,804.50	779,252.43	32° 12' 41.088 N	103° 25' 49.591 W
950.0	2.61	70.10	949.8	2.4	17.9	441,804.87	779,253.46	32° 12' 41.092 N	103° 25' 49.579 W
975.0	2.80	68.94	974.7	2.8	19.0	441,805.28	779,254.57	32° 12' 41.096 N	103° 25' 49.566 W
1,000.0	2.81	66.16	999.7	3.2	20.1	441,805.75	779,255.70	32° 12' 41.100 N	103° 25' 49.553 W
1,025.0	2.96	66.05	1,024.7	3.8	21.3	441,806.26	779,256.85	32° 12' 41.105 N	103° 25' 49.540 W
1,050.0	3.22	66.07	1,049.6	4.3	22.5	441,806.80	779,258.08	32° 12' 41.110 N	103° 25' 49.525 W
1,075.0	3.29	66.03	1,074.6	4.9	23.8	441,807.38	779,259.38	32° 12' 41.116 N	103° 25' 49.510 W
1,100.0	3.39	66.53	1,099.6	5.5	25.1	441,807.97	779,260.71	32° 12' 41.122 N	103° 25' 49.495 W
1,125.0	3.52	67.77	1,124.5	6.1	26.5	441,808.55	779,262.10	32° 12' 41.127 N	103° 25' 49.478 W
1,150.0	3.42	68.11	1,149.5	6.6	27.9	441,809.12	779,263.50	32° 12' 41.133 N	103° 25' 49.462 W
1,175.0	3.39	68.60	1,174.4	7.2	29.3	441,809.67	779,264.88	32° 12' 41.138 N	103° 25' 49.446 W
1,200.0	3.17	69.30	1,199.4	7.7	30.6	441,810.18	779,266.22	32° 12' 41.143 N	103° 25' 49.430 W
1,225.0	2.92	69.34	1,224.3	8.1	31.9	441,810.65	779,267.46	32° 12' 41.148 N	103° 25' 49.416 W
1,250.0	2.42	70.42	1,249.3	8.6	33.0	441,811.05	779,268.55	32° 12' 41.151 N	103° 25' 49.403 W
1,275.0	2.22	71.09	1,274.3	8.9	33.9	441,811.39	779,269.51	32° 12' 41.155 N	103° 25' 49.392 W
1,300.0	2.19	70.36	1,299.3	9.2	34.8	441,811.70	779,270.42	32° 12' 41.158 N	103° 25' 49.381 W
1,325.0	2.09	71.54	1,324.3	9.5	35.7	441,812.01	779,271.30	32° 12' 41.161 N	103° 25' 49.371 W
1,350.0	2.09	68.79	1,349.2	9.8	36.6	441,812.33	779,272.15	32° 12' 41.164 N	103° 25' 49.361 W
1,375.0	2.01	68.48	1,374.2	10.2	37.4	441,812.67	779,272.98	32° 12' 41.167 N	103° 25' 49.351 W
1,400.0	1.83	70.31	1,399.2	10.5	38.2	441,812.97	779,273.76	32° 12' 41.170 N	103° 25' 49.342 W
1,425.0	1.71	69.47	1,424.2	10.7	38.9	441,813.23	779,274.49	32° 12' 41.173 N	103° 25' 49.334 W
1,450.0	1.75	70.40	1,449.2	11.0	39.6	441,813.49	779,275.20	32° 12' 41.175 N	103° 25' 49.325 W
1,475.0	1.51	70.37	1,474.2	11.2	40.3	441,813.73	779,275.87	32° 12' 41.177 N	103° 25' 49.318 W
1,500.0	1.33	72.71	1,499.2	11.4	40.9	441,813.93	779,276.45	32° 12' 41.179 N	103° 25' 49.311 W
1,525.0	0.88	81.90	1,524.2	11.5	41.3	441,814.04	779,276.92	32° 12' 41.180 N	103° 25' 49.305 W
1,550.0	0.73	86.05	1,549.2	11.6	41.7	441,814.08	779,277.27	32° 12' 41.181 N	103° 25' 49.301 W
1,575.0	0.67	91.35	1,574.2	11.6	42.0	441,814.09	779,277.57	32° 12' 41.181 N	103° 25' 49.298 W
1,600.0	0.67	96.64	1,599.2	11.6	42.3	441,814.07	779,277.87	32° 12' 41.181 N	103° 25' 49.294 W
1,625.0	0.62	94.90	1,624.2	11.5	42.5	441,814.04	779,278.15	32° 12' 41.180 N	103° 25' 49.291 W
1,650.0	0.61	91.12	1,649.2	11.5	42.8	441,814.02	779,278.41	32° 12' 41.180 N	103° 25' 49.288 W
1,675.0	0.71	90.42	1,674.2	11.5	43.1	441,814.02	779,278.70	32° 12' 41.180 N	103° 25' 49.285 W
1,700.0	0.59	82.65	1,699.2	11.5	43.4	441,814.03	779,278.98	32° 12' 41.180 N	103° 25' 49.281 W



Survey Report - Geographic



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Well: Sombbrero Federal Com 4H
Wellbore: Side Track #1
Design: Side Track #1

Local Co-ordinate Reference: Well Sombbrero Federal Com 4H
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MD Reference: Well @ 3503.5usft (Noram #21)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM5002

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,725.0	0.52	87.96	1,724.2	11.6	43.6	441,814.06	779,279.22	32° 12' 41.180 N	103° 25' 49.279 W
1,750.0	0.57	91.93	1,749.2	11.6	43.9	441,814.05	779,279.46	32° 12' 41.180 N	103° 25' 49.276 W
1,775.0	0.52	96.30	1,774.1	11.5	44.1	441,814.04	779,279.70	32° 12' 41.180 N	103° 25' 49.273 W
1,800.0	0.44	84.37	1,799.1	11.5	44.3	441,814.04	779,279.91	32° 12' 41.180 N	103° 25' 49.271 W
1,825.0	0.40	101.62	1,824.1	11.5	44.5	441,814.03	779,280.09	32° 12' 41.180 N	103° 25' 49.268 W
1,850.0	0.32	106.37	1,849.1	11.5	44.6	441,813.99	779,280.24	32° 12' 41.180 N	103° 25' 49.267 W
1,875.0	0.33	109.32	1,874.1	11.4	44.8	441,813.95	779,280.38	32° 12' 41.179 N	103° 25' 49.265 W
1,900.0	0.26	103.30	1,899.1	11.4	44.9	441,813.91	779,280.50	32° 12' 41.179 N	103° 25' 49.264 W
1,925.0	0.28	83.80	1,924.1	11.4	45.0	441,813.90	779,280.62	32° 12' 41.179 N	103° 25' 49.262 W
1,950.0	0.20	73.49	1,949.1	11.4	45.1	441,813.92	779,280.72	32° 12' 41.179 N	103° 25' 49.261 W
1,975.0	0.15	89.44	1,974.1	11.4	45.2	441,813.93	779,280.79	32° 12' 41.179 N	103° 25' 49.260 W
2,000.0	0.28	37.67	1,999.1	11.5	45.3	441,813.98	779,280.86	32° 12' 41.179 N	103° 25' 49.259 W
2,025.0	0.02	75.96	2,024.1	11.5	45.3	441,814.03	779,280.90	32° 12' 41.180 N	103° 25' 49.259 W
2,050.0	0.04	299.56	2,049.1	11.5	45.3	441,814.04	779,280.90	32° 12' 41.180 N	103° 25' 49.259 W
2,075.0	0.04	146.73	2,074.1	11.5	45.3	441,814.04	779,280.90	32° 12' 41.180 N	103° 25' 49.259 W
2,100.0	0.05	131.58	2,099.1	11.5	45.3	441,814.02	779,280.91	32° 12' 41.180 N	103° 25' 49.259 W
2,125.0	0.06	60.00	2,124.1	11.5	45.3	441,814.02	779,280.93	32° 12' 41.180 N	103° 25' 49.259 W
2,150.0	0.05	30.00	2,149.1	11.5	45.3	441,814.04	779,280.95	32° 12' 41.180 N	103° 25' 49.258 W
2,175.0	0.10	11.86	2,174.1	11.6	45.4	441,814.07	779,280.96	32° 12' 41.180 N	103° 25' 49.258 W
2,200.0	0.19	332.90	2,199.1	11.6	45.3	441,814.13	779,280.94	32° 12' 41.181 N	103° 25' 49.259 W
2,225.0	0.10	344.60	2,224.1	11.7	45.3	441,814.18	779,280.92	32° 12' 41.181 N	103° 25' 49.259 W
2,250.0	0.09	293.64	2,249.1	11.7	45.3	441,814.21	779,280.89	32° 12' 41.182 N	103° 25' 49.259 W
2,275.0	0.12	304.66	2,274.1	11.7	45.3	441,814.23	779,280.85	32° 12' 41.182 N	103° 25' 49.260 W
2,300.0	0.10	353.71	2,299.1	11.8	45.2	441,814.27	779,280.83	32° 12' 41.182 N	103° 25' 49.260 W
2,325.0	0.13	344.63	2,324.1	11.8	45.2	441,814.32	779,280.82	32° 12' 41.183 N	103° 25' 49.260 W
2,350.0	0.20	357.09	2,349.1	11.9	45.2	441,814.39	779,280.81	32° 12' 41.184 N	103° 25' 49.260 W
2,375.0	0.19	342.74	2,374.1	12.0	45.2	441,814.47	779,280.80	32° 12' 41.184 N	103° 25' 49.260 W
2,400.0	0.26	343.35	2,399.1	12.1	45.2	441,814.57	779,280.77	32° 12' 41.185 N	103° 25' 49.260 W
2,425.0	0.23	310.73	2,424.1	12.2	45.1	441,814.66	779,280.71	32° 12' 41.186 N	103° 25' 49.261 W
2,450.0	0.18	296.45	2,449.1	12.2	45.0	441,814.71	779,280.64	32° 12' 41.187 N	103° 25' 49.262 W
2,475.0	0.07	283.56	2,474.1	12.2	45.0	441,814.73	779,280.59	32° 12' 41.187 N	103° 25' 49.263 W
2,500.0	0.11	288.92	2,499.1	12.2	45.0	441,814.74	779,280.55	32° 12' 41.187 N	103° 25' 49.263 W
2,525.0	0.12	337.46	2,524.1	12.3	44.9	441,814.77	779,280.52	32° 12' 41.187 N	103° 25' 49.263 W
2,550.0	0.11	324.26	2,549.1	12.3	44.9	441,814.81	779,280.50	32° 12' 41.188 N	103° 25' 49.264 W
2,575.0	0.15	1.54	2,574.1	12.4	44.9	441,814.87	779,280.48	32° 12' 41.188 N	103° 25' 49.264 W
2,600.0	0.18	319.06	2,599.1	12.4	44.9	441,814.93	779,280.46	32° 12' 41.189 N	103° 25' 49.264 W
2,625.0	0.18	303.42	2,624.1	12.5	44.8	441,814.98	779,280.40	32° 12' 41.189 N	103° 25' 49.265 W
2,650.0	0.16	301.58	2,649.1	12.5	44.7	441,815.02	779,280.34	32° 12' 41.190 N	103° 25' 49.265 W
2,675.0	0.09	273.70	2,674.1	12.5	44.7	441,815.04	779,280.29	32° 12' 41.190 N	103° 25' 49.266 W
2,700.0	0.18	224.31	2,699.1	12.5	44.6	441,815.01	779,280.24	32° 12' 41.190 N	103° 25' 49.267 W
2,725.0	0.01	264.45	2,724.1	12.5	44.6	441,814.98	779,280.21	32° 12' 41.189 N	103° 25' 49.267 W
2,750.0	0.07	19.65	2,749.1	12.5	44.6	441,815.00	779,280.21	32° 12' 41.190 N	103° 25' 49.267 W
2,775.0	0.12	16.61	2,774.1	12.5	44.6	441,815.04	779,280.23	32° 12' 41.190 N	103° 25' 49.267 W
2,800.0	0.08	339.85	2,799.1	12.6	44.6	441,815.08	779,280.23	32° 12' 41.190 N	103° 25' 49.267 W
2,825.0	0.08	48.62	2,824.1	12.6	44.6	441,815.11	779,280.24	32° 12' 41.191 N	103° 25' 49.267 W
2,850.0	0.10	33.69	2,849.1	12.6	44.7	441,815.14	779,280.26	32° 12' 41.191 N	103° 25' 49.266 W
2,875.0	0.13	36.26	2,874.1	12.7	44.7	441,815.18	779,280.29	32° 12' 41.191 N	103° 25' 49.266 W
2,900.0	0.21	103.38	2,899.1	12.7	44.8	441,815.19	779,280.35	32° 12' 41.191 N	103° 25' 49.265 W
2,925.0	0.33	88.10	2,924.1	12.7	44.9	441,815.18	779,280.47	32° 12' 41.191 N	103° 25' 49.264 W
2,950.0	0.34	87.71	2,949.1	12.7	45.0	441,815.19	779,280.61	32° 12' 41.191 N	103° 25' 49.262 W
2,975.0	0.41	77.93	2,974.1	12.7	45.2	441,815.21	779,280.77	32° 12' 41.192 N	103° 25' 49.260 W
3,000.0	0.29	65.71	2,999.1	12.8	45.3	441,815.25	779,280.92	32° 12' 41.192 N	103° 25' 49.259 W
3,025.0	0.26	74.44	3,024.1	12.8	45.4	441,815.29	779,281.03	32° 12' 41.192 N	103° 25' 49.257 W
3,050.0	0.30	72.88	3,049.1	12.8	45.6	441,815.33	779,281.15	32° 12' 41.193 N	103° 25' 49.256 W
3,075.0	0.28	78.04	3,074.1	12.9	45.7	441,815.36	779,281.27	32° 12' 41.193 N	103° 25' 49.255 W



Survey Report - Geographic



Company: COG Operating, LLC
Project: Lea County, NM
Site: Sec 13, T24-S, R34-E
Well: Sombrero Federal Com 4H
Wellbore: Side Track #1
Design: Side Track #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well Sombrero Federal Com 4H
Well @ 3503 5usft (Noram #21)
Well @ 3503 5usft (Noram #21)
Grid
Minimum Curvature
EDM5002

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
3,100.0	0.34	72.00	3,099.1	12.9	45.8	441,815.40	779,281.40	32° 12' 41.193 N	103° 25' 49.253 W
3,125.0	0.35	68.68	3,124.1	12.9	45.9	441,815.45	779,281.54	32° 12' 41.194 N	103° 25' 49.251 W
3,150.0	0.35	64.32	3,149.1	13.0	46.1	441,815.51	779,281.68	32° 12' 41.194 N	103° 25' 49.250 W
3,175.0	0.26	68.45	3,174.1	13.1	46.2	441,815.56	779,281.81	32° 12' 41.195 N	103° 25' 49.248 W
3,200.0	0.44	52.58	3,199.1	13.1	46.3	441,815.64	779,281.93	32° 12' 41.196 N	103° 25' 49.247 W
3,225.0	0.52	40.39	3,224.1	13.3	46.5	441,815.79	779,282.08	32° 12' 41.197 N	103° 25' 49.245 W
3,250.0	0.33	34.41	3,249.1	13.4	46.6	441,815.93	779,282.20	32° 12' 41.199 N	103° 25' 49.244 W
3,275.0	0.29	63.38	3,274.1	13.5	46.7	441,816.02	779,282.30	32° 12' 41.199 N	103° 25' 49.243 W
3,300.0	0.32	61.19	3,299.1	13.6	46.8	441,816.08	779,282.41	32° 12' 41.200 N	103° 25' 49.241 W
3,325.0	0.33	36.34	3,324.1	13.7	46.9	441,816.17	779,282.52	32° 12' 41.201 N	103° 25' 49.240 W
3,350.0	0.22	41.24	3,349.1	13.8	47.0	441,816.27	779,282.59	32° 12' 41.202 N	103° 25' 49.239 W
3,375.0	0.23	51.31	3,374.1	13.8	47.1	441,816.33	779,282.66	32° 12' 41.203 N	103° 25' 49.238 W
3,400.0	0.34	53.52	3,399.1	13.9	47.2	441,816.41	779,282.76	32° 12' 41.203 N	103° 25' 49.237 W
3,425.0	0.49	51.19	3,424.1	14.0	47.3	441,816.52	779,282.90	32° 12' 41.204 N	103° 25' 49.235 W
3,450.0	0.44	21.13	3,449.1	14.2	47.4	441,816.68	779,283.02	32° 12' 41.206 N	103° 25' 49.234 W
3,475.0	0.25	17.44	3,474.1	14.3	47.5	441,816.82	779,283.07	32° 12' 41.207 N	103° 25' 49.233 W
3,500.0	0.29	22.96	3,499.1	14.4	47.5	441,816.93	779,283.11	32° 12' 41.208 N	103° 25' 49.233 W
3,525.0	0.34	29.26	3,524.1	14.6	47.6	441,817.05	779,283.17	32° 12' 41.210 N	103° 25' 49.232 W
3,550.0	0.35	35.02	3,549.1	14.7	47.7	441,817.18	779,283.25	32° 12' 41.211 N	103° 25' 49.231 W
3,575.0	0.36	28.94	3,574.1	14.8	47.7	441,817.31	779,283.34	32° 12' 41.212 N	103° 25' 49.230 W
3,600.0	0.38	32.88	3,599.1	14.9	47.8	441,817.45	779,283.42	32° 12' 41.214 N	103° 25' 49.229 W
3,625.0	0.45	29.69	3,624.1	15.1	47.9	441,817.60	779,283.51	32° 12' 41.215 N	103° 25' 49.228 W
3,650.0	0.43	14.86	3,649.1	15.3	48.0	441,817.78	779,283.59	32° 12' 41.217 N	103° 25' 49.227 W
3,675.0	0.41	27.44	3,674.1	15.5	48.1	441,817.95	779,283.65	32° 12' 41.218 N	103° 25' 49.227 W
3,700.0	0.34	29.05	3,699.1	15.6	48.1	441,818.09	779,283.73	32° 12' 41.220 N	103° 25' 49.226 W
3,725.0	0.32	34.09	3,724.1	15.7	48.2	441,818.22	779,283.80	32° 12' 41.221 N	103° 25' 49.225 W
3,750.0	0.47	33.85	3,749.1	15.9	48.3	441,818.36	779,283.90	32° 12' 41.223 N	103° 25' 49.224 W
3,775.0	0.55	35.68	3,774.1	16.0	48.4	441,818.54	779,284.03	32° 12' 41.224 N	103° 25' 49.222 W
3,800.0	0.73	30.73	3,799.1	16.3	48.6	441,818.78	779,284.18	32° 12' 41.227 N	103° 25' 49.220 W
3,825.0	0.68	32.03	3,824.1	16.5	48.7	441,819.04	779,284.34	32° 12' 41.229 N	103° 25' 49.218 W
3,850.0	0.75	23.26	3,849.1	16.8	48.9	441,819.32	779,284.48	32° 12' 41.232 N	103° 25' 49.217 W
3,875.0	0.76	23.83	3,874.1	17.1	49.0	441,819.62	779,284.61	32° 12' 41.235 N	103° 25' 49.215 W
3,900.0	0.80	30.22	3,899.1	17.4	49.2	441,819.92	779,284.77	32° 12' 41.238 N	103° 25' 49.213 W
3,925.0	0.73	27.35	3,924.1	17.7	49.3	441,820.21	779,284.93	32° 12' 41.241 N	103° 25' 49.212 W
3,950.0	0.60	29.42	3,949.1	18.0	49.5	441,820.47	779,285.07	32° 12' 41.243 N	103° 25' 49.210 W
3,975.0	0.62	40.10	3,974.1	18.2	49.6	441,820.69	779,285.22	32° 12' 41.245 N	103° 25' 49.208 W
4,000.0	0.56	51.75	3,999.1	18.4	49.8	441,820.86	779,285.40	32° 12' 41.247 N	103° 25' 49.206 W
4,025.0	0.64	63.19	4,024.1	18.5	50.0	441,821.00	779,285.62	32° 12' 41.249 N	103° 25' 49.203 W
4,050.0	0.44	68.50	4,049.1	18.6	50.2	441,821.10	779,285.84	32° 12' 41.249 N	103° 25' 49.201 W
4,075.0	0.35	73.16	4,074.1	18.7	50.4	441,821.16	779,286.00	32° 12' 41.250 N	103° 25' 49.199 W
4,100.0	0.44	71.06	4,099.1	18.7	50.6	441,821.21	779,286.16	32° 12' 41.251 N	103° 25' 49.197 W
4,125.0	0.43	73.79	4,124.1	18.8	50.7	441,821.27	779,286.34	32° 12' 41.251 N	103° 25' 49.195 W
4,150.0	0.38	85.25	4,149.1	18.8	50.9	441,821.30	779,286.52	32° 12' 41.251 N	103° 25' 49.193 W
4,175.0	0.42	94.12	4,174.1	18.8	51.1	441,821.30	779,286.69	32° 12' 41.251 N	103° 25' 49.191 W
4,200.0	0.45	92.48	4,199.1	18.8	51.3	441,821.29	779,286.88	32° 12' 41.251 N	103° 25' 49.189 W
4,225.0	0.47	79.58	4,224.1	18.8	51.5	441,821.31	779,287.08	32° 12' 41.251 N	103° 25' 49.186 W
4,250.0	0.40	85.77	4,249.1	18.8	51.7	441,821.33	779,287.27	32° 12' 41.252 N	103° 25' 49.184 W
4,275.0	0.40	101.25	4,274.1	18.8	51.8	441,821.32	779,287.44	32° 12' 41.252 N	103° 25' 49.182 W
4,300.0	0.48	115.74	4,299.1	18.8	52.0	441,821.26	779,287.62	32° 12' 41.251 N	103° 25' 49.180 W
4,325.0	0.56	121.21	4,324.1	18.6	52.2	441,821.15	779,287.82	32° 12' 41.250 N	103° 25' 49.178 W
4,350.0	0.65	117.02	4,349.1	18.5	52.5	441,821.02	779,288.05	32° 12' 41.249 N	103° 25' 49.175 W
4,375.0	0.83	122.69	4,374.1	18.4	52.7	441,820.86	779,288.33	32° 12' 41.247 N	103° 25' 49.172 W
4,400.0	0.78	112.48	4,399.1	18.2	53.0	441,820.70	779,288.64	32° 12' 41.245 N	103° 25' 49.168 W
4,425.0	1.01	118.71	4,424.1	18.0	53.4	441,820.53	779,288.99	32° 12' 41.244 N	103° 25' 49.164 W
4,450.0	1.15	120.28	4,449.1	17.8	53.8	441,820.29	779,289.40	32° 12' 41.241 N	103° 25' 49.160 W

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Sombrero Federal Com 4H
Project:	Lea County, NM	TVD Reference:	Well @ 3503.5usft (Noram #21)
Site:	Sec 13, T24-S, R34-E	MD Reference:	Well @ 3503.5usft (Noram #21)
Well:	Sombrero Federal Com 4H	North Reference:	Grid
Wellbore:	Side Track #1	Survey Calculation Method:	Minimum Curvature
Design:	Side Track #1	Database:	EDM5002

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,475.0	1.38	122.06	4,474.1	17.5	54.3	441,820.01	779,289.87	32° 12' 41.238 N	103° 25' 49.154 W
4,500.0	1.50	124.35	4,499.1	17.2	54.8	441,819.66	779,290.39	32° 12' 41.235 N	103° 25' 49.148 W
4,525.0	1.58	124.43	4,524.1	16.8	55.4	441,819.28	779,290.95	32° 12' 41.231 N	103° 25' 49.142 W
4,550.0	1.56	122.23	4,549.1	16.4	55.9	441,818.91	779,291.52	32° 12' 41.227 N	103° 25' 49.135 W
4,575.0	1.71	123.85	4,574.0	16.0	56.5	441,818.52	779,292.12	32° 12' 41.223 N	103° 25' 49.128 W
4,600.0	1.81	123.78	4,599.0	15.6	57.2	441,818.09	779,292.76	32° 12' 41.219 N	103° 25' 49.121 W
4,625.0	1.85	121.86	4,624.0	15.2	57.8	441,817.66	779,293.43	32° 12' 41.215 N	103° 25' 49.113 W
4,650.0	1.97	122.48	4,649.0	14.7	58.5	441,817.21	779,294.13	32° 12' 41.210 N	103° 25' 49.105 W
4,675.0	1.95	123.24	4,674.0	14.3	59.3	441,816.75	779,294.85	32° 12' 41.206 N	103° 25' 49.096 W
4,700.0	2.01	124.29	4,699.0	13.8	60.0	441,816.27	779,295.57	32° 12' 41.201 N	103° 25' 49.088 W
4,725.0	1.84	129.44	4,724.0	13.3	60.6	441,815.77	779,296.24	32° 12' 41.196 N	103° 25' 49.080 W
4,750.0	1.53	134.71	4,749.0	12.8	61.2	441,815.28	779,296.79	32° 12' 41.191 N	103° 25' 49.074 W
4,775.0	1.22	139.39	4,773.9	12.3	61.6	441,814.84	779,297.20	32° 12' 41.187 N	103° 25' 49.069 W
4,800.0	1.18	135.57	4,798.9	12.0	62.0	441,814.46	779,297.55	32° 12' 41.183 N	103° 25' 49.065 W
4,825.0	1.26	139.12	4,823.9	11.6	62.3	441,814.06	779,297.91	32° 12' 41.179 N	103° 25' 49.061 W
4,850.0	1.28	130.71	4,848.9	11.2	62.7	441,813.67	779,298.30	32° 12' 41.175 N	103° 25' 49.056 W
4,875.0	1.19	126.16	4,873.9	10.8	63.1	441,813.34	779,298.72	32° 12' 41.172 N	103° 25' 49.052 W
4,900.0	1.27	124.39	4,898.9	10.5	63.6	441,813.03	779,299.16	32° 12' 41.169 N	103° 25' 49.047 W
4,925.0	1.39	112.38	4,923.9	10.3	64.1	441,812.76	779,299.67	32° 12' 41.166 N	103° 25' 49.041 W
4,950.0	1.27	112.67	4,948.9	10.0	64.6	441,812.53	779,300.21	32° 12' 41.164 N	103° 25' 49.034 W
4,975.0	1.38	109.18	4,973.9	9.8	65.2	441,812.33	779,300.75	32° 12' 41.161 N	103° 25' 49.028 W
5,000.0	1.21	107.33	4,998.9	9.7	65.7	441,812.15	779,301.28	32° 12' 41.160 N	103° 25' 49.022 W
5,025.0	0.96	104.42	5,023.9	9.5	66.1	441,812.02	779,301.74	32° 12' 41.158 N	103° 25' 49.017 W
5,050.0	0.72	113.20	5,048.9	9.4	66.5	441,811.91	779,302.09	32° 12' 41.157 N	103° 25' 49.013 W
5,075.0	0.64	100.79	5,073.9	9.3	66.8	441,811.82	779,302.37	32° 12' 41.156 N	103° 25' 49.009 W
5,100.0	0.70	105.09	5,098.9	9.3	67.1	441,811.75	779,302.65	32° 12' 41.156 N	103° 25' 49.006 W
5,125.0	0.75	110.60	5,123.9	9.2	67.4	441,811.66	779,302.95	32° 12' 41.155 N	103° 25' 49.003 W
5,150.0	0.72	103.52	5,148.9	9.1	67.7	441,811.56	779,303.26	32° 12' 41.154 N	103° 25' 48.999 W
5,175.0	0.87	108.97	5,173.9	9.0	68.0	441,811.46	779,303.59	32° 12' 41.153 N	103° 25' 48.995 W
5,200.0	0.93	107.82	5,198.9	8.8	68.4	441,811.34	779,303.96	32° 12' 41.151 N	103° 25' 48.991 W
5,225.0	1.01	107.26	5,223.9	8.7	68.8	441,811.21	779,304.37	32° 12' 41.150 N	103° 25' 48.986 W
5,250.0	1.06	107.48	5,248.9	8.6	69.2	441,811.08	779,304.80	32° 12' 41.149 N	103° 25' 48.981 W
5,275.0	1.05	107.54	5,273.9	8.4	69.6	441,810.94	779,305.24	32° 12' 41.147 N	103° 25' 48.976 W
5,300.0	1.01	105.37	5,298.9	8.3	70.1	441,810.81	779,305.67	32° 12' 41.146 N	103° 25' 48.971 W
Tie In @ 5300' MD / TVD									
5,415.0	1.10	117.90	5,413.8	7.5	72.0	441,810.03	779,307.62	32° 12' 41.138 N	103° 25' 48.948 W
5,510.0	1.20	133.60	5,508.8	6.4	73.5	441,808.91	779,309.15	32° 12' 41.127 N	103° 25' 48.931 W
5,605.0	1.10	131.10	5,603.8	5.1	75.0	441,807.63	779,310.55	32° 12' 41.114 N	103° 25' 48.914 W
5,700.0	0.40	136.20	5,698.8	4.3	75.9	441,806.79	779,311.47	32° 12' 41.106 N	103° 25' 48.904 W
5,795.0	0.80	299.10	5,793.8	4.4	75.5	441,806.87	779,311.12	32° 12' 41.107 N	103° 25' 48.908 W
5,891.0	1.50	307.60	5,889.8	5.5	73.9	441,807.96	779,309.54	32° 12' 41.118 N	103° 25' 48.926 W
5,985.0	1.60	307.20	5,983.7	7.0	71.9	441,809.51	779,307.52	32° 12' 41.133 N	103° 25' 48.950 W
6,080.0	1.80	304.40	6,078.7	8.7	69.6	441,811.15	779,305.23	32° 12' 41.149 N	103° 25' 48.976 W
6,175.0	1.90	313.90	6,173.6	10.6	67.3	441,813.09	779,302.87	32° 12' 41.169 N	103° 25' 49.003 W
6,269.0	2.10	309.20	6,267.6	12.8	64.8	441,815.26	779,300.41	32° 12' 41.190 N	103° 25' 49.032 W
6,364.0	2.30	310.40	6,362.5	15.1	62.0	441,817.59	779,297.61	32° 12' 41.214 N	103° 25' 49.064 W
6,458.0	2.30	303.50	6,456.4	17.4	59.0	441,819.86	779,294.60	32° 12' 41.236 N	103° 25' 49.099 W
6,553.0	1.30	298.60	6,551.4	18.9	58.5	441,821.42	779,292.06	32° 12' 41.252 N	103° 25' 49.128 W
6,648.0	1.40	309.00	6,646.4	20.2	54.6	441,822.67	779,290.22	32° 12' 41.265 N	103° 25' 49.150 W
6,743.0	1.30	311.30	6,741.3	21.6	52.9	441,824.11	779,288.50	32° 12' 41.279 N	103° 25' 49.170 W
6,838.0	1.20	302.00	6,836.3	22.9	51.3	441,825.35	779,286.85	32° 12' 41.291 N	103° 25' 49.189 W
6,933.0	1.40	312.00	6,931.3	24.2	49.5	441,826.65	779,285.14	32° 12' 41.304 N	103° 25' 49.208 W
7,028.0	1.50	312.30	7,026.3	25.8	47.8	441,828.27	779,283.36	32° 12' 41.321 N	103° 25' 49.229 W
7,123.0	1.50	307.90	7,121.2	27.4	45.9	441,829.87	779,281.46	32° 12' 41.337 N	103° 25' 49.251 W
7,218.0	1.70	314.30	7,216.2	29.1	43.9	441,831.62	779,279.47	32° 12' 41.354 N	103° 25' 49.274 W



Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Sombrero Federal Com 4H
Project:	Lea County, NM	TVD Reference:	Well @ 3503.5usft (Noram #21)
Site:	Sec 13, T24-S, R34-E	MD Reference:	Well @ 3503.5usft (Noram #21)
Well:	Sombrero Federal Com 4H	North Reference:	Grid
Wellbore:	Side Track #1	Survey Calculation Method:	Minimum Curvature
Design:	Side Track #1	Database:	EDM5002

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,313.0	1.00	324.30	7,311.2	30.8	42.4	441,833.27	779,277.98	32° 12' 41.371 N	103° 25' 49.291 W
7,408.0	1.00	306.50	7,406.1	31.9	41.2	441,834.44	779,276.83	32° 12' 41.382 N	103° 25' 49.304 W
7,503.0	1.20	317.80	7,501.1	33.2	39.9	441,835.67	779,275.50	32° 12' 41.395 N	103° 25' 49.320 W
7,598.0	1.10	312.30	7,596.1	34.5	38.6	441,837.02	779,274.15	32° 12' 41.408 N	103° 25' 49.335 W
7,693.0	1.10	323.40	7,691.1	35.9	37.3	441,838.37	779,272.93	32° 12' 41.421 N	103° 25' 49.349 W
7,788.0	1.10	315.30	7,786.1	37.2	36.2	441,839.75	779,271.75	32° 12' 41.435 N	103° 25' 49.363 W
7,883.0	0.40	313.40	7,881.1	38.1	35.3	441,840.62	779,270.87	32° 12' 41.444 N	103° 25' 49.373 W
7,978.0	0.30	302.30	7,976.1	38.5	34.8	441,840.98	779,270.42	32° 12' 41.448 N	103° 25' 49.378 W
8,073.0	0.80	232.90	8,071.1	38.2	34.1	441,840.72	779,269.68	32° 12' 41.445 N	103° 25' 49.387 W
8,168.0	0.80	291.90	8,166.1	38.1	32.9	441,840.56	779,268.53	32° 12' 41.444 N	103° 25' 49.400 W
8,262.0	1.10	303.40	8,260.0	38.8	31.6	441,841.31	779,267.17	32° 12' 41.451 N	103° 25' 49.416 W
8,356.0	1.10	306.70	8,354.0	39.8	30.1	441,842.34	779,265.69	32° 12' 41.461 N	103° 25' 49.433 W
8,452.0	0.80	305.30	8,450.0	40.8	28.8	441,843.28	779,264.41	32° 12' 41.471 N	103° 25' 49.448 W
8,546.0	0.80	322.40	8,544.0	41.7	27.9	441,844.18	779,263.47	32° 12' 41.480 N	103° 25' 49.459 W
8,641.0	1.10	322.70	8,639.0	42.9	26.9	441,845.43	779,262.51	32° 12' 41.492 N	103° 25' 49.470 W
8,735.0	0.70	338.70	8,733.0	44.2	26.2	441,846.68	779,261.76	32° 12' 41.505 N	103° 25' 49.479 W
8,829.0	1.00	345.70	8,827.0	45.5	25.8	441,848.01	779,261.35	32° 12' 41.518 N	103° 25' 49.483 W
8,923.0	0.30	270.50	8,921.0	46.3	25.3	441,848.81	779,260.90	32° 12' 41.526 N	103° 25' 49.488 W
9,017.0	0.40	270.80	9,015.0	46.3	24.7	441,848.82	779,260.32	32° 12' 41.526 N	103° 25' 49.495 W
9,124.0	5.10	336.80	9,121.8	50.7	22.5	441,853.19	779,258.08	32° 12' 41.569 N	103° 25' 49.521 W
9,171.0	8.80	341.90	9,168.5	56.0	20.5	441,858.53	779,256.14	32° 12' 41.622 N	103° 25' 49.543 W
9,219.0	11.90	343.10	9,215.7	64.3	18.0	441,866.76	779,253.56	32° 12' 41.704 N	103° 25' 49.572 W
9,266.0	14.90	343.10	9,261.4	74.7	14.8	441,877.18	779,250.39	32° 12' 41.807 N	103° 25' 49.608 W
9,314.0	17.40	345.20	9,307.5	87.5	11.2	441,890.03	779,246.76	32° 12' 41.935 N	103° 25' 49.649 W
9,345.0	19.20	348.70	9,336.9	97.0	9.0	441,899.51	779,244.58	32° 12' 42.029 N	103° 25' 49.673 W
9,377.0	20.90	351.70	9,367.0	107.8	7.1	441,910.32	779,242.72	32° 12' 42.136 N	103° 25' 49.694 W
9,409.0	23.00	354.00	9,396.7	119.7	5.6	441,922.18	779,241.25	32° 12' 42.253 N	103° 25' 49.710 W
9,440.0	27.40	356.30	9,424.7	132.8	4.6	441,935.33	779,240.15	32° 12' 42.384 N	103° 25' 49.721 W
9,472.0	33.00	356.80	9,452.4	148.9	3.6	441,951.39	779,239.19	32° 12' 42.543 N	103° 25' 49.731 W
9,504.0	37.80	356.80	9,478.4	167.4	2.6	441,969.90	779,238.16	32° 12' 42.726 N	103° 25' 49.741 W
9,551.0	46.50	357.30	9,513.2	198.9	0.9	442,001.37	779,236.55	32° 12' 43.037 N	103° 25' 49.757 W
9,599.0	55.20	359.10	9,543.5	236.0	-0.2	442,038.53	779,235.41	32° 12' 43.405 N	103° 25' 49.766 W
9,646.0	62.80	2.30	9,567.7	276.3	0.4	442,078.78	779,235.95	32° 12' 43.803 N	103° 25' 49.756 W
9,694.0	71.80	2.30	9,588.2	320.5	2.1	442,122.98	779,237.73	32° 12' 44.241 N	103° 25' 49.731 W
9,738.0	78.80	1.00	9,597.4	363.0	3.3	442,165.49	779,238.94	32° 12' 44.661 N	103° 25' 49.713 W
9,786.0	81.30	0.70	9,605.7	410.3	4.0	442,212.76	779,239.64	32° 12' 45.129 N	103° 25' 49.700 W
9,833.0	83.00	0.50	9,612.1	456.8	4.5	442,259.32	779,240.13	32° 12' 45.590 N	103° 25' 49.690 W
9,881.0	87.00	1.00	9,616.3	504.6	5.2	442,307.12	779,240.76	32° 12' 46.062 N	103° 25' 49.678 W
9,913.0	91.10	1.20	9,616.8	536.6	5.8	442,339.11	779,241.37	32° 12' 46.379 N	103° 25' 49.668 W
9,977.0	91.70	1.40	9,615.2	600.6	7.2	442,403.07	779,242.82	32° 12' 47.012 N	103° 25' 49.645 W
10,072.0	93.10	1.50	9,611.3	695.5	9.6	442,497.95	779,245.22	32° 12' 47.950 N	103° 25' 49.607 W
10,170.0	92.40	0.30	9,606.6	793.3	11.2	442,595.83	779,246.76	32° 12' 48.919 N	103° 25' 49.580 W
10,265.0	91.00	0.00	9,603.7	888.3	11.4	442,690.78	779,247.01	32° 12' 49.858 N	103° 25' 49.568 W
10,360.0	91.80	359.10	9,601.4	983.2	10.7	442,785.75	779,246.26	32° 12' 50.798 N	103° 25' 49.567 W
10,454.0	90.80	359.80	9,599.3	1,077.2	9.8	442,879.72	779,245.36	32° 12' 51.728 N	103° 25' 49.568 W
10,549.0	92.10	0.10	9,598.9	1,172.2	9.7	442,974.69	779,245.28	32° 12' 52.668 N	103° 25' 49.560 W
10,643.0	89.90	0.10	9,595.2	1,266.2	9.8	443,068.67	779,245.44	32° 12' 53.598 N	103° 25' 49.549 W
10,737.0	90.80	0.10	9,594.7	1,360.2	10.0	443,162.66	779,245.61	32° 12' 54.528 N	103° 25' 49.538 W
10,832.0	92.00	0.00	9,592.3	1,455.1	10.1	443,257.63	779,245.69	32° 12' 55.468 N	103° 25' 49.528 W
10,926.0	90.30	359.60	9,590.5	1,549.1	9.8	443,351.61	779,245.36	32° 12' 56.397 N	103° 25' 49.522 W
11,020.0	91.20	359.10	9,589.2	1,643.1	8.7	443,445.59	779,244.30	32° 12' 57.328 N	103° 25' 49.525 W
11,114.0	92.10	358.90	9,586.5	1,737.0	7.1	443,539.54	779,242.66	32° 12' 58.257 N	103° 25' 49.535 W
11,209.0	91.90	359.60	9,583.2	1,832.0	5.8	443,634.47	779,241.41	32° 12' 59.197 N	103° 25' 49.541 W
11,303.0	92.20	359.30	9,579.8	1,925.9	4.9	443,728.41	779,240.51	32° 13' 0.126 N	103° 25' 49.542 W
11,397.0	89.40	0.10	9,578.5	2,019.9	4.4	443,822.39	779,240.02	32° 13' 1.056 N	103° 25' 49.538 W

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Sombrero Federal Com 4H
Project:	Lea County, NM	TVD Reference:	Well @ 3503.5usft (Noram #21)
Site:	Sec 13, T24-S, R34-E	MD Reference:	Well @ 3503.5usft (Noram #21)
Well:	Sombrero Federal Com 4H	North Reference:	Grid
Wellbore:	Side Track #1	Survey Calculation Method:	Minimum Curvature
Design:	Side Track #1	Database:	EDM5002

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
11,492.0	91.20	0.30	9,578.0	2,114.9	4.8	443,917.38	779,240.35	32° 13' 1.996 N	103° 25' 49.525 W	
11,587.0	92.60	0.70	9,574.9	2,209.8	5.6	444,012.32	779,241.18	32° 13' 2.936 N	103° 25' 49.506 W	
11,681.0	93.90	0.70	9,569.6	2,303.7	6.7	444,106.16	779,242.33	32° 13' 3.864 N	103° 25' 49.484 W	
11,775.0	92.90	359.10	9,564.0	2,397.5	6.6	444,199.99	779,242.16	32° 13' 4.793 N	103° 25' 49.477 W	
11,870.0	92.00	356.60	9,559.9	2,492.3	3.0	444,294.83	779,238.60	32° 13' 5.731 N	103° 25' 49.509 W	
11,965.0	93.40	357.00	9,555.4	2,587.1	-2.3	444,389.58	779,233.30	32° 13' 6.669 N	103° 25' 49.561 W	
12,060.0	93.60	357.30	9,549.6	2,681.8	-7.0	444,484.28	779,228.59	32° 13' 7.607 N	103° 25' 49.607 W	
12,154.0	93.70	357.00	9,543.7	2,775.5	-11.7	444,577.97	779,223.92	32° 13' 8.534 N	103° 25' 49.652 W	
12,249.0	94.00	357.90	9,537.3	2,870.2	-15.9	444,672.66	779,219.71	32° 13' 9.472 N	103° 25' 49.692 W	
12,344.0	92.90	359.40	9,531.6	2,965.0	-18.1	444,767.46	779,217.47	32° 13' 10.410 N	103° 25' 49.708 W	
12,438.0	93.40	358.90	9,526.4	3,058.8	-19.5	444,861.31	779,216.08	32° 13' 11.339 N	103° 25' 49.715 W	
12,533.0	91.90	359.80	9,522.0	3,153.7	-20.6	444,956.20	779,215.01	32° 13' 12.278 N	103° 25' 49.719 W	
12,628.0	92.00	359.60	9,518.8	3,248.6	-21.1	445,051.14	779,214.51	32° 13' 13.217 N	103° 25' 49.715 W	
12,723.0	91.80	359.60	9,515.6	3,343.6	-21.8	445,146.09	779,213.85	32° 13' 14.157 N	103° 25' 49.714 W	
12,818.0	91.70	0.00	9,512.7	3,438.5	-22.1	445,241.04	779,213.51	32° 13' 15.096 N	103° 25' 49.708 W	
12,913.0	91.10	359.40	9,510.4	3,533.5	-22.6	445,336.01	779,213.02	32° 13' 16.036 N	103° 25' 49.705 W	
13,007.0	92.90	359.80	9,507.1	3,627.4	-23.2	445,429.95	779,212.36	32° 13' 16.966 N	103° 25' 49.703 W	
13,102.0	94.30	359.80	9,501.2	3,722.3	-23.6	445,524.76	779,212.03	32° 13' 17.904 N	103° 25' 49.698 W	
13,197.0	94.20	359.40	9,494.1	3,817.0	-24.2	445,619.49	779,211.37	32° 13' 18.841 N	103° 25' 49.696 W	
13,291.0	94.60	358.90	9,486.9	3,910.7	-25.6	445,713.21	779,209.98	32° 13' 19.769 N	103° 25' 49.703 W	
13,387.0	93.40	0.50	9,480.2	4,006.5	-26.1	445,808.97	779,209.48	32° 13' 20.716 N	103° 25' 49.700 W	
13,481.0	93.20	0.00	9,474.8	4,100.3	-25.7	445,902.81	779,209.89	32° 13' 21.645 N	103° 25' 49.686 W	
13,576.0	93.40	0.10	9,469.3	4,195.2	-25.6	445,997.65	779,209.97	32° 13' 22.583 N	103° 25' 49.675 W	
13,671.0	90.00	359.40	9,466.5	4,290.1	-26.0	446,092.59	779,209.56	32° 13' 23.523 N	103° 25' 49.671 W	
13,765.0	88.50	359.10	9,467.7	4,384.1	-27.3	446,186.57	779,208.33	32° 13' 24.453 N	103° 25' 49.676 W	
13,859.0	90.50	0.00	9,468.6	4,478.1	-28.0	446,280.56	779,207.59	32° 13' 25.383 N	103° 25' 49.675 W	
13,954.0	94.00	0.00	9,464.8	4,573.0	-28.0	446,375.47	779,207.59	32° 13' 26.322 N	103° 25' 49.666 W	
14,049.0	94.50	359.40	9,457.8	4,667.7	-28.5	446,470.21	779,207.09	32° 13' 27.260 N	103° 25' 49.663 W	
14,145.0	95.30	359.60	9,449.6	4,763.4	-29.3	446,565.86	779,206.26	32° 13' 28.206 N	103° 25' 49.663 W	
14,234.0	94.90	0.90	9,441.7	4,852.0	-29.0	446,654.50	779,206.64	32° 13' 29.083 N	103° 25' 49.650 W	
14,328.0	95.90	0.50	9,432.8	4,945.6	-27.8	446,748.07	779,207.79	32° 13' 30.009 N	103° 25' 49.627 W	
14,423.0	95.30	1.50	9,423.6	5,040.1	-26.2	446,842.61	779,209.44	32° 13' 30.944 N	103° 25' 49.599 W	
14,518.0	93.50	0.90	9,416.3	5,134.8	-24.2	446,937.30	779,211.42	32° 13' 31.881 N	103° 25' 49.567 W	
14,613.0	92.90	0.10	9,411.0	5,229.6	-23.3	447,032.15	779,212.25	32° 13' 32.820 N	103° 25' 49.548 W	
14,707.0	93.00	359.80	9,406.1	5,323.5	-23.4	447,126.02	779,212.17	32° 13' 33.749 N	103° 25' 49.539 W	
14,801.0	91.70	0.10	9,402.3	5,417.4	-23.5	447,219.94	779,212.08	32° 13' 34.678 N	103° 25' 49.531 W	
14,895.0	92.00	359.10	9,399.2	5,511.4	-24.2	447,313.89	779,211.43	32° 13' 35.608 N	103° 25' 49.530 W	
14,990.0	92.20	358.70	9,395.8	5,606.3	-26.0	447,408.81	779,209.61	32° 13' 36.547 N	103° 25' 49.542 W	
15,085.0	93.70	357.90	9,390.9	5,701.1	-28.8	447,503.64	779,206.79	32° 13' 37.486 N	103° 25' 49.565 W	
15,180.0	92.80	358.40	9,385.5	5,795.9	-31.9	447,598.43	779,203.73	32° 13' 38.424 N	103° 25' 49.591 W	
15,275.0	93.40	358.60	9,380.3	5,890.8	-34.4	447,693.26	779,201.25	32° 13' 39.362 N	103° 25' 49.611 W	
15,369.0	93.60	359.30	9,374.6	5,984.6	-36.1	447,787.07	779,199.53	32° 13' 40.291 N	103° 25' 49.622 W	
15,463.0	93.50	357.00	9,368.8	6,078.3	-39.1	447,880.83	779,196.50	32° 13' 41.219 N	103° 25' 49.648 W	
15,558.0	92.10	357.50	9,364.1	6,173.1	-43.7	447,975.61	779,191.95	32° 13' 42.157 N	103° 25' 49.692 W	
15,652.0	92.60	357.50	9,360.3	6,268.9	-47.7	448,069.44	779,187.85	32° 13' 43.086 N	103° 25' 49.730 W	
15,746.0	93.70	357.10	9,355.1	6,360.7	-52.2	448,163.19	779,183.43	32° 13' 44.014 N	103° 25' 49.773 W	
15,841.0	92.20	358.70	9,350.2	6,455.5	-55.6	448,258.00	779,179.95	32° 13' 44.952 N	103° 25' 49.804 W	
15,936.0	92.10	359.60	9,346.7	6,550.4	-57.1	448,352.92	779,178.55	32° 13' 45.892 N	103° 25' 49.811 W	
16,030.0	92.00	359.30	9,343.3	6,644.4	-58.0	448,446.85	779,177.64	32° 13' 46.821 N	103° 25' 49.812 W	
16,124.0	92.80	358.60	9,339.4	6,738.3	-59.7	448,540.75	779,175.92	32° 13' 47.751 N	103° 25' 49.823 W	
16,219.0	94.30	358.00	9,333.5	6,833.0	-62.5	448,635.53	779,173.11	32° 13' 48.689 N	103° 25' 49.846 W	
16,314.0	93.90	358.70	9,328.7	6,927.7	-65.2	448,730.24	779,170.38	32° 13' 49.626 N	103° 25' 49.869 W	
16,409.0	92.60	0.70	9,321.3	7,022.6	-65.7	448,825.08	779,169.89	32° 13' 50.565 N	103° 25' 49.865 W	
16,503.0	92.10	0.30	9,317.5	7,116.5	-64.9	448,919.00	779,170.71	32° 13' 51.494 N	103° 25' 49.847 W	

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Sombrero Federal Com 4H
Project:	Lea County, NM	TVD Reference:	Well @ 3503.5usft (Noram #21)
Site:	Sec 13, T24-S, R34-E	MD Reference:	Well @ 3503.5usft (Noram #21)
Well:	Sombrero Federal Com 4H	North Reference:	Grid
Wellbore:	Side Track #1	Survey Calculation Method:	Minimum Curvature
Design:	Side Track #1	Database:	EDMS002

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
16,640.0	92.10	0.30	9,312.4	7,253.4	-64.2	449,055.90	779,171.42	32° 13' 52.848 N	103° 25' 49.825 W
TD @ 16640' MD / 9312' TVD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,300.0	5,298.9	8.3	70.1	Tie In @ 5300' MD / TVD
16,640.0	9,312.4	7,253.4	-64.2	TD @ 16640' MD / 9312' TVD