



CONCHO

COG Operating LLC

**Lea Co., NM
Pitchblende Federal
19-30 457H**

Wellbore #1

Design: Wellbore #1

Standard Survey Report

30 March, 2020



NABORS

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Project	Lea Co., NM, Test		
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	Pitchblende Federal				
Site Position:		Northing:	409,474.100 usft	Latitude:	32° 7' 20.462348 N
From:	Map	Easting:	787,678.000 usft	Longitude:	103° 24' 14.780437 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.49 °

Well	19-30 457H					
Well Position	+N/-S	0.00 ft	Northing:	409,474.400 usft	Latitude:	32° 7' 20.461049 N
	+E/-W	0.00 ft	Easting:	787,728.000 usft	Longitude:	103° 24' 14.199055 W
Position Uncertainty		2.00 ft	Wellhead Elevation:	ft	Ground Level:	3,337.70 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM_FILE	12/31/2019	6.55	59.75	47,676.20000000

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	176.71	

Survey Program	Date	3/30/2020			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	11,887.00	Survey #2 Gyro (Wellbore #1)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4	
11,887.00	20,195.00	Survey #3 C \ L (Wellbore #1)	MWD+IFR1+FDIR	OWSG MWD + IFR1 + FDIR Correction	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.37	310.29	100.00	0.21	-0.25	-0.22	0.37	0.37	0.00	
125.00	0.30	323.93	125.00	0.31	-0.35	-0.33	0.42	-0.28	54.56	
150.00	0.55	301.75	150.00	0.43	-0.49	-0.46	1.18	1.00	-88.72	
175.00	0.40	323.16	175.00	0.56	-0.64	-0.60	0.92	-0.60	85.64	
200.00	0.50	316.12	200.00	0.71	-0.77	-0.75	0.46	0.40	-28.16	
225.00	0.56	303.87	225.00	0.86	-0.95	-0.91	0.51	0.24	-49.00	
250.00	0.46	307.54	249.99	0.99	-1.13	-1.05	0.42	-0.40	14.68	
275.00	0.46	305.24	274.99	1.11	-1.29	-1.18	0.07	0.00	-9.20	
300.00	0.47	309.94	299.99	1.23	-1.45	-1.31	0.16	0.04	18.80	

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
325.00	0.42	312.05	324.99	1.36	-1.60	-1.45	0.21	-0.20	8.44
350.00	0.42	323.15	349.99	1.49	-1.72	-1.59	0.32	0.00	44.40
375.00	0.51	318.87	374.99	1.65	-1.85	-1.75	0.39	0.36	-17.12
400.00	0.46	316.12	399.99	1.81	-1.99	-1.92	0.22	-0.20	-11.00
425.00	0.59	300.76	424.99	1.94	-2.17	-2.06	0.76	0.52	-61.44
450.00	0.51	301.99	449.99	2.07	-2.38	-2.20	0.32	-0.32	4.92
475.00	0.42	308.16	474.99	2.18	-2.54	-2.33	0.41	-0.36	24.68
500.00	0.39	303.81	499.99	2.29	-2.68	-2.44	0.17	-0.12	-17.40
525.00	0.38	294.04	524.99	2.37	-2.83	-2.53	0.27	-0.04	-39.08
550.00	0.41	294.97	549.98	2.44	-2.99	-2.61	0.12	0.12	3.72
575.00	0.39	297.90	574.98	2.52	-3.14	-2.69	0.11	-0.08	11.72
600.00	0.32	295.31	599.98	2.59	-3.28	-2.77	0.29	-0.28	-10.36
625.00	0.29	312.05	624.98	2.66	-3.39	-2.85	0.37	-0.12	66.96
650.00	0.35	312.24	649.98	2.75	-3.50	-2.95	0.24	0.24	0.76
675.00	0.40	314.45	674.98	2.87	-3.61	-3.07	0.21	0.20	8.84
700.00	0.43	307.62	699.98	2.98	-3.75	-3.19	0.23	0.12	-27.32
725.00	0.43	313.14	724.98	3.11	-3.89	-3.32	0.17	0.00	22.08
750.00	0.45	305.32	749.98	3.23	-4.04	-3.45	0.25	0.08	-31.28
775.00	0.45	301.12	774.98	3.33	-4.21	-3.57	0.13	0.00	-16.80
800.00	0.37	298.39	799.98	3.42	-4.36	-3.67	0.33	-0.32	-10.92
825.00	0.37	287.75	824.98	3.49	-4.51	-3.74	0.27	0.00	-42.56
850.00	0.31	290.06	849.98	3.53	-4.65	-3.80	0.25	-0.24	9.24
875.00	0.32	311.69	874.98	3.60	-4.77	-3.87	0.47	0.04	86.52
900.00	0.42	298.18	899.98	3.69	-4.90	-3.97	0.53	0.40	-54.04
925.00	0.35	300.66	924.98	3.78	-5.04	-4.06	0.29	-0.28	9.92
950.00	0.43	287.50	949.98	3.84	-5.20	-4.13	0.48	0.32	-52.64
975.00	0.41	279.63	974.98	3.89	-5.38	-4.19	0.24	-0.08	-31.48
1,000.00	0.30	277.75	999.97	3.91	-5.53	-4.22	0.44	-0.44	-7.52
1,025.00	0.24	284.55	1,024.97	3.93	-5.65	-4.25	0.27	-0.24	27.20
1,050.00	0.38	281.95	1,049.97	3.96	-5.78	-4.29	0.56	0.56	-10.40
1,075.00	0.33	284.01	1,074.97	4.00	-5.93	-4.33	0.21	-0.20	8.24
1,100.00	0.21	267.11	1,099.97	4.01	-6.04	-4.35	0.57	-0.48	-67.60
1,125.00	0.23	214.18	1,124.97	3.97	-6.12	-4.31	0.79	0.08	-211.72
1,150.00	0.35	163.60	1,149.97	3.85	-6.13	-4.20	1.08	0.48	-202.32
1,175.00	0.40	155.35	1,174.97	3.70	-6.07	-4.04	0.29	0.20	-33.00
1,200.00	0.42	154.78	1,199.97	3.54	-5.99	-3.88	0.08	0.08	-2.28
1,225.00	0.38	159.90	1,224.97	3.38	-5.92	-3.71	0.21	-0.16	20.48
1,250.00	0.42	153.03	1,249.97	3.22	-5.85	-3.55	0.25	0.16	-27.48
1,275.00	0.35	158.61	1,274.97	3.07	-5.78	-3.39	0.32	-0.28	22.32
1,300.00	0.37	155.35	1,299.97	2.92	-5.72	-3.24	0.11	0.08	-13.04
1,325.00	0.29	162.31	1,324.97	2.79	-5.67	-3.11	0.36	-0.32	27.84
1,350.00	0.35	152.64	1,349.97	2.66	-5.62	-2.98	0.32	0.24	-38.68
1,375.00	0.36	161.60	1,374.97	2.52	-5.56	-2.83	0.23	0.04	35.84

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Survey										
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1,400.00	0.36	157.56	1,399.97	2.37	-5.50	-2.68	0.10	0.00	-16.16	
1,425.00	0.42	150.48	1,424.97	2.22	-5.43	-2.53	0.31	0.24	-28.32	
1,450.00	0.36	137.59	1,449.97	2.08	-5.33	-2.38	0.42	-0.24	-51.56	
1,475.00	0.38	124.76	1,474.97	1.97	-5.21	-2.27	0.34	0.08	-51.32	
1,500.00	0.21	113.92	1,499.97	1.91	-5.10	-2.20	0.71	-0.68	-43.36	
1,525.00	0.34	102.94	1,524.97	1.87	-4.98	-2.16	0.56	0.52	-43.92	
1,550.00	0.37	95.07	1,549.97	1.85	-4.83	-2.12	0.23	0.12	-31.48	
1,575.00	0.35	91.79	1,574.96	1.84	-4.67	-2.11	0.11	-0.08	-13.12	
1,600.00	0.36	81.23	1,599.96	1.85	-4.52	-2.11	0.26	0.04	-42.24	
1,625.00	0.31	73.89	1,624.96	1.88	-4.38	-2.13	0.26	-0.20	-29.36	
1,650.00	0.31	72.77	1,649.96	1.92	-4.25	-2.16	0.02	0.00	-4.48	
1,675.00	0.27	75.12	1,674.96	1.95	-4.13	-2.19	0.17	-0.16	9.40	
1,700.00	0.26	94.22	1,699.96	1.97	-4.01	-2.19	0.35	-0.04	76.40	
1,725.00	0.22	81.79	1,724.96	1.97	-3.91	-2.19	0.26	-0.16	-49.72	
1,750.00	0.27	98.32	1,749.96	1.97	-3.80	-2.18	0.34	0.20	66.12	
1,775.00	0.44	94.89	1,774.96	1.95	-3.65	-2.16	0.68	0.68	-13.72	
1,800.00	0.43	91.08	1,799.96	1.94	-3.46	-2.14	0.12	-0.04	-15.24	
1,825.00	0.32	86.64	1,824.96	1.94	-3.30	-2.13	0.45	-0.44	-17.76	
1,850.00	0.46	86.65	1,849.96	1.95	-3.13	-2.13	0.56	0.56	0.04	
1,875.00	0.43	87.66	1,874.96	1.96	-2.93	-2.13	0.12	-0.12	4.04	
1,900.00	0.36	77.74	1,899.96	1.98	-2.76	-2.14	0.39	-0.28	-39.68	
1,925.00	0.44	81.75	1,924.96	2.01	-2.59	-2.16	0.34	0.32	16.04	
1,950.00	0.36	80.76	1,949.96	2.04	-2.42	-2.17	0.32	-0.32	-3.96	
1,975.00	0.45	83.73	1,974.96	2.06	-2.24	-2.19	0.37	0.36	11.88	
2,000.00	0.42	93.31	1,999.96	2.07	-2.05	-2.18	0.31	-0.12	38.32	
2,025.00	0.35	93.47	2,024.96	2.06	-1.89	-2.16	0.28	-0.28	0.64	
2,050.00	0.37	95.97	2,049.96	2.04	-1.73	-2.14	0.10	0.08	10.00	
2,075.00	0.43	94.08	2,074.95	2.03	-1.55	-2.12	0.25	0.24	-7.56	
2,100.00	0.48	97.77	2,099.95	2.01	-1.36	-2.08	0.23	0.20	14.76	
2,125.00	0.53	93.40	2,124.95	1.99	-1.14	-2.05	0.25	0.20	-17.48	
2,150.00	0.52	98.96	2,149.95	1.96	-0.91	-2.01	0.21	-0.04	22.24	
2,175.00	0.57	99.83	2,174.95	1.92	-0.68	-1.96	0.20	0.20	3.48	
2,200.00	0.75	100.40	2,199.95	1.87	-0.39	-1.89	0.72	0.72	2.28	
2,225.00	0.67	99.96	2,224.95	1.82	-0.09	-1.82	0.32	-0.32	-1.76	
2,250.00	0.69	103.12	2,249.95	1.76	0.20	-1.74	0.17	0.08	12.64	
2,275.00	0.72	100.99	2,274.94	1.70	0.50	-1.66	0.16	0.12	-8.52	
2,300.00	0.72	99.93	2,299.94	1.64	0.81	-1.59	0.05	0.00	-4.24	
2,325.00	0.75	98.80	2,324.94	1.59	1.13	-1.52	0.13	0.12	-4.52	
2,350.00	0.82	96.95	2,349.94	1.54	1.47	-1.45	0.30	0.28	-7.40	
2,375.00	0.86	94.88	2,374.93	1.50	1.83	-1.39	0.20	0.16	-8.28	
2,400.00	0.77	95.37	2,399.93	1.47	2.19	-1.34	0.36	-0.36	1.96	
2,425.00	0.90	90.02	2,424.93	1.45	2.55	-1.31	0.61	0.52	-21.40	
2,450.00	0.82	89.71	2,449.93	1.46	2.93	-1.29	0.32	-0.32	-1.24	

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
2,475.00	0.80	88.59	2,474.92	1.46	3.28	-1.27	0.10	-0.08	-4.48	
2,500.00	0.86	85.89	2,499.92	1.48	3.64	-1.27	0.29	0.24	-10.80	
2,525.00	1.03	86.68	2,524.92	1.50	4.05	-1.27	0.68	0.68	3.16	
2,550.00	1.04	84.95	2,549.91	1.54	4.50	-1.28	0.13	0.04	-6.92	
2,575.00	1.20	86.77	2,574.91	1.57	4.99	-1.28	0.66	0.64	7.28	
2,600.00	1.15	84.47	2,599.90	1.61	5.50	-1.29	0.27	-0.20	-9.20	
2,625.00	1.13	78.81	2,624.90	1.68	5.99	-1.34	0.46	-0.08	-22.64	
2,650.00	1.33	82.61	2,649.89	1.77	6.52	-1.39	0.86	0.80	15.20	
2,675.00	1.33	83.91	2,674.89	1.84	7.10	-1.43	0.12	0.00	5.20	
2,700.00	1.40	82.42	2,699.88	1.91	7.69	-1.46	0.31	0.28	-5.96	
2,725.00	1.34	82.36	2,724.87	1.99	8.28	-1.51	0.24	-0.24	-0.24	
2,750.00	1.32	87.12	2,749.87	2.04	8.86	-1.53	0.45	-0.08	19.04	
2,775.00	1.36	85.41	2,774.86	2.08	9.44	-1.53	0.23	0.16	-6.84	
2,800.00	1.42	86.22	2,799.85	2.12	10.05	-1.54	0.25	0.24	3.24	
2,825.00	1.48	86.60	2,824.84	2.16	10.68	-1.55	0.24	0.24	1.52	
2,850.00	1.50	86.41	2,849.83	2.20	11.33	-1.55	0.08	0.08	-0.76	
2,875.00	1.55	85.96	2,874.83	2.25	11.99	-1.55	0.21	0.20	-1.80	
2,900.00	1.53	84.40	2,899.82	2.30	12.66	-1.57	0.19	-0.08	-6.24	
2,925.00	1.64	84.17	2,924.81	2.37	13.35	-1.60	0.44	0.44	-0.92	
2,950.00	1.71	85.71	2,949.80	2.44	14.08	-1.62	0.33	0.28	6.16	
2,975.00	1.76	85.95	2,974.78	2.49	14.83	-1.64	0.20	0.20	0.96	
3,000.00	1.78	86.05	2,999.77	2.54	15.60	-1.64	0.08	0.08	0.40	
3,025.00	1.75	85.66	3,024.76	2.60	16.37	-1.66	0.13	-0.12	-1.56	
3,050.00	1.90	86.38	3,049.75	2.66	17.16	-1.67	0.61	0.60	2.88	
3,075.00	1.89	86.27	3,074.73	2.71	17.99	-1.67	0.04	-0.04	-0.44	
3,100.00	1.93	87.14	3,099.72	2.76	18.82	-1.67	0.20	0.16	3.48	
3,125.00	2.10	85.78	3,124.71	2.81	19.70	-1.68	0.71	0.68	-5.44	
3,150.00	2.20	85.69	3,149.69	2.88	20.63	-1.69	0.40	0.40	-0.36	
3,175.00	2.19	85.34	3,174.67	2.96	21.59	-1.71	0.07	-0.04	-1.40	
3,200.00	2.24	85.10	3,199.65	3.04	22.55	-1.74	0.20	0.20	-0.96	
3,225.00	2.25	84.19	3,224.63	3.13	23.53	-1.77	0.15	0.04	-3.64	
3,250.00	2.23	85.52	3,249.61	3.21	24.50	-1.80	0.22	-0.08	5.32	
3,275.00	2.19	83.98	3,274.59	3.30	25.46	-1.84	0.29	-0.16	-6.16	
3,300.00	2.18	84.03	3,299.58	3.40	26.41	-1.88	0.04	-0.04	0.20	
3,325.00	1.89	75.41	3,324.56	3.56	27.28	-1.98	1.68	-1.16	-34.48	
3,350.00	1.31	37.05	3,349.55	3.89	27.85	-2.28	4.74	-2.32	-153.44	
3,375.00	1.43	14.67	3,374.54	4.42	28.10	-2.80	2.18	0.48	-89.52	
3,400.00	1.64	8.33	3,399.53	5.07	28.23	-3.44	1.08	0.84	-25.36	
3,425.00	1.77	9.50	3,424.52	5.81	28.35	-4.17	0.54	0.52	4.68	
3,450.00	1.89	12.20	3,449.51	6.59	28.50	-4.95	0.59	0.48	10.80	
3,475.00	2.00	12.81	3,474.50	7.42	28.68	-5.76	0.45	0.44	2.44	
3,500.00	2.03	14.20	3,499.48	8.27	28.89	-6.60	0.23	0.12	5.56	
3,525.00	2.13	16.22	3,524.46	9.15	29.13	-7.46	0.50	0.40	8.08	
3,550.00	2.31	19.41	3,549.45	10.07	29.42	-8.37	0.87	0.72	12.76	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
3,575.00	2.41	21.70	3,574.42	11.04	29.78	-9.31	0.55	0.40	9.16	
3,600.00	2.42	21.01	3,599.40	12.02	30.17	-10.27	0.12	0.04	-2.76	
3,625.00	2.40	19.58	3,624.38	13.00	30.53	-11.23	0.25	-0.08	-5.72	
3,650.00	2.45	22.06	3,649.36	13.99	30.91	-12.19	0.46	0.20	9.92	
3,675.00	2.34	21.54	3,674.34	14.96	31.30	-13.14	0.45	-0.44	-2.08	
3,700.00	1.51	17.35	3,699.32	15.75	31.58	-13.91	3.37	-3.32	-16.76	
3,725.00	1.08	18.80	3,724.32	16.29	31.76	-14.44	1.72	-1.72	5.80	
3,750.00	0.99	20.39	3,749.31	16.71	31.91	-14.85	0.38	-0.36	6.36	
3,775.00	0.90	10.34	3,774.31	17.11	32.02	-15.24	0.75	-0.36	-40.20	
3,800.00	0.94	19.01	3,799.30	17.50	32.12	-15.62	0.58	0.16	34.68	
3,825.00	0.96	24.46	3,824.30	17.88	32.27	-16.00	0.37	0.08	21.80	
3,850.00	0.96	22.43	3,849.30	18.26	32.44	-16.37	0.14	0.00	-8.12	
3,875.00	0.97	26.98	3,874.29	18.65	32.62	-16.74	0.31	0.04	18.20	
3,900.00	0.99	22.43	3,899.29	19.03	32.80	-17.12	0.32	0.08	-18.20	
3,925.00	0.98	23.22	3,924.29	19.43	32.96	-17.51	0.07	-0.04	3.16	
3,950.00	0.97	18.57	3,949.28	19.83	33.11	-17.89	0.32	-0.04	-18.60	
3,975.00	1.18	16.49	3,974.28	20.27	33.25	-18.33	0.85	0.84	-8.32	
4,000.00	0.96	27.46	3,999.27	20.71	33.42	-18.76	1.20	-0.88	43.88	
4,025.00	0.94	26.66	4,024.27	21.08	33.61	-19.11	0.10	-0.08	-3.20	
4,050.00	0.99	26.19	4,049.27	21.45	33.80	-19.48	0.20	0.20	-1.88	
4,075.00	0.97	24.96	4,074.26	21.84	33.98	-19.85	0.12	-0.08	-4.92	
4,100.00	0.93	22.64	4,099.26	22.22	34.15	-20.22	0.22	-0.16	-9.28	
4,125.00	1.09	14.61	4,124.26	22.64	34.29	-20.63	0.85	0.64	-32.12	
4,150.00	1.05	12.80	4,149.25	23.09	34.40	-21.08	0.21	-0.16	-7.24	
4,175.00	1.11	10.97	4,174.25	23.55	34.50	-21.53	0.28	0.24	-7.32	
4,200.00	1.16	7.65	4,199.24	24.04	34.58	-22.01	0.33	0.20	-13.28	
4,225.00	1.18	7.16	4,224.24	24.55	34.64	-22.52	0.09	0.08	-1.96	
4,250.00	1.17	6.96	4,249.23	25.05	34.71	-23.02	0.04	-0.04	-0.80	
4,275.00	1.19	6.77	4,274.23	25.57	34.77	-23.53	0.08	0.08	-0.76	
4,300.00	1.19	7.18	4,299.22	26.08	34.83	-24.04	0.03	0.00	1.64	
4,325.00	1.17	9.24	4,324.22	26.59	34.90	-24.54	0.19	-0.08	8.24	
4,350.00	1.18	10.91	4,349.21	27.09	34.99	-25.04	0.14	0.04	6.68	
4,375.00	0.74	70.54	4,374.21	27.40	35.19	-25.34	4.11	-1.76	238.52	
4,400.00	0.72	71.56	4,399.21	27.50	35.50	-25.42	0.10	-0.08	4.08	
4,425.00	0.73	71.89	4,424.20	27.60	35.80	-25.50	0.04	0.04	1.32	
4,450.00	0.77	72.36	4,449.20	27.70	36.11	-25.59	0.16	0.16	1.88	
4,475.00	0.81	75.62	4,474.20	27.80	36.44	-25.66	0.24	0.16	13.04	
4,500.00	0.89	71.21	4,499.20	27.91	36.79	-25.75	0.41	0.32	-17.64	
4,525.00	1.00	68.56	4,524.19	28.05	37.18	-25.87	0.47	0.44	-10.60	
4,550.00	1.30	66.79	4,549.19	28.24	37.64	-26.03	1.21	1.20	-7.08	
4,575.00	1.56	70.16	4,574.18	28.47	38.23	-26.23	1.09	1.04	13.48	
4,600.00	1.79	78.11	4,599.17	28.66	38.93	-26.38	1.31	0.92	31.80	
4,625.00	2.17	78.58	4,624.15	28.84	39.77	-26.51	1.52	1.52	1.88	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,650.00	2.21	78.79	4,649.14	29.02	40.71	-26.64	0.16	0.16	0.84	
4,675.00	2.38	80.65	4,674.12	29.20	41.70	-26.76	0.74	0.68	7.44	
4,700.00	2.62	84.73	4,699.09	29.34	42.78	-26.84	1.19	0.96	16.32	
4,725.00	2.71	86.85	4,724.07	29.42	43.94	-26.85	0.53	0.36	8.48	
4,750.00	2.73	85.16	4,749.04	29.51	45.12	-26.87	0.33	0.08	-6.76	
4,775.00	2.73	86.95	4,774.01	29.59	46.31	-26.88	0.34	0.00	7.16	
4,800.00	2.76	87.50	4,798.98	29.65	47.50	-26.87	0.16	0.12	2.20	
4,825.00	2.55	84.99	4,823.95	29.72	48.66	-26.88	0.96	-0.84	-10.04	
4,850.00	1.06	87.81	4,848.94	29.78	49.44	-26.89	5.97	-5.96	11.28	
4,875.00	0.61	82.28	4,873.94	29.81	49.81	-26.90	1.83	-1.80	-22.12	
4,900.00	0.56	81.33	4,898.94	29.84	50.06	-26.92	0.20	-0.20	-3.80	
4,925.00	0.58	86.80	4,923.94	29.87	50.31	-26.93	0.23	0.08	21.88	
4,950.00	0.90	97.55	4,948.93	29.85	50.63	-26.89	1.39	1.28	43.00	
4,975.00	1.34	103.05	4,973.93	29.76	51.11	-26.77	1.81	1.76	22.00	
5,000.00	1.75	105.51	4,998.92	29.59	51.76	-26.57	1.66	1.64	9.84	
5,025.00	1.95	104.20	5,023.91	29.38	52.54	-26.32	0.82	0.80	-5.24	
5,050.00	2.23	105.58	5,048.89	29.15	53.42	-26.03	1.14	1.12	5.52	
5,075.00	2.56	107.56	5,073.87	28.85	54.42	-25.68	1.36	1.32	7.92	
5,100.00	2.75	106.20	5,098.84	28.51	55.53	-25.28	0.80	0.76	-5.44	
5,125.00	2.98	107.31	5,123.81	28.15	56.72	-24.85	0.95	0.92	4.44	
5,150.00	3.14	110.64	5,148.77	27.72	57.99	-24.34	0.96	0.64	13.32	
5,175.00	3.13	110.04	5,173.74	27.24	59.27	-23.80	0.14	-0.04	-2.40	
5,200.00	2.97	109.44	5,198.70	26.79	60.52	-23.27	0.65	-0.64	-2.40	
5,225.00	1.67	90.52	5,223.68	26.57	61.49	-23.00	5.97	-5.20	-75.68	
5,250.00	1.14	42.77	5,248.67	26.75	62.03	-23.15	4.94	-2.12	-191.00	
5,275.00	1.31	24.80	5,273.67	27.19	62.32	-23.57	1.67	0.68	-71.88	
5,300.00	1.46	19.51	5,298.66	27.75	62.54	-24.12	0.79	0.60	-21.16	
5,325.00	1.28	26.25	5,323.65	28.30	62.77	-24.66	0.97	-0.72	26.96	
5,350.00	1.29	22.24	5,348.65	28.82	63.00	-25.15	0.36	0.04	-16.04	
5,375.00	1.36	19.77	5,373.64	29.36	63.21	-25.68	0.36	0.28	-9.88	
5,400.00	1.22	20.87	5,398.63	29.88	63.41	-26.20	0.57	-0.56	4.40	
5,425.00	1.17	16.49	5,423.63	30.38	63.57	-26.68	0.42	-0.20	-17.52	
5,450.00	1.17	15.98	5,448.62	30.87	63.71	-27.16	0.04	0.00	-2.04	
5,475.00	1.10	16.05	5,473.62	31.34	63.85	-27.63	0.28	-0.28	0.28	
5,500.00	1.10	14.08	5,498.61	31.81	63.98	-28.08	0.15	0.00	-7.88	
5,525.00	1.09	13.42	5,523.61	32.27	64.09	-28.54	0.06	-0.04	-2.64	
5,550.00	0.99	13.07	5,548.61	32.71	64.19	-28.97	0.40	-0.40	-1.40	
5,575.00	1.11	8.63	5,573.60	33.16	64.28	-29.42	0.58	0.48	-17.76	
5,600.00	1.06	10.21	5,598.60	33.63	64.36	-29.88	0.23	-0.20	6.32	
5,625.00	0.99	10.31	5,623.59	34.07	64.44	-30.31	0.28	-0.28	0.40	
5,650.00	1.13	7.03	5,648.59	34.53	64.50	-30.77	0.61	0.56	-13.12	
5,675.00	1.02	7.93	5,673.58	34.99	64.57	-31.23	0.45	-0.44	3.60	
5,700.00	0.91	10.59	5,698.58	35.41	64.63	-31.64	0.47	-0.44	10.64	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
5,725.00	1.15	5.18	5,723.58	35.85	64.69	-32.08	1.03	0.96	-21.64	
5,750.00	1.03	8.93	5,748.57	36.32	64.75	-32.55	0.56	-0.48	15.00	
5,775.00	0.92	11.53	5,773.57	36.74	64.82	-32.96	0.47	-0.44	10.40	
5,800.00	1.06	6.78	5,798.56	37.17	64.89	-33.38	0.65	0.56	-19.00	
5,825.00	1.03	11.65	5,823.56	37.62	64.96	-33.83	0.37	-0.12	19.48	
5,850.00	0.94	11.37	5,848.56	38.04	65.05	-34.24	0.36	-0.36	-1.12	
5,875.00	1.06	11.25	5,873.55	38.47	65.14	-34.67	0.48	0.48	-0.48	
5,900.00	1.00	11.35	5,898.55	38.91	65.22	-35.10	0.24	-0.24	0.40	
5,925.00	0.99	9.42	5,923.55	39.33	65.30	-35.52	0.14	-0.04	-7.72	
5,950.00	1.01	9.21	5,948.54	39.76	65.37	-35.95	0.08	0.08	-0.84	
5,975.00	0.96	10.10	5,973.54	40.19	65.44	-36.37	0.21	-0.20	3.56	
6,000.00	1.01	8.77	5,998.53	40.61	65.52	-36.79	0.22	0.20	-5.32	
6,025.00	0.89	13.57	6,023.53	41.02	65.59	-37.19	0.58	-0.48	19.20	
6,050.00	0.88	14.81	6,048.53	41.39	65.69	-37.56	0.09	-0.04	4.96	
6,075.00	0.82	25.73	6,073.52	41.74	65.82	-37.89	0.69	-0.24	43.68	
6,100.00	0.64	51.94	6,098.52	41.99	66.00	-38.13	1.50	-0.72	104.84	
6,125.00	0.71	60.52	6,123.52	42.15	66.25	-38.28	0.49	0.28	34.32	
6,150.00	0.73	59.60	6,148.52	42.31	66.52	-38.42	0.09	0.08	-3.68	
6,175.00	0.73	69.72	6,173.52	42.44	66.81	-38.54	0.52	0.00	40.48	
6,200.00	0.75	64.44	6,198.52	42.57	67.10	-38.65	0.28	0.08	-21.12	
6,225.00	0.76	62.86	6,223.51	42.71	67.40	-38.78	0.09	0.04	-6.32	
6,250.00	0.74	65.69	6,248.51	42.86	67.69	-38.90	0.17	-0.08	11.32	
6,275.00	0.79	59.59	6,273.51	43.01	67.99	-39.04	0.38	0.20	-24.40	
6,300.00	1.22	70.39	6,298.50	43.19	68.39	-39.19	1.87	1.72	43.20	
6,325.00	2.17	82.86	6,323.49	43.33	69.11	-39.30	4.05	3.80	49.88	
6,350.00	2.99	81.99	6,348.47	43.48	70.22	-39.38	3.28	3.28	-3.48	
6,375.00	3.22	82.61	6,373.43	43.67	71.57	-39.49	0.93	0.92	2.48	
6,400.00	3.29	82.81	6,398.39	43.85	72.97	-39.59	0.28	0.28	0.80	
6,425.00	3.26	83.07	6,423.35	44.02	74.39	-39.68	0.13	-0.12	1.04	
6,450.00	3.27	81.95	6,448.31	44.21	75.80	-39.78	0.26	0.04	-4.48	
6,475.00	3.29	80.74	6,473.27	44.42	77.22	-39.92	0.29	0.08	-4.84	
6,500.00	3.21	80.24	6,498.23	44.66	78.62	-40.07	0.34	-0.32	-2.00	
6,525.00	3.20	78.01	6,523.19	44.92	79.99	-40.26	0.50	-0.04	-8.92	
6,550.00	3.12	78.17	6,548.15	45.20	81.34	-40.46	0.32	-0.32	0.64	
6,575.00	3.12	78.92	6,573.11	45.47	82.67	-40.66	0.16	0.00	3.00	
6,600.00	3.09	78.45	6,598.08	45.74	84.00	-40.84	0.16	-0.12	-1.88	
6,625.00	3.09	77.18	6,623.04	46.02	85.31	-41.05	0.27	0.00	-5.08	
6,650.00	3.08	77.20	6,648.00	46.32	86.63	-41.28	0.04	-0.04	0.08	
6,675.00	3.01	76.07	6,672.97	46.63	87.92	-41.51	0.37	-0.28	-4.52	
6,700.00	2.97	76.38	6,697.94	46.94	89.19	-41.74	0.17	-0.16	1.24	
6,725.00	2.88	75.18	6,722.90	47.25	90.42	-41.99	0.44	-0.36	-4.80	
6,750.00	2.82	73.86	6,747.87	47.59	91.62	-42.25	0.36	-0.24	-5.28	
6,775.00	2.76	72.71	6,772.84	47.93	92.79	-42.53	0.33	-0.24	-4.60	
6,800.00	2.75	72.83	6,797.81	48.29	93.93	-42.82	0.05	-0.04	0.48	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,825.00	2.76	72.21	6,822.78	48.65	95.08	-43.12	0.13	0.04	-2.48
6,850.00	2.67	72.45	6,847.76	49.01	96.21	-43.41	0.36	-0.36	0.96
6,875.00	2.71	71.05	6,872.73	49.38	97.32	-43.71	0.31	0.16	-5.60
6,900.00	2.82	68.35	6,897.70	49.80	98.45	-44.07	0.68	0.44	-10.80
6,925.00	3.13	62.97	6,922.67	50.33	99.63	-44.53	1.67	1.24	-21.52
6,950.00	3.34	59.36	6,947.63	51.02	100.87	-45.14	1.17	0.84	-14.44
6,975.00	3.42	59.08	6,972.58	51.77	102.13	-45.82	0.33	0.32	-1.12
7,000.00	3.39	60.07	6,997.54	52.52	103.41	-46.50	0.26	-0.12	3.96
7,025.00	3.47	59.59	7,022.49	53.27	104.71	-47.18	0.34	0.32	-1.92
7,050.00	3.42	59.37	7,047.45	54.04	106.00	-47.86	0.21	-0.20	-0.88
7,075.00	3.41	59.40	7,072.40	54.80	107.28	-48.55	0.04	-0.04	0.12
7,100.00	3.42	58.02	7,097.36	55.57	108.55	-49.25	0.33	0.04	-5.52
7,125.00	3.34	57.65	7,122.32	56.35	109.80	-49.96	0.33	-0.32	-1.48
7,150.00	3.27	56.99	7,147.27	57.13	111.02	-50.67	0.32	-0.28	-2.64
7,175.00	3.21	57.52	7,172.24	57.90	112.20	-51.36	0.27	-0.24	2.12
7,200.00	3.19	58.22	7,197.20	58.64	113.39	-52.03	0.18	-0.08	2.80
7,225.00	3.19	56.79	7,222.16	59.39	114.56	-52.71	0.32	0.00	-5.72
7,250.00	3.22	56.67	7,247.12	60.15	115.73	-53.41	0.12	0.12	-0.48
7,275.00	3.23	57.11	7,272.08	60.92	116.91	-54.11	0.11	0.04	1.76
7,300.00	3.58	58.25	7,297.03	61.71	118.16	-54.83	1.43	1.40	4.56
7,325.00	5.29	66.29	7,321.96	62.59	119.88	-55.60	7.26	6.84	32.16
7,350.00	5.25	66.94	7,346.85	63.50	121.99	-56.39	0.29	-0.16	2.60
7,375.00	5.27	66.50	7,371.75	64.40	124.09	-57.18	0.18	0.08	-1.76
7,400.00	5.26	66.57	7,396.64	65.32	126.20	-57.97	0.05	-0.04	0.28
7,425.00	5.27	66.83	7,421.54	66.23	128.30	-58.75	0.10	0.04	1.04
7,450.00	5.32	65.96	7,446.43	67.15	130.42	-59.55	0.38	0.20	-3.48
7,475.00	5.29	66.84	7,471.32	68.08	132.54	-60.36	0.35	-0.12	3.52
7,500.00	5.22	66.42	7,496.22	68.98	134.64	-61.14	0.32	-0.28	-1.68
7,525.00	5.21	66.47	7,521.11	69.89	136.72	-61.93	0.04	-0.04	0.20
7,550.00	5.12	65.37	7,546.01	70.81	138.78	-62.73	0.54	-0.36	-4.40
7,575.00	4.93	65.99	7,570.92	71.71	140.77	-63.51	0.79	-0.76	2.48
7,600.00	4.82	65.85	7,595.83	72.58	142.71	-64.27	0.44	-0.44	-0.56
7,625.00	4.72	65.85	7,620.74	73.43	144.61	-65.01	0.40	-0.40	0.00
7,650.00	4.62	65.96	7,645.66	74.26	146.47	-65.73	0.40	-0.40	0.44
7,675.00	4.50	65.96	7,670.58	75.07	148.28	-66.44	0.48	-0.48	0.00
7,700.00	4.47	65.64	7,695.50	75.87	150.06	-67.13	0.16	-0.12	-1.28
7,725.00	4.40	65.13	7,720.43	76.68	151.82	-67.84	0.32	-0.28	-2.04
7,750.00	4.26	65.28	7,745.36	77.47	153.53	-68.53	0.56	-0.56	0.60
7,775.00	4.18	65.06	7,770.29	78.24	155.20	-69.20	0.33	-0.32	-0.88
7,800.00	4.11	64.70	7,795.22	79.01	156.84	-69.88	0.30	-0.28	-1.44
7,825.00	4.03	63.92	7,820.16	79.78	158.44	-70.55	0.39	-0.32	-3.12
7,850.00	3.94	63.49	7,845.10	80.55	160.00	-71.23	0.38	-0.36	-1.72
7,875.00	3.92	63.87	7,870.04	81.31	161.53	-71.90	0.13	-0.08	1.52

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
7,900.00	3.82	62.54	7,894.98	82.07	163.04	-72.57	0.54	-0.40	-5.32	
7,925.00	3.81	62.36	7,919.93	82.84	164.51	-73.26	0.06	-0.04	-0.72	
7,950.00	3.85	65.02	7,944.87	83.58	166.01	-73.91	0.73	0.16	10.64	
7,975.00	4.11	64.78	7,969.81	84.31	167.58	-74.55	1.04	1.04	-0.96	
8,000.00	5.05	66.65	7,994.73	85.13	169.40	-75.27	3.81	3.76	7.48	
8,025.00	5.24	67.76	8,019.63	86.00	171.47	-76.01	0.86	0.76	4.44	
8,050.00	5.32	66.91	8,044.52	86.88	173.59	-76.78	0.45	0.32	-3.40	
8,075.00	5.26	66.40	8,069.42	87.80	175.71	-77.57	0.30	-0.24	-2.04	
8,100.00	5.03	67.34	8,094.32	88.68	177.77	-78.33	0.98	-0.92	3.76	
8,125.00	4.86	66.77	8,119.22	89.52	179.75	-79.05	0.71	-0.68	-2.28	
8,150.00	4.78	68.01	8,144.14	90.33	181.69	-79.75	0.53	-0.32	4.96	
8,175.00	4.63	68.32	8,169.05	91.09	183.60	-80.40	0.61	-0.60	1.24	
8,200.00	4.43	68.30	8,193.97	91.82	185.43	-81.03	0.80	-0.80	-0.08	
8,225.00	4.22	69.67	8,218.90	92.49	187.19	-81.60	0.94	-0.84	5.48	
8,250.00	4.06	70.20	8,243.84	93.11	188.89	-82.12	0.66	-0.64	2.12	
8,275.00	3.87	71.32	8,268.78	93.68	190.52	-82.60	0.82	-0.76	4.48	
8,300.00	3.62	71.24	8,293.72	94.21	192.06	-83.03	1.00	-1.00	-0.32	
8,325.00	3.59	71.70	8,318.67	94.71	193.56	-83.44	0.17	-0.12	1.84	
8,350.00	3.53	71.90	8,343.63	95.19	195.03	-83.84	0.25	-0.24	0.80	
8,375.00	3.44	72.48	8,368.58	95.66	196.48	-84.22	0.39	-0.36	2.32	
8,400.00	3.29	72.41	8,393.54	96.10	197.88	-84.59	0.60	-0.60	-0.28	
8,425.00	3.24	72.19	8,418.50	96.53	199.23	-84.94	0.21	-0.20	-0.88	
8,450.00	3.16	72.44	8,443.46	96.96	200.56	-85.29	0.32	-0.32	1.00	
8,475.00	3.12	73.70	8,468.42	97.36	201.87	-85.61	0.32	-0.16	5.04	
8,500.00	3.15	74.27	8,493.38	97.73	203.19	-85.91	0.17	0.12	2.28	
8,525.00	3.19	74.36	8,518.34	98.11	204.52	-86.21	0.16	0.16	0.36	
8,550.00	3.37	76.25	8,543.30	98.47	205.90	-86.49	0.84	0.72	7.56	
8,575.00	3.45	76.81	8,568.26	98.82	207.35	-86.75	0.35	0.32	2.24	
8,600.00	3.69	75.62	8,593.21	99.19	208.86	-87.04	1.00	0.96	-4.76	
8,625.00	3.66	76.62	8,618.16	99.57	210.41	-87.33	0.28	-0.12	4.00	
8,650.00	3.68	76.08	8,643.11	99.95	211.97	-87.62	0.16	0.08	-2.16	
8,675.00	3.48	76.37	8,668.06	100.32	213.48	-87.90	0.80	-0.80	1.16	
8,700.00	3.26	76.23	8,693.02	100.67	214.91	-88.17	0.88	-0.88	-0.56	
8,725.00	3.07	75.84	8,717.98	101.00	216.25	-88.42	0.76	-0.76	-1.56	
8,750.00	2.94	79.16	8,742.94	101.29	217.53	-88.64	0.87	-0.52	13.28	
8,775.00	2.82	78.79	8,767.91	101.53	218.76	-88.80	0.49	-0.48	-1.48	
8,800.00	2.82	78.39	8,792.88	101.77	219.97	-88.98	0.08	0.00	-1.60	
8,825.00	2.84	78.94	8,817.85	102.01	221.18	-89.15	0.13	0.08	2.20	
8,850.00	3.36	75.50	8,842.81	102.31	222.50	-89.38	2.21	2.08	-13.76	
8,875.00	4.59	71.21	8,867.75	102.82	224.15	-89.79	5.06	4.92	-17.16	
8,900.00	4.84	71.05	8,892.67	103.48	226.10	-90.34	1.00	1.00	-0.64	
8,925.00	4.85	71.14	8,917.58	104.17	228.10	-90.91	0.05	0.04	0.36	
8,950.00	4.84	70.68	8,942.49	104.86	230.09	-91.48	0.16	-0.04	-1.84	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
8,975.00	4.79	71.00	8,967.40	105.55	232.07	-92.06	0.23	-0.20	1.28	
9,000.00	4.62	72.59	8,992.32	106.19	234.02	-92.58	0.86	-0.68	6.36	
9,025.00	4.62	72.81	9,017.24	106.79	235.94	-93.07	0.07	0.00	0.88	
9,050.00	4.58	72.55	9,042.16	107.38	237.86	-93.56	0.18	-0.16	-1.04	
9,075.00	4.49	72.53	9,067.08	107.98	239.74	-94.04	0.36	-0.36	-0.08	
9,100.00	4.36	72.64	9,092.00	108.56	241.58	-94.51	0.52	-0.52	0.44	
9,125.00	4.31	71.78	9,116.93	109.13	243.38	-94.98	0.33	-0.20	-3.44	
9,150.00	4.12	72.35	9,141.86	109.70	245.13	-95.45	0.78	-0.76	2.28	
9,175.00	3.96	72.91	9,166.80	110.22	246.81	-95.88	0.66	-0.64	2.24	
9,200.00	3.81	71.83	9,191.74	110.74	248.43	-96.30	0.67	-0.60	-4.32	
9,225.00	3.68	71.41	9,216.69	111.25	249.98	-96.72	0.53	-0.52	-1.68	
9,250.00	3.50	71.53	9,241.64	111.75	251.46	-97.13	0.72	-0.72	0.48	
9,275.00	3.43	71.63	9,266.60	112.23	252.89	-97.53	0.28	-0.28	0.40	
9,300.00	3.40	72.35	9,291.55	112.69	254.31	-97.91	0.21	-0.12	2.88	
9,325.00	3.38	72.21	9,316.51	113.14	255.72	-98.28	0.09	-0.08	-0.56	
9,350.00	3.39	73.35	9,341.46	113.57	257.13	-98.63	0.27	0.04	4.56	
9,375.00	3.23	73.76	9,366.42	113.98	258.51	-98.96	0.65	-0.64	1.64	
9,400.00	3.09	72.34	9,391.38	114.38	259.83	-99.28	0.64	-0.56	-5.68	
9,425.00	2.93	75.00	9,416.35	114.75	261.09	-99.58	0.85	-0.64	10.64	
9,450.00	2.89	75.05	9,441.32	115.08	262.32	-99.84	0.16	-0.16	0.20	
9,475.00	2.85	76.35	9,466.29	115.39	263.53	-100.08	0.31	-0.16	5.20	
9,500.00	2.76	76.51	9,491.26	115.68	264.72	-100.30	0.36	-0.36	0.64	
9,525.00	2.77	77.85	9,516.23	115.95	265.89	-100.50	0.26	0.04	5.36	
9,550.00	2.66	80.67	9,541.20	116.17	267.06	-100.65	0.69	-0.44	11.28	
9,575.00	2.63	84.92	9,566.17	116.31	268.20	-100.73	0.79	-0.12	17.00	
9,600.00	2.54	89.32	9,591.15	116.37	269.33	-100.72	0.87	-0.36	17.60	
9,625.00	2.37	94.70	9,616.12	116.33	270.39	-100.62	1.14	-0.68	21.52	
9,650.00	2.23	97.43	9,641.10	116.23	271.39	-100.46	0.71	-0.56	10.92	
9,675.00	2.04	97.06	9,666.09	116.11	272.32	-100.29	0.76	-0.76	-1.48	
9,700.00	1.77	99.33	9,691.07	115.99	273.14	-100.13	1.12	-1.08	9.08	
9,725.00	1.30	102.07	9,716.06	115.87	273.80	-99.97	1.90	-1.88	10.96	
9,750.00	0.89	106.77	9,741.06	115.76	274.26	-99.83	1.68	-1.64	18.80	
9,775.00	0.41	105.42	9,766.06	115.68	274.53	-99.73	1.92	-1.92	-5.40	
9,800.00	0.07	316.09	9,791.06	115.66	274.61	-99.71	1.89	-1.36	-597.32	
9,825.00	0.50	296.26	9,816.06	115.72	274.50	-99.78	1.74	1.72	-79.32	
9,850.00	0.63	292.54	9,841.06	115.82	274.27	-99.89	0.54	0.52	-14.88	
9,875.00	0.68	290.27	9,866.05	115.93	274.01	-100.01	0.23	0.20	-9.08	
9,900.00	0.69	291.73	9,891.05	116.04	273.73	-100.13	0.08	0.04	5.84	
9,925.00	0.76	292.76	9,916.05	116.16	273.44	-100.27	0.28	0.28	4.12	
9,950.00	1.03	293.31	9,941.05	116.31	273.08	-100.44	1.08	1.08	2.20	
9,975.00	1.24	293.70	9,966.04	116.51	272.62	-100.67	0.84	0.84	1.56	
10,000.00	1.41	290.41	9,991.04	116.72	272.09	-100.91	0.74	0.68	-13.16	
10,025.00	1.57	289.31	10,016.03	116.94	271.48	-101.17	0.65	0.64	-4.40	
10,050.00	1.71	289.52	10,041.02	117.18	270.80	-101.45	0.56	0.56	0.84	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
10,075.00	1.83	288.63	10,066.01	117.43	270.07	-101.74	0.49	0.48	-3.56
10,100.00	1.75	287.83	10,090.99	117.68	269.33	-102.03	0.34	-0.32	-3.20
10,125.00	1.81	288.06	10,115.98	117.92	268.59	-102.31	0.24	0.24	0.92
10,150.00	1.87	289.65	10,140.97	118.18	267.83	-102.61	0.32	0.24	6.36
10,175.00	1.87	289.04	10,165.95	118.45	267.06	-102.92	0.08	0.00	-2.44
10,200.00	1.93	286.91	10,190.94	118.70	266.27	-103.22	0.37	0.24	-8.52
10,225.00	1.89	287.20	10,215.93	118.95	265.48	-103.51	0.16	-0.16	1.16
10,250.00	1.87	286.18	10,240.91	119.18	264.69	-103.79	0.16	-0.08	-4.08
10,275.00	1.96	285.35	10,265.90	119.41	263.89	-104.07	0.38	0.36	-3.32
10,300.00	1.91	286.48	10,290.89	119.64	263.08	-104.34	0.25	-0.20	4.52
10,325.00	1.97	284.83	10,315.87	119.87	262.26	-104.62	0.33	0.24	-6.60
10,350.00	1.61	276.93	10,340.86	120.02	261.50	-104.81	1.74	-1.44	-31.60
10,375.00	1.43	265.07	10,365.85	120.04	260.84	-104.87	1.45	-0.72	-47.44
10,400.00	1.27	259.54	10,390.84	119.96	260.25	-104.82	0.82	-0.64	-22.12
10,425.00	1.16	258.22	10,415.84	119.86	259.73	-104.75	0.45	-0.44	-5.28
10,450.00	0.16	322.65	10,440.84	119.83	259.46	-104.74	4.40	-4.00	257.72
10,475.00	0.34	48.95	10,465.84	119.91	259.50	-104.82	1.47	0.72	345.20
10,500.00	0.40	47.41	10,490.84	120.02	259.62	-104.92	0.24	0.24	-6.16
10,525.00	0.39	35.23	10,515.83	120.15	259.73	-105.04	0.34	-0.04	-48.72
10,550.00	0.42	33.32	10,540.83	120.29	259.83	-105.18	0.13	0.12	-7.64
10,575.00	0.51	33.62	10,565.83	120.46	259.94	-105.34	0.36	0.36	1.20
10,600.00	0.67	28.10	10,590.83	120.68	260.07	-105.56	0.68	0.64	-22.08
10,625.00	0.83	25.34	10,615.83	120.97	260.22	-105.84	0.66	0.64	-11.04
10,650.00	1.03	16.99	10,640.83	121.35	260.36	-106.21	0.96	0.80	-33.40
10,675.00	1.07	22.00	10,665.82	121.78	260.52	-106.63	0.40	0.16	20.04
10,700.00	1.21	28.64	10,690.82	122.23	260.73	-107.07	0.77	0.56	26.56
10,725.00	1.28	36.51	10,715.81	122.69	261.02	-107.51	0.74	0.28	31.48
10,750.00	1.35	32.16	10,740.80	123.16	261.35	-107.96	0.49	0.28	-17.40
10,775.00	1.35	28.85	10,765.80	123.67	261.65	-108.45	0.31	0.00	-13.24
10,800.00	1.50	26.73	10,790.79	124.22	261.94	-108.98	0.64	0.60	-8.48
10,825.00	1.57	26.82	10,815.78	124.82	262.24	-109.56	0.28	0.28	0.36
10,850.00	1.74	24.72	10,840.77	125.47	262.55	-110.19	0.72	0.68	-8.40
10,875.00	1.90	19.54	10,865.76	126.20	262.85	-110.91	0.92	0.64	-20.72
10,900.00	2.05	20.93	10,890.74	127.01	263.15	-111.70	0.63	0.60	5.56
10,925.00	2.34	27.68	10,915.72	127.88	263.54	-112.55	1.55	1.16	27.00
10,950.00	2.67	33.20	10,940.70	128.82	264.10	-113.45	1.63	1.32	22.08
10,975.00	2.92	32.89	10,965.67	129.84	264.76	-114.43	1.00	1.00	-1.24
11,000.00	2.93	32.05	10,990.64	130.92	265.45	-115.47	0.18	0.04	-3.36
11,025.00	2.92	32.69	11,015.61	132.00	266.13	-116.51	0.14	-0.04	2.56
11,050.00	2.89	33.20	11,040.57	133.06	266.82	-117.53	0.16	-0.12	2.04
11,075.00	2.88	28.13	11,065.54	134.14	267.46	-118.57	1.02	-0.04	-20.28
11,100.00	2.94	26.73	11,090.51	135.27	268.05	-119.66	0.37	0.24	-5.60
11,125.00	2.91	26.27	11,115.48	136.41	268.61	-120.77	0.15	-0.12	-1.84

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
11,150.00	2.84	27.42	11,140.45	137.53	269.18	-121.85	0.36	-0.28	4.60	
11,175.00	2.92	33.94	11,165.41	138.61	269.82	-122.89	1.35	0.32	26.08	
11,200.00	2.82	37.30	11,190.38	139.62	270.55	-123.87	0.78	-0.40	13.44	
11,225.00	2.79	38.18	11,215.35	140.59	271.30	-124.79	0.21	-0.12	3.52	
11,250.00	2.85	39.30	11,240.32	141.55	272.07	-125.70	0.33	0.24	4.48	
11,275.00	2.93	40.06	11,265.29	142.52	272.87	-126.63	0.35	0.32	3.04	
11,300.00	2.83	40.73	11,290.26	143.48	273.69	-127.53	0.42	-0.40	2.68	
11,325.00	2.47	43.74	11,315.23	144.33	274.46	-128.34	1.54	-1.44	12.04	
11,350.00	2.22	41.08	11,340.21	145.09	275.15	-129.06	1.09	-1.00	-10.64	
11,375.00	2.30	29.67	11,365.19	145.89	275.72	-129.82	1.82	0.32	-45.64	
11,400.00	2.38	17.93	11,390.17	146.82	276.13	-130.73	1.94	0.32	-46.96	
11,425.00	2.37	12.96	11,415.15	147.82	276.40	-131.71	0.82	-0.04	-19.88	
11,450.00	2.52	13.30	11,440.13	148.85	276.65	-132.73	0.60	0.60	1.36	
11,475.00	2.59	12.97	11,465.10	149.94	276.90	-133.80	0.29	0.28	-1.32	
11,500.00	2.40	18.17	11,490.08	150.99	277.19	-134.83	1.18	-0.76	20.80	
11,525.00	2.24	23.52	11,515.06	151.93	277.55	-135.75	1.08	-0.64	21.40	
11,550.00	2.05	23.66	11,540.04	152.79	277.92	-136.59	0.76	-0.76	0.56	
11,575.00	1.79	28.62	11,565.03	153.54	278.29	-137.32	1.23	-1.04	19.84	
11,600.00	1.54	43.71	11,590.02	154.13	278.71	-137.88	2.01	-1.00	60.36	
11,625.00	1.54	57.76	11,615.01	154.55	279.22	-138.27	1.51	0.00	56.20	
11,650.00	1.57	62.69	11,640.00	154.89	279.81	-138.57	0.55	0.12	19.72	
11,675.00	1.26	46.10	11,664.99	155.23	280.31	-138.89	2.04	-1.24	-66.36	
11,700.00	1.06	16.48	11,689.99	155.65	280.58	-139.29	2.49	-0.80	-118.48	
11,725.00	1.18	7.87	11,714.98	156.12	280.68	-139.76	0.83	0.48	-34.44	
11,750.00	1.40	7.77	11,739.97	156.68	280.76	-140.31	0.88	0.88	-0.40	
11,775.00	1.56	11.60	11,764.97	157.32	280.87	-140.94	0.75	0.64	15.32	
11,800.00	1.79	7.81	11,789.96	158.04	280.99	-141.65	1.02	0.92	-15.16	
11,825.00	1.74	17.02	11,814.94	158.79	281.15	-142.39	1.15	-0.20	36.84	
11,850.00	1.75	29.86	11,839.93	159.48	281.45	-143.07	1.56	0.04	51.36	
11,875.00	1.70	30.76	11,864.92	160.13	281.83	-143.69	0.23	-0.20	3.60	
11,887.00	1.68	31.03	11,876.92	160.43	282.01	-143.99	0.18	-0.17	2.25	
12,033.00	1.81	41.67	12,022.85	163.99	284.65	-147.38	0.24	0.09	7.29	
12,118.00	3.01	142.97	12,107.80	163.21	286.89	-146.48	4.47	1.41	119.18	
12,149.00	8.52	162.28	12,138.63	160.37	288.08	-143.58	18.60	17.77	62.29	
12,181.00	13.88	165.77	12,170.01	154.39	289.74	-137.51	16.88	16.75	10.91	
12,190.91	15.42	166.17	12,179.60	151.96	290.35	-135.04	15.58	15.54	4.01	
FTP @ 12190.91' MD										
12,212.00	18.70	166.80	12,199.76	145.94	291.79	-128.96	15.58	15.55	3.00	
12,244.00	24.70	168.49	12,229.48	134.39	294.30	-117.27	18.85	18.75	5.28	
12,276.00	27.79	168.43	12,258.18	120.52	297.13	-103.27	9.66	9.66	-0.19	
12,307.00	27.81	167.86	12,285.60	106.37	300.10	-88.97	0.86	0.06	-1.84	
12,339.00	31.79	169.59	12,313.36	90.78	303.20	-73.23	12.72	12.44	5.41	
12,370.00	35.12	170.99	12,339.22	73.94	306.07	-56.25	11.03	10.74	4.52	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
12,402.00	35.05	171.50	12,365.41	55.76	308.87	-37.94	0.94	-0.22	1.59	
12,433.00	37.55	174.31	12,390.39	37.55	311.12	-19.63	9.69	8.06	9.06	
12,464.00	39.80	176.07	12,414.59	18.25	312.74	-0.27	8.08	7.26	5.68	
12,496.00	39.73	175.96	12,439.19	-2.17	314.16	20.20	0.31	-0.22	-0.34	
12,527.00	43.90	176.58	12,462.29	-22.79	315.50	40.86	13.52	13.45	2.00	
12,559.00	47.06	177.31	12,484.72	-45.57	316.71	63.67	10.01	9.88	2.28	
12,590.00	48.44	176.72	12,505.57	-68.49	317.91	86.62	4.67	4.45	-1.90	
12,622.00	51.55	175.53	12,526.14	-92.94	319.57	111.13	10.13	9.72	-3.72	
12,654.00	53.76	174.97	12,545.55	-118.29	321.68	136.56	7.04	6.91	-1.75	
12,686.00	53.07	175.06	12,564.62	-143.89	323.91	162.24	2.17	-2.16	0.28	
12,717.00	53.18	175.38	12,583.22	-168.60	325.98	187.03	0.90	0.35	1.03	
12,749.00	55.42	175.59	12,601.89	-194.50	328.02	213.01	7.02	7.00	0.66	
12,781.00	59.21	175.30	12,619.17	-221.35	330.16	239.93	11.87	11.84	-0.91	
12,812.00	64.66	176.38	12,633.75	-248.62	332.14	267.27	17.85	17.58	3.48	
12,844.00	68.50	176.48	12,646.47	-277.92	333.97	296.63	12.00	12.00	0.31	
12,876.00	72.78	176.99	12,657.07	-308.05	335.68	326.81	13.46	13.38	1.59	
12,971.00	88.12	179.74	12,672.79	-401.41	338.30	420.17	16.40	16.15	2.89	
13,066.00	88.38	180.00	12,675.69	-496.37	338.51	514.98	0.39	0.27	0.27	
13,162.00	87.28	178.48	12,679.33	-592.29	339.79	610.81	1.95	-1.15	-1.58	
13,257.00	86.28	177.37	12,684.66	-687.07	343.22	705.64	1.57	-1.05	-1.17	
13,352.00	89.72	178.77	12,687.98	-781.94	346.42	800.54	3.91	3.62	1.47	
13,446.00	90.89	176.00	12,687.48	-875.83	350.70	894.52	3.20	1.24	-2.95	
13,540.00	90.17	172.71	12,686.61	-969.36	359.95	988.42	3.58	-0.77	-3.50	
13,635.00	88.15	176.87	12,688.00	-1,063.93	368.57	1,083.33	4.87	-2.13	4.38	
13,730.00	87.74	178.64	12,691.41	-1,158.79	372.29	1,178.25	1.91	-0.43	1.86	
13,825.00	85.98	177.90	12,696.61	-1,253.60	375.15	1,273.07	2.01	-1.85	-0.78	
13,919.00	88.00	178.65	12,701.55	-1,347.43	377.98	1,366.90	2.29	2.15	0.80	
14,014.00	90.69	180.06	12,702.63	-1,442.40	379.05	1,461.78	3.20	2.83	1.48	
14,109.00	90.77	178.75	12,701.42	-1,537.39	380.04	1,556.66	1.38	0.08	-1.38	
14,204.00	92.11	178.57	12,699.04	-1,632.33	382.26	1,651.58	1.42	1.41	-0.19	
14,298.00	92.30	179.86	12,695.42	-1,726.25	383.54	1,745.41	1.39	0.20	1.37	
14,393.00	92.23	182.43	12,691.66	-1,821.15	381.65	1,840.05	2.70	-0.07	2.71	
14,488.00	91.32	181.37	12,688.72	-1,916.05	378.50	1,934.61	1.47	-0.96	-1.12	
14,583.00	91.61	178.97	12,686.29	-2,011.01	378.22	2,029.40	2.54	0.31	-2.53	
14,677.00	91.89	183.77	12,683.42	-2,104.91	375.97	2,123.02	5.11	0.30	5.11	
14,772.00	88.89	177.65	12,682.77	-2,199.84	374.80	2,217.73	7.17	-3.16	-6.44	
14,867.00	87.10	176.13	12,686.10	-2,294.64	379.95	2,312.66	2.47	-1.88	-1.60	
14,955.00	89.09	179.42	12,689.02	-2,382.51	383.36	2,400.58	4.37	2.26	3.74	
15,050.00	87.46	178.62	12,691.88	-2,477.45	384.98	2,495.46	1.91	-1.72	-0.84	
15,145.00	86.65	178.40	12,696.76	-2,572.29	387.45	2,590.29	0.88	-0.85	-0.23	
15,239.00	88.21	177.53	12,700.98	-2,666.13	390.78	2,684.16	1.90	1.66	-0.93	
15,334.00	88.04	177.29	12,704.09	-2,760.98	395.07	2,779.11	0.31	-0.18	-0.25	
15,430.00	89.72	177.63	12,705.96	-2,856.87	399.33	2,875.08	1.79	1.75	0.35	
15,525.00	91.35	177.94	12,705.07	-2,951.79	403.00	2,970.05	1.75	1.72	0.33	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
15,620.00	92.48	177.28	12,701.90	-3,046.65	406.96	3,064.99	1.38	1.19	-0.69	
15,714.00	92.71	177.34	12,697.64	-3,140.45	411.36	3,158.88	0.25	0.24	0.06	
15,808.00	92.96	177.62	12,693.00	-3,234.25	415.49	3,252.76	0.40	0.27	0.30	
15,903.00	93.69	177.78	12,687.49	-3,329.01	419.30	3,347.59	0.79	0.77	0.17	
15,998.00	93.98	177.42	12,681.13	-3,423.71	423.27	3,442.36	0.49	0.31	-0.38	
16,093.00	93.79	178.62	12,674.69	-3,518.44	426.54	3,537.12	1.28	-0.20	1.26	
16,187.00	94.64	178.57	12,667.79	-3,612.15	428.84	3,630.81	0.91	0.90	-0.05	
16,282.00	91.83	179.18	12,662.42	-3,706.97	430.70	3,725.58	3.03	-2.96	0.64	
16,377.00	91.54	179.69	12,659.63	-3,801.93	431.64	3,820.43	0.62	-0.31	0.54	
16,472.00	90.30	181.05	12,658.11	-3,896.91	431.03	3,915.22	1.94	-1.31	1.43	
16,567.00	87.75	178.41	12,659.72	-3,991.88	431.47	4,010.06	3.86	-2.68	-2.78	
16,662.00	90.22	179.08	12,661.41	-4,086.83	433.55	4,104.98	2.69	2.60	0.71	
16,757.00	89.18	179.07	12,661.90	-4,181.82	435.09	4,199.89	1.09	-1.09	-0.01	
16,852.00	88.66	179.71	12,663.69	-4,276.79	436.10	4,294.77	0.87	-0.55	0.67	
16,947.00	91.23	180.44	12,663.78	-4,371.79	435.97	4,389.60	2.81	2.71	0.77	
17,042.00	92.46	181.70	12,660.73	-4,466.72	434.20	4,484.27	1.85	1.29	1.33	
17,137.00	92.94	182.00	12,656.25	-4,561.56	431.14	4,578.79	0.60	0.51	0.32	
17,232.00	91.65	183.85	12,652.45	-4,656.35	426.29	4,673.14	2.37	-1.36	1.95	
17,326.00	87.68	183.92	12,653.00	-4,750.12	419.92	4,766.39	4.22	-4.22	0.07	
17,419.00	84.44	181.89	12,659.39	-4,842.76	415.22	4,858.61	4.11	-3.48	-2.18	
17,514.00	85.54	179.71	12,667.68	-4,937.38	413.90	4,953.00	2.56	1.16	-2.29	
17,607.00	87.18	179.73	12,673.59	-5,030.19	414.35	5,045.68	1.76	1.76	0.02	
17,702.00	89.30	179.47	12,676.50	-5,125.14	415.02	5,140.51	2.25	2.23	-0.27	
17,796.00	90.71	180.14	12,676.50	-5,219.13	415.34	5,234.37	1.66	1.50	0.71	
17,891.00	90.31	179.93	12,675.65	-5,314.13	415.28	5,329.20	0.48	-0.42	-0.22	
17,986.00	89.40	179.88	12,675.89	-5,409.13	415.44	5,424.06	0.96	-0.96	-0.05	
18,080.00	88.25	179.49	12,677.82	-5,503.11	415.95	5,517.91	1.29	-1.22	-0.41	
18,175.00	90.47	179.40	12,678.88	-5,598.09	416.87	5,612.79	2.34	2.34	-0.09	
18,270.00	94.50	179.82	12,674.76	-5,692.98	417.52	5,707.56	4.27	4.24	0.44	
18,365.00	92.92	180.01	12,668.62	-5,787.78	417.66	5,802.21	1.68	-1.66	0.20	
18,462.00	92.82	179.86	12,663.76	-5,884.65	417.77	5,898.93	0.19	-0.10	-0.15	
18,558.00	93.29	180.03	12,658.64	-5,980.52	417.86	5,994.64	0.52	0.49	0.18	
18,652.00	91.56	178.77	12,654.66	-6,074.42	418.85	6,088.45	2.28	-1.84	-1.34	
18,747.00	90.69	181.43	12,652.80	-6,169.39	418.68	6,183.25	2.95	-0.92	2.80	
18,842.00	91.01	174.43	12,651.39	-6,264.26	422.11	6,278.16	7.38	0.34	-7.37	
18,937.00	90.28	172.12	12,650.32	-6,358.60	433.23	6,372.98	2.55	-0.77	-2.43	
19,030.00	88.17	173.36	12,651.58	-6,450.84	444.98	6,465.74	2.63	-2.27	1.33	
19,125.00	89.13	176.95	12,653.82	-6,545.45	453.00	6,560.66	3.91	1.01	3.78	
19,218.00	90.32	177.34	12,654.26	-6,638.33	457.63	6,653.66	1.35	1.28	0.42	
19,312.00	91.26	180.42	12,652.97	-6,732.30	459.47	6,747.57	3.43	1.00	3.28	
19,407.00	89.73	180.45	12,652.14	-6,827.29	458.75	6,842.36	1.61	-1.61	0.03	
19,500.00	91.89	181.22	12,650.83	-6,920.26	457.40	6,935.11	2.47	2.32	0.83	
19,595.00	90.10	176.67	12,649.18	-7,015.20	459.15	7,029.99	5.15	-1.88	-4.79	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 457H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3364.70ft (Nabors 893)
Well:	19-30 457H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	RyanUSA_32Bit

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
19,691.00	88.63	175.48	12,650.24	-7,110.97	465.72	7,125.97	1.97	-1.53	-1.24
19,785.00	87.52	179.03	12,653.40	-7,204.79	470.22	7,219.90	3.95	-1.18	3.78
19,879.00	90.61	185.69	12,654.94	-7,298.63	466.35	7,313.37	7.81	3.29	7.09
19,974.00	91.01	182.70	12,653.59	-7,393.36	459.40	7,407.54	3.18	0.42	-3.15
20,069.00	89.50	179.70	12,653.17	-7,488.32	457.41	7,502.23	3.54	-1.59	-3.16
20,130.00	89.04	179.31	12,653.95	-7,549.31	457.93	7,563.15	0.99	-0.75	-0.64
20,152.80	89.04	179.31	12,654.33	-7,572.11	458.21	7,585.93	0.00	0.00	0.00
LTP @ 20152.80' MD									
20,195.00	89.04	179.31	12,655.04	-7,614.30	458.72	7,628.08	0.00	0.00	0.00
20195' MD PTB									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
12,190.91	12,179.60	151.96	290.35	FTP @ 12190.91' MD
20,152.80	12,654.33	-7,572.11	458.21	LTP @ 20152.80' MD
20,195.00	12,655.04	-7,614.30	458.72	20195' MD PTB

Checked By: _____ Approved By: _____ Date: _____