



PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)
Little Bear Federal Com
4H

OH / 63528

Design: Surveys (Ensign 155)

Standard Survey Report

21 November, 2018

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AUG 02 2019
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Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3828.40usft (Ensign 155)
Site:	Little Bear Federal Com	MD Reference:	RKB @ 3828.40usft (Ensign 155)
Well:	4H	North Reference:	Grid
Wellbore:	OH / 63528	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	Little Bear Federal Com				
Site Position:		Northing:	555,243.20 usft	Latitude:	32° 31' 26.81346 N
From:	Map	Easting:	737,377.40 usft	Longitude:	103° 33' 47.46075 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.41 °

Well	4H					
Well Position	+N/-S	0.00 usft	Northing:	554,915.90 usft	Latitude:	32° 31' 23.71586 N
	+E/-W	0.00 usft	Easting:	735,397.00 usft	Longitude:	103° 34' 10.61720 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,804.40 usft	

Wellbore	OH / 63528
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	11/30/2018	6.70	60.42	48,187.05483918

Design	Surveys (Ensign 155)
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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	3.46

Survey Program	Date	11/21/2018
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From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	10,700.00	Scientific Gyros (OH / 63528)	Scientific Keeper	Scientific Drilling Intl. Standard Wireline Keeper
10,780.00	18,783.00	Phoenix MWD Surveys (OH / 63528)	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	0.85	308.33	100.00	0.46	-0.58	0.42	0.85	0.85	0.00
125.00	0.82	300.97	124.99	0.67	-0.88	0.61	0.45	-0.12	-29.44
150.00	0.62	320.08	149.99	0.86	-1.12	0.79	1.24	-0.80	76.44
175.00	0.68	332.47	174.99	1.10	-1.28	1.02	0.61	0.24	49.56
200.00	0.96	328.85	199.99	1.41	-1.45	1.32	1.14	1.12	-14.48
225.00	0.94	327.67	224.98	1.76	-1.67	1.66	0.11	-0.08	-4.72
250.00	0.93	318.80	249.98	2.09	-1.91	1.97	0.58	-0.04	-35.48
275.00	0.48	325.79	274.98	2.33	-2.11	2.20	1.83	-1.80	27.96
300.00	0.21	23.45	299.98	2.46	-2.15	2.32	1.63	-1.08	230.64



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
MD Reference: RKB @ 3828.40usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
325.00	0.36	100.20	324.98	2.48	-2.05	2.36	1.49	0.60	307.00
350.00	0.71	101.46	349.98	2.44	-1.82	2.32	1.40	1.40	5.04
375.00	0.73	106.07	374.98	2.36	-1.52	2.27	0.25	0.08	18.44
400.00	0.73	109.05	399.97	2.27	-1.21	2.19	0.15	0.00	11.92
425.00	0.87	98.87	424.97	2.19	-0.88	2.13	0.80	0.56	-40.72
450.00	0.91	95.92	449.97	2.14	-0.49	2.10	0.24	0.16	-11.80
475.00	0.81	94.19	474.96	2.10	-0.12	2.09	0.41	-0.40	-6.92
500.00	0.76	88.89	499.96	2.09	0.22	2.10	0.35	-0.20	-21.20
525.00	0.73	92.82	524.96	2.09	0.55	2.12	0.24	-0.12	15.72
550.00	0.74	99.05	549.96	2.06	0.87	2.10	0.32	0.04	24.92
575.00	0.66	93.55	574.96	2.02	1.17	2.09	0.42	-0.32	-22.00
600.00	0.66	92.73	599.95	2.01	1.46	2.09	0.04	0.00	-3.28
625.00	0.63	96.12	624.95	1.98	1.74	2.09	0.19	-0.12	13.56
650.00	0.48	104.98	649.95	1.94	1.98	2.06	0.69	-0.60	35.44
675.00	0.56	94.37	674.95	1.91	2.20	2.04	0.50	0.32	-42.44
700.00	0.75	99.66	699.95	1.87	2.48	2.02	0.80	0.76	21.16
725.00	0.68	94.20	724.95	1.83	2.79	2.00	0.39	-0.28	-21.84
750.00	0.65	88.39	749.95	1.82	3.08	2.01	0.30	-0.12	-23.24
775.00	0.81	88.04	774.94	1.83	3.40	2.04	0.64	0.64	-1.40
800.00	0.68	96.38	799.94	1.82	3.72	2.05	0.68	-0.52	33.36
825.00	0.63	97.04	824.94	1.79	4.01	2.03	0.20	-0.20	2.64
850.00	0.73	92.67	849.94	1.77	4.30	2.02	0.45	0.40	-17.48
875.00	0.73	90.11	874.94	1.76	4.62	2.03	0.13	0.00	-10.24
900.00	0.72	100.54	899.93	1.73	4.94	2.02	0.53	-0.04	41.72
925.00	0.67	99.05	924.93	1.68	5.23	1.99	0.21	-0.20	-5.96
950.00	0.70	91.12	949.93	1.65	5.53	1.98	0.40	0.12	-31.72
975.00	0.82	100.14	974.93	1.62	5.86	1.97	0.68	0.48	36.08
1,000.00	0.76	106.28	999.93	1.54	6.20	1.91	0.41	-0.24	24.56
1,025.00	0.85	105.81	1,024.92	1.44	6.53	1.83	0.36	0.36	-1.88
1,050.00	0.77	110.24	1,049.92	1.33	6.87	1.75	0.41	-0.32	17.72
1,075.00	0.87	115.52	1,074.92	1.19	7.20	1.63	0.50	0.40	21.12
1,100.00	0.95	111.79	1,099.92	1.04	7.56	1.49	0.40	0.32	-14.92
1,125.00	1.11	128.93	1,124.91	0.81	7.94	1.28	1.38	0.64	68.56
1,150.00	1.07	131.04	1,149.91	0.50	8.31	1.00	0.23	-0.16	8.44
1,175.00	0.95	132.46	1,174.90	0.21	8.64	0.73	0.49	-0.48	5.68
1,200.00	1.40	128.15	1,199.90	-0.12	9.03	0.42	1.83	1.80	-17.24
1,225.00	1.20	131.06	1,224.89	-0.48	9.47	0.09	0.84	-0.80	11.64
1,250.00	1.33	129.47	1,249.89	-0.84	9.89	-0.24	0.54	0.52	-6.36
1,275.00	1.26	121.72	1,274.88	-1.17	10.35	-0.54	0.75	-0.28	-31.00
1,300.00	1.32	130.45	1,299.87	-1.50	10.80	-0.84	0.82	0.24	34.92
1,325.00	1.43	129.85	1,324.87	-1.89	11.26	-1.20	0.44	0.44	-2.40
1,350.00	1.26	139.04	1,349.86	-2.29	11.68	-1.58	1.10	-0.68	36.76
1,375.00	1.12	150.81	1,374.85	-2.71	11.98	-1.99	1.12	-0.56	47.08



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North Reference: Grid
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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,400.00	1.37	129.10	1,399.85	-3.12	12.33	-2.37	2.12	1.00	-86.84
1,425.00	1.34	125.42	1,424.84	-3.47	12.80	-2.69	0.37	-0.12	-14.72
1,450.00	1.39	122.81	1,449.83	-3.81	13.29	-3.00	0.32	0.20	-10.44
1,475.00	1.37	124.62	1,474.83	-4.14	13.79	-3.30	0.19	-0.08	7.24
1,500.00	1.43	124.96	1,499.82	-4.49	14.29	-3.62	0.24	0.24	1.36
1,525.00	1.40	122.17	1,524.81	-4.83	14.81	-3.93	0.30	-0.12	-11.16
1,550.00	1.24	118.87	1,549.80	-5.12	15.30	-4.19	0.71	-0.64	-13.20
1,575.00	1.18	120.52	1,574.80	-5.39	15.76	-4.42	0.28	-0.24	6.60
1,600.00	1.24	116.03	1,599.79	-5.63	16.23	-4.65	0.45	0.24	-17.96
1,625.00	1.39	118.05	1,624.79	-5.90	16.74	-4.88	0.63	0.60	8.08
1,650.00	1.52	112.38	1,649.78	-6.16	17.31	-5.11	0.78	0.52	-22.68
1,675.00	1.26	119.64	1,674.77	-6.43	17.86	-5.34	1.25	-1.04	29.04
1,700.00	1.20	104.33	1,699.77	-6.63	18.35	-5.51	1.33	-0.24	-61.24
1,725.00	1.35	104.82	1,724.76	-6.77	18.89	-5.62	0.60	0.60	1.96
1,750.00	1.04	107.79	1,749.75	-6.91	19.39	-5.73	1.26	-1.24	11.88
1,775.00	1.27	107.53	1,774.75	-7.07	19.87	-5.85	0.92	0.92	-1.04
1,800.00	1.54	102.45	1,799.74	-7.22	20.46	-5.97	1.19	1.08	-20.32
1,825.00	1.55	104.75	1,824.73	-7.38	21.11	-6.09	0.25	0.04	9.20
1,850.00	1.58	102.03	1,849.72	-7.54	21.78	-6.21	0.32	0.12	-10.88
1,875.00	1.70	101.33	1,874.71	-7.68	22.48	-6.31	0.49	0.48	-2.80
1,900.00	1.79	102.71	1,899.70	-7.84	23.22	-6.43	0.40	0.36	5.52
1,925.00	1.77	99.56	1,924.69	-7.99	23.99	-6.53	0.40	-0.08	-12.60
1,950.00	1.73	101.07	1,949.68	-8.13	24.74	-6.62	0.24	-0.16	6.04
1,975.00	1.87	102.64	1,974.66	-8.29	25.51	-6.74	0.59	0.56	6.28
2,000.00	2.15	102.89	1,999.65	-8.48	26.36	-6.88	1.12	1.12	1.00
2,025.00	2.10	105.74	2,024.63	-8.71	27.26	-7.05	0.47	-0.20	11.40
2,050.00	2.08	104.52	2,049.62	-8.95	28.14	-7.24	0.20	-0.08	-4.88
2,075.00	1.97	116.06	2,074.60	-9.25	28.96	-7.49	1.69	-0.44	46.16
2,100.00	1.88	121.32	2,099.59	-9.65	29.70	-7.84	0.79	-0.36	21.04
2,125.00	1.76	126.54	2,124.57	-10.10	30.36	-8.25	0.82	-0.48	20.88
2,150.00	1.56	133.95	2,149.56	-10.56	30.91	-8.68	1.17	-0.80	29.64
2,175.00	1.52	149.38	2,174.55	-11.08	31.33	-9.17	1.66	-0.16	61.72
2,200.00	1.40	160.14	2,199.55	-11.66	31.60	-9.73	1.19	-0.48	43.04
2,225.00	1.62	145.51	2,224.54	-12.23	31.90	-10.29	1.77	0.88	-58.52
2,250.00	1.76	145.46	2,249.53	-12.84	32.32	-10.87	0.56	0.56	-0.20
2,275.00	1.75	148.29	2,274.51	-13.48	32.74	-11.48	0.35	-0.04	11.32
2,300.00	1.75	146.70	2,299.50	-14.13	33.15	-12.10	0.19	0.00	-6.36
2,325.00	1.82	148.02	2,324.49	-14.78	33.57	-12.73	0.32	0.28	5.28
2,350.00	1.84	147.29	2,349.48	-15.46	34.00	-13.38	0.12	0.08	-2.92
2,375.00	1.86	145.87	2,374.47	-16.13	34.44	-14.02	0.20	0.08	-5.68
2,400.00	1.90	142.41	2,399.45	-16.79	34.92	-14.66	0.48	0.16	-13.84
2,425.00	1.98	130.37	2,424.44	-17.40	35.50	-15.23	1.66	0.32	-48.16
2,450.00	2.10	123.35	2,449.42	-17.93	36.21	-15.72	1.11	0.48	-28.08



Survey Report



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Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
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North Reference: Grid
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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,475.00	2.43	117.94	2,474.40	-18.43	37.07	-16.16	1.57	1.32	-21.64
2,500.00	2.36	113.93	2,499.38	-18.89	38.00	-16.56	0.73	-0.28	-16.04
2,525.00	2.34	116.62	2,524.36	-19.33	38.93	-16.94	0.45	-0.08	10.76
2,550.00	2.39	116.51	2,549.34	-19.79	39.85	-17.35	0.20	0.20	-0.44
2,575.00	2.44	110.30	2,574.32	-20.21	40.82	-17.71	1.07	0.20	-24.84
2,600.00	2.44	113.79	2,599.29	-20.61	41.81	-18.05	0.59	0.00	13.96
2,625.00	2.56	111.21	2,624.27	-21.02	42.81	-18.40	0.66	0.48	-10.32
2,650.00	2.35	114.43	2,649.25	-21.44	43.80	-18.75	1.00	-0.84	12.88
2,675.00	2.48	112.43	2,674.22	-21.86	44.77	-19.11	0.62	0.52	-8.00
2,700.00	2.34	116.86	2,699.20	-22.29	45.72	-19.49	0.93	-0.56	17.72
2,725.00	2.21	114.57	2,724.18	-22.72	46.62	-19.87	0.63	-0.52	-9.16
2,750.00	1.93	110.05	2,749.17	-23.07	47.45	-20.16	1.30	-1.12	-18.08
2,775.00	1.85	112.36	2,774.15	-23.37	48.22	-20.41	0.44	-0.32	9.24
2,800.00	1.90	108.82	2,799.14	-23.65	48.98	-20.65	0.50	0.20	-14.16
2,825.00	1.77	106.02	2,824.13	-23.89	49.75	-20.85	0.63	-0.52	-11.20
2,850.00	1.65	107.78	2,849.12	-24.11	50.46	-21.02	0.52	-0.48	7.04
2,875.00	1.70	108.95	2,874.10	-24.34	51.15	-21.21	0.24	0.20	4.68
2,900.00	1.52	105.55	2,899.09	-24.55	51.82	-21.38	0.81	-0.72	-13.60
2,925.00	1.65	105.45	2,924.08	-24.73	52.49	-21.52	0.52	0.52	-0.40
2,950.00	1.75	110.00	2,949.07	-24.96	53.20	-21.70	0.67	0.40	18.20
2,975.00	1.54	107.42	2,974.06	-25.19	53.88	-21.89	0.89	-0.84	-10.32
3,000.00	1.65	101.46	2,999.05	-25.36	54.55	-22.03	0.80	0.44	-23.84
3,025.00	1.79	108.55	3,024.04	-25.56	55.27	-22.18	1.02	0.56	28.36
3,050.00	2.05	112.21	3,049.03	-25.85	56.06	-22.42	1.15	1.04	14.64
3,075.00	2.10	114.67	3,074.01	-26.21	56.89	-22.73	0.41	0.20	9.84
3,100.00	2.10	113.40	3,099.00	-26.59	57.72	-23.05	0.19	0.00	-5.08
3,125.00	2.05	117.71	3,123.98	-26.98	58.54	-23.39	0.66	-0.20	17.24
3,150.00	2.09	121.06	3,148.96	-27.42	59.33	-23.79	0.51	0.16	13.40
3,175.00	2.17	120.94	3,173.95	-27.90	60.12	-24.22	0.32	0.32	-0.48
3,200.00	2.08	124.73	3,198.93	-28.40	60.90	-24.67	0.67	-0.36	15.16
3,225.00	2.12	126.80	3,223.91	-28.94	61.64	-25.16	0.34	0.16	8.28
3,250.00	1.93	126.91	3,248.90	-29.46	62.35	-25.65	0.76	-0.76	0.44
3,275.00	1.86	123.27	3,273.88	-29.94	63.03	-26.08	0.56	-0.28	-14.56
3,300.00	1.90	124.51	3,298.87	-30.40	63.71	-26.50	0.23	0.16	4.96
3,325.00	1.87	124.09	3,323.86	-30.86	64.39	-26.92	0.13	-0.12	-1.68
3,350.00	2.00	115.17	3,348.84	-31.28	65.12	-27.29	1.31	0.52	-35.68
3,375.00	2.01	115.30	3,373.83	-31.65	65.91	-27.61	0.04	0.04	0.52
3,400.00	2.13	114.02	3,398.81	-32.02	66.73	-27.94	0.51	0.48	-5.12
3,425.00	2.11	111.61	3,423.79	-32.38	67.58	-28.25	0.37	-0.08	-9.64
3,450.00	1.92	104.64	3,448.78	-32.66	68.42	-28.47	1.24	-0.76	-27.88
3,475.00	1.92	96.12	3,473.76	-32.81	69.24	-28.57	1.14	0.00	-34.08
3,500.00	1.83	80.64	3,498.75	-32.79	70.05	-28.50	2.05	-0.36	-61.92
3,525.00	1.57	90.67	3,523.74	-32.73	70.78	-28.40	1.58	-1.04	40.12
3,550.00	1.79	85.43	3,548.73	-32.70	71.52	-28.33	1.07	0.88	-20.96



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
MD Reference: RKB @ 3828.40usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,575.00	1.73	83.70	3,573.72	-32.63	72.28	-28.21	0.32	-0.24	-6.92
3,600.00	1.67	80.95	3,598.71	-32.53	73.02	-28.06	0.41	-0.24	-11.00
3,625.00	1.78	77.41	3,623.69	-32.39	73.75	-27.88	0.61	0.44	-14.16
3,650.00	1.95	80.30	3,648.68	-32.23	74.55	-27.67	0.78	0.68	11.56
3,675.00	1.91	81.68	3,673.67	-32.10	75.38	-27.49	0.25	-0.16	5.52
3,700.00	1.81	77.17	3,698.65	-31.95	76.18	-27.30	0.71	-0.40	-18.04
3,725.00	1.57	94.32	3,723.64	-31.89	76.91	-27.19	2.23	-0.96	68.60
3,750.00	1.20	112.55	3,748.64	-32.02	77.49	-27.28	2.28	-1.48	72.92
3,775.00	1.21	131.10	3,773.63	-32.29	77.93	-27.53	1.55	0.04	74.20
3,800.00	1.19	144.34	3,798.62	-32.67	78.28	-27.89	1.11	-0.08	52.96
3,825.00	1.10	168.93	3,823.62	-33.12	78.48	-28.32	1.98	-0.36	98.36
3,850.00	1.17	151.54	3,848.61	-33.58	78.65	-28.77	1.40	0.28	-69.56
3,875.00	1.15	143.20	3,873.61	-34.01	78.92	-29.18	0.68	-0.08	-33.36
3,900.00	1.21	151.46	3,898.60	-34.44	79.19	-29.60	0.72	0.24	33.04
3,925.00	1.04	159.96	3,923.60	-34.88	79.40	-30.03	0.95	-0.68	34.00
3,950.00	1.03	169.37	3,948.60	-35.32	79.52	-30.45	0.68	-0.04	37.64
3,975.00	0.81	173.56	3,973.59	-35.71	79.58	-30.85	0.92	-0.88	16.76
4,000.00	1.06	175.41	3,998.59	-36.12	79.62	-31.25	1.01	1.00	7.40
4,025.00	0.95	182.31	4,023.59	-36.56	79.63	-31.69	0.65	-0.44	27.60
4,050.00	0.90	184.11	4,048.58	-36.96	79.61	-32.09	0.23	-0.20	7.20
4,075.00	0.85	192.28	4,073.58	-37.34	79.55	-32.47	0.54	-0.20	32.68
4,100.00	0.72	192.56	4,098.58	-37.67	79.48	-32.81	0.52	-0.52	1.12
4,125.00	0.71	183.07	4,123.57	-37.98	79.44	-33.12	0.47	-0.04	-37.96
4,150.00	0.66	192.03	4,148.57	-38.28	79.40	-33.41	0.47	-0.20	35.84
4,175.00	0.70	191.73	4,173.57	-38.57	79.34	-33.71	0.16	0.16	-1.20
4,200.00	0.61	174.63	4,198.57	-38.85	79.32	-33.99	0.86	-0.36	-68.40
4,225.00	0.94	181.08	4,223.57	-39.19	79.33	-34.33	1.36	1.32	25.80
4,250.00	0.90	182.83	4,248.56	-39.59	79.31	-34.73	0.20	-0.16	7.00
4,275.00	0.75	183.96	4,273.56	-39.95	79.29	-35.09	0.60	-0.60	4.52
4,300.00	0.33	156.33	4,298.56	-40.18	79.31	-35.32	1.93	-1.68	-110.52
4,325.00	0.51	113.59	4,323.56	-40.29	79.44	-35.42	1.40	0.72	-170.96
4,350.00	0.62	100.20	4,348.56	-40.35	79.68	-35.47	0.68	0.44	-53.56
4,375.00	0.62	112.95	4,373.56	-40.43	79.93	-35.53	0.55	0.00	51.00
4,400.00	0.55	123.93	4,398.56	-40.55	80.16	-35.64	0.53	-0.28	43.92
4,425.00	0.48	122.03	4,423.55	-40.67	80.35	-35.75	0.29	-0.28	-7.60
4,450.00	0.32	158.97	4,448.55	-40.79	80.46	-35.86	1.18	-0.64	147.76
4,475.00	0.34	106.36	4,473.55	-40.88	80.56	-35.94	1.17	0.08	-210.44
4,500.00	0.33	98.57	4,498.55	-40.91	80.70	-35.97	0.19	-0.04	-31.16
4,525.00	0.48	110.17	4,523.55	-40.96	80.87	-36.00	0.68	0.60	46.40
4,550.00	0.35	144.05	4,548.55	-41.06	81.01	-36.09	1.09	-0.52	135.52
4,575.00	0.36	192.67	4,573.55	-41.19	81.04	-36.23	1.17	0.04	194.48
4,600.00	0.52	237.44	4,598.55	-41.33	80.93	-36.37	1.47	0.64	179.08
4,625.00	0.73	252.82	4,623.55	-41.44	80.68	-36.50	1.07	0.84	61.52



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Local Co-ordinate Reference: Well 4H
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,650.00	1.02	253.76	4,648.55	-41.55	80.31	-36.63	1.16	1.16	3.76
4,675.00	1.07	240.85	4,673.54	-41.73	79.89	-36.83	0.96	0.20	-51.64
4,700.00	1.15	241.79	4,698.54	-41.96	79.47	-37.09	0.33	0.32	3.76
4,725.00	1.26	242.36	4,723.53	-42.20	79.00	-37.36	0.44	0.44	2.28
4,750.00	1.40	244.39	4,748.53	-42.46	78.49	-37.65	0.59	0.56	8.12
4,775.00	1.00	237.49	4,773.52	-42.71	78.03	-37.93	1.70	-1.60	-27.60
4,800.00	0.93	218.90	4,798.52	-42.99	77.71	-38.22	1.28	-0.28	-74.36
4,825.00	0.72	203.47	4,823.51	-43.29	77.52	-38.53	1.22	-0.84	-61.72
4,850.00	0.82	168.64	4,848.51	-43.61	77.50	-38.85	1.88	0.40	-139.32
4,875.00	1.17	140.28	4,873.51	-43.98	77.70	-39.21	2.38	1.40	-113.44
4,900.00	1.12	163.95	4,898.50	-44.41	77.93	-39.63	1.89	-0.20	94.68
4,925.00	1.23	137.49	4,923.50	-44.84	78.18	-40.04	2.19	0.44	-105.84
4,950.00	1.81	136.29	4,948.49	-45.33	78.63	-40.50	2.32	2.32	-4.80
4,975.00	1.75	129.65	4,973.48	-45.86	79.20	-40.99	0.86	-0.24	-26.56
5,000.00	1.69	116.83	4,998.47	-46.27	79.82	-41.37	1.55	-0.24	-51.28
5,025.00	2.00	128.57	5,023.45	-46.71	80.49	-41.76	1.95	1.24	46.96
5,050.00	1.56	124.82	5,048.44	-47.17	81.11	-42.19	1.82	-1.76	-15.00
5,075.00	1.17	108.56	5,073.43	-47.45	81.63	-42.43	2.18	-1.56	-65.04
5,100.00	1.31	113.77	5,098.43	-47.64	82.13	-42.60	0.72	0.56	20.84
5,125.00	1.11	113.76	5,123.42	-47.86	82.62	-42.78	0.80	-0.80	-0.04
5,150.00	1.09	118.11	5,148.42	-48.07	83.05	-42.97	0.34	-0.08	17.40
5,175.00	1.02	117.47	5,173.41	-48.28	83.46	-43.16	0.28	-0.28	-2.56
5,200.00	1.00	110.88	5,198.41	-48.46	83.86	-43.31	0.47	-0.08	-26.36
5,225.00	1.09	103.28	5,223.41	-48.59	84.29	-43.42	0.66	0.36	-30.40
5,250.00	1.17	115.96	5,248.40	-48.76	84.75	-43.56	1.05	0.32	50.72
5,275.00	1.01	121.16	5,273.40	-48.99	85.17	-43.76	0.75	-0.64	20.80
5,300.00	0.88	104.64	5,298.39	-49.15	85.55	-43.90	1.20	-0.52	-66.08
5,325.00	0.99	101.20	5,323.39	-49.24	85.94	-43.96	0.49	0.44	-13.76
5,350.00	1.12	113.41	5,348.39	-49.38	86.38	-44.07	1.04	0.52	48.84
5,375.00	1.02	119.75	5,373.38	-49.58	86.80	-44.26	0.62	-0.40	25.36
5,400.00	0.83	109.93	5,398.38	-49.76	87.16	-44.41	0.99	-0.76	-39.28
5,425.00	0.91	104.46	5,423.37	-49.87	87.52	-44.50	0.46	0.32	-21.88
5,450.00	1.08	96.52	5,448.37	-49.94	87.95	-44.55	0.87	0.68	-31.76
5,475.00	1.20	115.10	5,473.37	-50.08	88.42	-44.65	1.55	0.48	74.32
5,500.00	1.06	120.11	5,498.36	-50.31	88.86	-44.86	0.68	-0.56	20.04
5,525.00	0.83	123.07	5,523.36	-50.52	89.21	-45.05	0.94	-0.92	11.84
5,550.00	0.73	108.22	5,548.36	-50.67	89.51	-45.18	0.90	-0.40	-59.40
5,575.00	0.98	101.89	5,573.35	-50.77	89.87	-45.25	1.07	1.00	-25.32
5,600.00	0.82	108.07	5,598.35	-50.87	90.25	-45.33	0.75	-0.64	24.72
5,625.00	0.98	108.06	5,623.35	-50.99	90.63	-45.43	0.64	0.64	-0.04
5,650.00	0.71	124.29	5,648.34	-51.14	90.96	-45.56	1.43	-1.08	64.92
5,675.00	0.68	107.68	5,673.34	-51.27	91.23	-45.67	0.81	-0.12	-66.44
5,700.00	0.71	99.03	5,698.34	-51.34	91.52	-45.73	0.44	0.12	-34.60



Survey Report



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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	0.63	100.70	5,723.34	-51.39	91.81	-45.76	0.33	-0.32	6.68
5,750.00	0.30	100.81	5,748.34	-51.43	92.01	-45.78	1.32	-1.32	0.44
5,775.00	0.38	98.20	5,773.34	-51.46	92.15	-45.80	0.33	0.32	-10.44
5,800.00	0.44	84.73	5,798.34	-51.46	92.33	-45.79	0.45	0.24	-53.88
5,825.00	0.54	104.34	5,823.34	-51.48	92.54	-45.80	0.78	0.40	78.44
5,850.00	0.33	100.59	5,848.34	-51.52	92.73	-45.83	0.85	-0.84	-15.00
5,875.00	0.35	98.23	5,873.33	-51.54	92.87	-45.85	0.10	0.08	-9.44
5,900.00	1.00	107.79	5,898.33	-51.62	93.16	-45.91	2.63	2.60	38.24
5,925.00	2.24	114.51	5,923.32	-51.89	93.81	-46.14	5.01	4.96	26.88
5,950.00	2.74	118.73	5,948.30	-52.38	94.78	-46.57	2.13	2.00	16.88
5,975.00	3.18	117.91	5,973.27	-52.99	95.91	-47.11	1.77	1.76	-3.28
6,000.00	4.07	113.45	5,998.22	-53.67	97.34	-47.70	3.73	3.56	-17.84
6,025.00	5.15	114.58	6,023.13	-54.49	99.17	-48.41	4.34	4.32	4.52
6,050.00	5.84	115.67	6,048.02	-55.51	101.34	-49.29	2.79	2.76	4.36
6,075.00	5.87	114.22	6,072.89	-56.58	103.65	-50.23	0.60	0.12	-5.80
6,100.00	6.31	112.56	6,097.75	-57.64	106.09	-51.13	1.90	1.76	-6.64
6,125.00	6.92	112.08	6,122.58	-58.73	108.75	-52.06	2.45	2.44	-1.92
6,150.00	6.95	113.92	6,147.40	-59.91	111.53	-53.07	0.90	0.12	7.36
6,175.00	7.14	113.08	6,172.21	-61.13	114.34	-54.12	0.86	0.76	-3.36
6,200.00	7.55	112.74	6,197.00	-62.37	117.29	-55.18	1.65	1.64	-1.36
6,225.00	7.54	113.59	6,221.79	-63.67	120.30	-56.29	0.45	-0.04	3.40
6,250.00	7.70	114.72	6,246.57	-65.02	123.33	-57.46	0.88	0.64	4.52
6,275.00	7.72	115.23	6,271.34	-66.44	126.37	-58.69	0.29	0.08	2.04
6,300.00	7.39	118.14	6,296.12	-67.91	129.31	-59.99	2.02	-1.32	11.64
6,325.00	6.87	123.57	6,320.93	-69.50	131.97	-61.41	3.40	-2.08	21.72
6,350.00	6.85	124.97	6,345.75	-71.18	134.44	-62.94	0.67	-0.08	5.60
6,375.00	6.88	123.36	6,370.57	-72.86	136.91	-64.46	0.78	0.12	-6.44
6,400.00	7.12	125.43	6,395.39	-74.58	139.42	-66.03	1.39	0.96	8.28
6,425.00	6.96	125.95	6,420.20	-76.37	141.91	-67.66	0.69	-0.64	2.08
6,450.00	6.97	124.75	6,445.01	-78.12	144.38	-69.26	0.58	0.04	-4.80
6,475.00	6.80	124.51	6,469.83	-79.82	146.85	-70.81	0.69	-0.68	-0.96
6,500.00	6.49	123.59	6,494.66	-81.44	149.25	-72.29	1.31	-1.24	-3.68
6,525.00	5.91	119.74	6,519.52	-82.86	151.54	-73.57	2.85	-2.32	-15.40
6,550.00	5.89	119.93	6,544.39	-84.14	153.77	-74.71	0.11	-0.08	0.76
6,575.00	6.15	120.02	6,569.25	-85.45	156.04	-75.88	1.04	1.04	0.36
6,600.00	6.23	122.16	6,594.10	-86.84	158.35	-77.13	0.98	0.32	8.56
6,625.00	6.00	119.48	6,618.96	-88.21	160.64	-78.35	1.47	-0.92	-10.72
6,650.00	6.27	118.00	6,643.82	-89.49	162.98	-79.49	1.25	1.08	-5.92
6,675.00	6.43	118.49	6,668.66	-90.80	165.41	-80.65	0.68	0.64	1.96
6,700.00	6.63	119.39	6,693.50	-92.18	167.90	-81.88	0.90	0.80	3.60
6,725.00	6.38	120.22	6,718.34	-93.58	170.36	-83.13	1.07	-1.00	3.32
6,750.00	6.28	119.62	6,743.19	-94.96	172.75	-84.36	0.48	-0.40	-2.40
6,775.00	6.47	118.81	6,768.03	-96.31	175.17	-85.57	0.84	0.76	-3.24
6,800.00	6.56	118.14	6,792.87	-97.67	177.66	-86.77	0.47	0.36	-2.68



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6,825.00	6.51	117.67	6,817.71	-99.00	180.18	-87.94	0.29	-0.20	-1.88
6,850.00	6.67	117.85	6,842.54	-100.33	182.72	-89.12	0.65	0.64	0.72
6,875.00	6.76	118.17	6,867.37	-101.71	185.30	-90.34	0.39	0.36	1.28
6,900.00	6.85	120.36	6,892.20	-103.16	187.88	-91.63	1.10	0.36	8.76
6,925.00	6.67	121.13	6,917.02	-104.66	190.41	-92.98	0.81	-0.72	3.08
6,950.00	6.56	120.89	6,941.86	-106.14	192.88	-94.31	0.45	-0.44	-0.96
6,975.00	6.89	120.97	6,966.68	-107.65	195.39	-95.66	1.32	1.32	0.32
7,000.00	7.02	120.66	6,991.50	-109.20	197.99	-97.05	0.54	0.52	-1.24
7,025.00	7.15	120.55	7,016.31	-110.77	200.64	-98.46	0.52	0.52	-0.44
7,050.00	7.01	120.86	7,041.12	-112.34	203.29	-99.87	0.58	-0.56	1.24
7,075.00	6.02	123.91	7,065.96	-113.86	205.69	-101.23	4.19	-3.96	12.20
7,100.00	5.49	123.14	7,090.83	-115.24	207.78	-102.49	2.14	-2.12	-3.08
7,125.00	4.81	124.65	7,115.73	-116.49	209.64	-103.63	2.77	-2.72	6.04
7,150.00	3.95	121.91	7,140.66	-117.54	211.24	-104.58	3.54	-3.44	-10.96
7,175.00	3.66	124.01	7,165.60	-118.44	212.63	-105.40	1.29	-1.16	8.40
7,200.00	3.63	125.76	7,190.55	-119.35	213.93	-106.22	0.46	-0.12	7.00
7,225.00	3.52	127.70	7,215.50	-120.28	215.18	-107.08	0.65	-0.44	7.76
7,250.00	3.50	127.02	7,240.46	-121.21	216.40	-107.93	0.18	-0.08	-2.72
7,275.00	3.51	126.10	7,265.41	-122.12	217.63	-108.77	0.23	0.04	-3.68
7,300.00	3.57	124.01	7,290.36	-123.01	218.89	-109.58	0.57	0.24	-8.36
7,325.00	3.61	123.53	7,315.31	-123.88	220.19	-110.37	0.20	0.16	-1.92
7,350.00	3.79	124.66	7,340.26	-124.78	221.53	-111.19	0.78	0.72	4.52
7,375.00	3.66	124.73	7,365.21	-125.71	222.86	-112.03	0.52	-0.52	0.28
7,400.00	3.76	125.84	7,390.16	-126.64	224.18	-112.88	0.49	0.40	4.44
7,425.00	3.58	127.11	7,415.10	-127.59	225.47	-113.75	0.79	-0.72	5.08
7,450.00	3.62	127.11	7,440.05	-128.54	226.72	-114.62	0.16	0.16	0.00
7,475.00	3.67	125.70	7,465.00	-129.48	228.00	-115.49	0.41	0.20	-5.64
7,500.00	3.82	124.28	7,489.95	-130.42	229.34	-116.34	0.71	0.60	-5.68
7,525.00	4.24	122.04	7,514.89	-131.38	230.81	-117.21	1.79	1.68	-8.96
7,550.00	4.83	120.02	7,539.81	-132.40	232.51	-118.12	2.44	2.36	-8.08
7,575.00	5.03	122.18	7,564.72	-133.51	234.34	-119.12	1.09	0.80	8.64
7,600.00	5.42	120.70	7,589.61	-134.69	236.29	-120.19	1.65	1.56	-5.92
7,625.00	5.34	120.81	7,614.50	-135.89	238.30	-121.26	0.32	-0.32	0.44
7,650.00	5.42	121.61	7,639.39	-137.11	240.31	-122.35	0.44	0.32	3.20
7,675.00	5.36	121.49	7,664.28	-138.34	242.31	-123.46	0.24	-0.24	-0.48
7,700.00	5.44	120.59	7,689.17	-139.55	244.32	-124.55	0.47	0.32	-3.60
7,725.00	5.47	122.30	7,714.06	-140.79	246.35	-125.66	0.66	0.12	6.84
7,750.00	5.57	124.13	7,738.94	-142.11	248.36	-126.86	0.81	0.40	7.32
7,775.00	5.63	123.64	7,763.82	-143.47	250.39	-128.09	0.31	0.24	-1.96
7,800.00	5.64	125.53	7,788.70	-144.86	252.41	-129.36	0.74	0.04	7.56
7,825.00	5.62	125.42	7,813.58	-146.28	254.41	-130.66	0.09	-0.08	-0.44
7,850.00	5.75	125.10	7,838.46	-147.71	256.43	-131.97	0.54	0.52	-1.28
7,875.00	5.77	123.92	7,863.33	-149.13	258.50	-133.26	0.48	0.08	-4.72



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
MD Reference: RKB @ 3828.40usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,900.00	6.33	121.49	7,888.19	-150.55	260.71	-134.55	2.46	2.24	-9.72
7,925.00	6.78	119.46	7,913.03	-152.00	263.17	-135.84	2.02	1.80	-8.12
7,950.00	6.93	118.65	7,937.85	-153.45	265.78	-137.13	0.71	0.60	-3.24
7,975.00	7.05	118.26	7,962.67	-154.90	268.46	-138.41	0.52	0.48	-1.56
8,000.00	7.09	117.70	7,987.48	-156.34	271.17	-139.69	0.32	0.16	-2.24
8,025.00	7.24	117.72	8,012.28	-157.79	273.93	-140.97	0.60	0.60	0.08
8,050.00	7.38	118.26	8,037.08	-159.29	276.74	-142.29	0.62	0.56	2.16
8,075.00	7.57	118.38	8,061.86	-160.83	279.61	-143.66	0.76	0.76	0.48
8,100.00	7.47	118.56	8,086.65	-162.39	282.48	-145.04	0.41	-0.40	0.72
8,125.00	7.39	119.40	8,111.44	-163.95	285.31	-146.44	0.54	-0.32	3.36
8,150.00	7.50	119.73	8,136.23	-165.55	288.13	-147.86	0.47	0.44	1.32
8,175.00	7.25	119.71	8,161.02	-167.14	290.92	-149.28	1.00	-1.00	-0.08
8,200.00	7.10	121.41	8,185.83	-168.73	293.60	-150.70	1.04	-0.60	6.80
8,225.00	7.11	120.06	8,210.63	-170.31	296.26	-152.12	0.67	0.04	-5.40
8,250.00	6.66	121.07	8,235.45	-171.83	298.84	-153.48	1.86	-1.80	4.04
8,275.00	6.13	125.23	8,260.30	-173.35	301.17	-154.86	2.81	-2.12	16.64
8,300.00	5.65	126.00	8,285.17	-174.85	303.26	-156.22	1.95	-1.92	3.08
8,325.00	5.45	126.51	8,310.05	-176.28	305.21	-157.53	0.82	-0.80	2.04
8,350.00	5.47	127.42	8,334.94	-177.71	307.11	-158.85	0.36	0.08	3.64
8,375.00	5.52	127.96	8,359.82	-179.17	309.01	-160.19	0.29	0.20	2.16
8,400.00	5.38	127.30	8,384.71	-180.62	310.89	-161.53	0.61	-0.56	-2.64
8,425.00	5.40	127.62	8,409.60	-182.05	312.75	-162.84	0.14	0.08	1.28
8,450.00	5.38	129.15	8,434.49	-183.51	314.59	-164.18	0.58	-0.08	6.12
8,475.00	5.37	129.29	8,459.38	-184.99	316.40	-165.55	0.07	-0.04	0.56
8,500.00	5.15	131.31	8,484.27	-186.47	318.15	-166.93	1.15	-0.88	8.08
8,525.00	5.22	129.44	8,509.17	-187.93	319.87	-168.28	0.73	0.28	-7.48
8,550.00	5.21	129.61	8,534.07	-189.38	321.63	-169.62	0.07	-0.04	0.68
8,575.00	5.15	128.91	8,558.96	-190.81	323.37	-170.94	0.35	-0.24	-2.80
8,600.00	5.16	131.37	8,583.86	-192.25	325.09	-172.28	0.88	0.04	9.84
8,625.00	5.18	129.68	8,608.76	-193.72	326.80	-173.64	0.61	0.08	-6.76
8,650.00	5.16	130.07	8,633.66	-195.16	328.53	-174.98	0.16	-0.08	1.56
8,675.00	5.19	130.50	8,658.56	-196.62	330.25	-176.33	0.20	0.12	1.72
8,700.00	5.30	131.61	8,683.45	-198.12	331.98	-177.72	0.60	0.44	4.44
8,725.00	5.11	130.30	8,708.35	-199.61	333.69	-179.10	0.90	-0.76	-5.24
8,750.00	5.08	126.10	8,733.25	-200.98	335.43	-180.37	1.50	-0.12	-16.80
8,775.00	5.05	123.11	8,758.15	-202.23	337.25	-181.51	1.06	-0.12	-11.96
8,800.00	5.09	120.82	8,783.06	-203.40	339.12	-182.56	0.83	0.16	-9.16
8,825.00	5.10	118.78	8,807.96	-204.50	341.05	-183.55	0.73	0.04	-8.16
8,850.00	5.04	117.54	8,832.86	-205.55	343.00	-184.47	0.50	-0.24	-4.96
8,875.00	4.82	117.19	8,857.77	-206.54	344.90	-185.34	0.89	-0.88	-1.40
8,900.00	4.64	118.09	8,882.68	-207.49	346.73	-186.19	0.78	-0.72	3.60
8,925.00	4.44	119.24	8,907.60	-208.44	348.47	-187.03	0.88	-0.80	4.60
8,950.00	4.71	119.46	8,932.52	-209.42	350.20	-187.90	1.08	1.08	0.88



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
MD Reference: RKB @ 3828.40usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,975.00	4.42	118.58	8,957.44	-210.38	351.94	-188.76	1.19	-1.16	-3.52
9,000.00	4.39	116.31	8,982.37	-211.27	353.65	-189.54	0.71	-0.12	-9.08
9,025.00	4.73	115.25	9,007.29	-212.13	355.44	-190.29	1.40	1.36	-4.24
9,050.00	4.65	114.50	9,032.21	-212.99	357.29	-191.04	0.40	-0.32	-3.00
9,075.00	4.61	114.79	9,057.13	-213.83	359.13	-191.77	0.19	-0.16	1.16
9,100.00	4.33	115.36	9,082.05	-214.66	360.89	-192.49	1.13	-1.12	2.28
9,125.00	4.74	117.39	9,106.97	-215.54	362.66	-193.26	1.76	1.64	8.12
9,150.00	4.68	115.73	9,131.89	-216.46	364.50	-194.06	0.60	-0.24	-6.64
9,175.00	4.79	114.11	9,156.80	-217.33	366.37	-194.82	0.69	0.44	-6.48
9,200.00	4.66	114.63	9,181.72	-218.17	368.24	-195.55	0.55	-0.52	2.08
9,225.00	4.82	113.31	9,206.63	-219.01	370.13	-196.28	0.77	0.64	-5.28
9,250.00	5.39	116.22	9,231.53	-219.95	372.15	-197.09	2.50	2.28	11.64
9,275.00	5.69	115.69	9,256.42	-221.00	374.32	-198.01	1.22	1.20	-2.12
9,300.00	5.89	114.54	9,281.29	-222.07	376.60	-198.94	0.92	0.80	-4.60
9,325.00	6.31	116.73	9,306.15	-223.22	379.00	-199.94	1.92	1.68	8.76
9,350.00	6.34	115.44	9,330.99	-224.44	381.47	-201.00	0.58	0.12	-5.16
9,375.00	6.36	117.59	9,355.84	-225.67	383.95	-202.09	0.95	0.08	8.60
9,400.00	6.50	118.14	9,380.68	-226.98	386.42	-203.24	0.61	0.56	2.20
9,425.00	6.26	116.42	9,405.53	-228.25	388.89	-204.37	1.23	-0.96	-6.88
9,450.00	5.79	113.80	9,430.39	-229.37	391.26	-205.34	2.18	-1.88	-10.48
9,475.00	5.52	114.06	9,455.27	-230.37	393.51	-206.20	1.08	-1.08	1.04
9,500.00	5.35	115.32	9,480.16	-231.36	395.67	-207.05	0.83	-0.68	5.04
9,525.00	5.31	114.66	9,505.05	-232.34	397.77	-207.91	0.29	-0.16	-2.64
9,550.00	5.21	114.52	9,529.94	-233.29	399.86	-208.73	0.40	-0.40	-0.56
9,575.00	5.43	113.73	9,554.84	-234.24	401.97	-209.55	0.93	0.88	-3.16
9,600.00	5.79	113.92	9,579.72	-235.22	404.21	-210.40	1.44	1.44	0.76
9,625.00	5.96	115.46	9,604.58	-236.29	406.53	-211.33	0.93	0.68	6.16
9,650.00	6.19	117.52	9,629.44	-237.47	408.90	-212.36	1.27	0.92	8.24
9,675.00	6.53	116.23	9,654.29	-238.73	411.37	-213.46	1.48	1.36	-5.16
9,700.00	7.01	112.92	9,679.12	-239.95	414.05	-214.52	2.47	1.92	-13.24
9,725.00	7.29	111.77	9,703.92	-241.13	416.93	-215.53	1.26	1.12	-4.60
9,750.00	7.44	113.08	9,728.72	-242.35	419.89	-216.57	0.90	0.60	5.24
9,775.00	7.49	112.12	9,753.50	-243.60	422.89	-217.64	0.54	0.20	-3.84
9,800.00	7.28	110.14	9,778.30	-244.76	425.88	-218.61	1.32	-0.84	-7.92
9,825.00	6.90	109.85	9,803.10	-245.82	428.78	-219.49	1.53	-1.52	-1.16
9,850.00	6.70	109.99	9,827.93	-246.82	431.57	-220.33	0.80	-0.80	0.56
9,875.00	6.75	110.30	9,852.76	-247.83	434.32	-221.17	0.25	0.20	1.24
9,900.00	6.69	109.78	9,877.59	-248.84	437.06	-222.00	0.34	-0.24	-2.08
9,925.00	6.56	110.00	9,902.42	-249.82	439.78	-222.82	0.53	-0.52	0.88
9,950.00	6.56	111.55	9,927.25	-250.83	442.45	-223.67	0.71	0.00	6.20
9,975.00	6.69	114.08	9,952.09	-251.95	445.10	-224.63	1.28	0.52	10.12
10,000.00	6.69	113.60	9,976.92	-253.13	447.77	-225.64	0.22	0.00	-1.92
10,025.00	6.71	115.47	10,001.75	-254.34	450.42	-226.69	0.88	0.08	7.48
10,050.00	7.08	124.27	10,026.57	-255.83	453.01	-228.03	4.47	1.48	35.20



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
MD Reference: RKB @ 3828.40usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,075.00	7.65	129.67	10,051.36	-257.76	455.57	-229.80	3.58	2.28	21.60
10,100.00	7.70	129.56	10,076.14	-259.89	458.14	-231.77	0.21	0.20	-0.44
10,125.00	7.69	130.66	10,100.91	-262.05	460.70	-233.77	0.59	-0.04	4.40
10,150.00	7.39	129.96	10,125.70	-264.17	463.20	-235.73	1.25	-1.20	-2.80
10,175.00	6.96	131.88	10,150.50	-266.21	465.56	-237.63	1.97	-1.72	7.68
10,200.00	6.66	130.88	10,175.32	-268.17	467.78	-239.45	1.29	-1.20	-4.00
10,225.00	6.29	133.29	10,200.16	-270.06	469.88	-241.21	1.84	-1.48	9.64
10,250.00	6.32	133.23	10,225.01	-271.94	471.88	-242.97	0.12	0.12	-0.24
10,275.00	6.00	132.58	10,249.87	-273.77	473.84	-244.67	1.31	-1.28	-2.60
10,300.00	5.45	135.09	10,274.74	-275.49	475.64	-246.29	2.42	-2.20	10.04
10,325.00	5.03	135.27	10,299.64	-277.11	477.25	-247.81	1.68	-1.68	0.72
10,350.00	4.55	133.14	10,324.55	-278.57	478.75	-249.17	2.05	-1.92	-8.52
10,375.00	4.28	134.23	10,349.48	-279.90	480.14	-250.41	1.13	-1.08	4.36
10,400.00	4.41	134.64	10,374.41	-281.23	481.49	-251.65	0.53	0.52	1.64
10,425.00	4.33	136.40	10,399.33	-282.58	482.82	-252.93	0.62	-0.32	7.04
10,450.00	4.37	133.98	10,424.26	-283.93	484.16	-254.19	0.75	0.16	-9.68
10,475.00	4.40	136.49	10,449.19	-285.29	485.51	-255.46	0.78	0.12	10.04
10,500.00	4.19	135.25	10,474.12	-286.63	486.81	-256.73	0.92	-0.84	-4.96
10,525.00	4.12	134.44	10,499.05	-287.91	488.09	-257.93	0.37	-0.28	-3.24
10,550.00	3.74	132.28	10,523.99	-289.08	489.34	-259.03	1.63	-1.52	-8.64
10,575.00	3.82	131.22	10,548.94	-290.18	490.57	-260.05	0.42	0.32	-4.24
10,600.00	3.78	129.82	10,573.88	-291.26	491.83	-261.05	0.40	-0.16	-5.60
10,625.00	3.58	126.92	10,598.83	-292.26	493.08	-261.96	1.09	-0.80	-11.60
10,650.00	2.89	122.04	10,623.79	-293.06	494.24	-262.70	2.97	-2.76	-19.52
10,675.00	2.53	114.53	10,648.76	-293.62	495.28	-263.20	2.02	-1.44	-30.04
10,700.00	2.02	113.14	10,673.74	-294.02	496.19	-263.54	2.05	-2.04	-5.56
Tie In									
10,780.00	1.06	320.29	10,753.73	-294.01	497.01	-263.48	3.75	-1.20	-191.06
First Phoenix MWD Survey									
10,835.00	1.14	306.57	10,808.72	-293.29	496.25	-262.81	0.50	0.15	-24.95
10,928.00	7.02	344.95	10,901.45	-287.25	494.02	-256.91	6.63	6.32	41.27
11,022.00	20.72	348.87	10,992.50	-265.28	489.30	-235.26	14.60	14.57	4.17
11,069.00	23.92	346.93	11,035.97	-247.83	485.54	-218.08	6.99	6.81	-4.13
11,116.00	27.06	353.85	11,078.40	-227.91	482.24	-198.39	9.20	6.68	14.72
11,163.00	32.08	0.10	11,119.27	-204.78	481.11	-175.37	12.52	10.68	13.30
11,211.00	38.66	358.16	11,158.39	-177.02	480.65	-147.69	13.91	13.71	-4.04
11,258.00	44.89	357.06	11,193.43	-145.75	479.33	-116.56	13.35	13.26	-2.34
11,305.00	50.36	357.55	11,225.09	-111.08	477.71	-82.05	11.66	11.64	1.04
11,352.00	55.46	359.71	11,253.43	-73.62	476.83	-44.71	11.45	10.85	4.60
11,380.00	57.92	1.07	11,268.81	-50.22	477.00	-21.34	9.66	8.77	4.85
FTP: 11380' MD									
11,399.00	59.59	1.95	11,278.66	-33.99	477.43	-5.11	9.66	8.81	4.64
11,446.00	63.21	3.96	11,301.16	7.21	479.56	36.14	8.57	7.70	4.28



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
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Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,494.00	66.93	4.41	11,321.39	50.62	482.74	79.66	7.80	7.75	0.94
11,541.00	70.83	3.42	11,338.32	94.35	485.73	123.49	8.53	8.30	-2.11
11,588.00	74.29	1.63	11,352.41	139.14	487.70	168.32	8.21	7.36	-3.81
11,635.00	78.61	0.57	11,363.42	184.81	488.57	213.96	9.45	9.19	-2.26
11,683.00	81.88	359.93	11,371.55	232.11	488.78	261.18	6.94	6.81	-1.33
11,730.00	86.44	359.34	11,376.33	278.85	488.48	307.82	9.78	9.70	-1.26
11,801.00	90.06	357.90	11,378.50	349.78	486.77	378.52	5.49	5.10	-2.03
11,895.00	90.70	358.54	11,377.87	443.73	483.85	472.13	0.96	0.68	0.68
11,989.00	91.46	0.40	11,376.10	537.71	482.98	565.88	2.14	0.81	1.98
12,084.00	91.40	1.04	11,373.73	632.67	484.17	660.74	0.68	-0.06	0.67
12,178.00	91.85	1.09	11,371.06	726.62	485.92	754.62	0.48	0.48	0.05
12,272.00	92.38	1.30	11,367.60	820.53	487.88	848.48	0.61	0.56	0.22
12,367.00	92.89	1.53	11,363.23	915.40	490.22	943.32	0.59	0.54	0.24
12,461.00	90.87	0.63	11,360.14	1,009.33	491.99	1,037.18	2.35	-2.15	-0.96
12,555.00	90.70	0.62	11,358.86	1,103.32	493.02	1,131.06	0.18	-0.18	-0.01
12,649.00	90.78	0.75	11,357.64	1,197.30	494.14	1,224.94	0.16	0.09	0.14
12,744.00	90.67	1.16	11,356.44	1,292.28	495.72	1,319.84	0.45	-0.12	0.43
12,838.00	90.95	1.44	11,355.11	1,386.25	497.86	1,413.77	0.42	0.30	0.30
12,932.00	91.40	1.53	11,353.18	1,480.19	500.29	1,507.69	0.49	0.48	0.10
13,026.00	91.40	0.62	11,350.89	1,574.15	502.06	1,601.58	0.97	0.00	-0.97
13,120.00	91.68	359.90	11,348.36	1,668.11	502.48	1,695.40	0.82	0.30	-0.77
13,214.00	91.99	0.58	11,345.35	1,762.06	502.88	1,789.20	0.79	0.33	0.72
13,308.00	93.19	1.32	11,341.10	1,855.95	504.43	1,883.01	1.50	1.28	0.79
13,401.00	91.09	0.97	11,337.63	1,948.86	506.29	1,975.87	2.29	-2.26	-0.38
13,495.00	92.49	1.98	11,334.69	2,042.78	508.71	2,069.76	1.84	1.49	1.07
13,589.00	91.88	1.70	11,331.11	2,136.67	511.72	2,163.65	0.71	-0.65	-0.30
13,683.00	91.12	0.63	11,328.65	2,230.61	513.63	2,257.54	1.40	-0.81	-1.14
13,777.00	91.18	0.73	11,326.76	2,324.59	514.75	2,351.41	0.12	0.06	0.11
13,871.00	90.70	0.23	11,325.22	2,418.57	515.54	2,445.27	0.74	-0.51	-0.53
13,965.00	90.45	0.23	11,324.28	2,512.56	515.91	2,539.12	0.27	-0.27	0.00
14,060.00	87.42	358.08	11,326.04	2,607.52	514.51	2,633.82	3.91	-3.19	-2.26
14,154.00	85.94	355.65	11,331.49	2,701.21	509.38	2,727.03	3.02	-1.57	-2.59
14,249.00	87.87	355.22	11,336.62	2,795.77	501.83	2,820.96	2.08	2.03	-0.45
14,296.00	89.86	354.93	11,337.55	2,842.58	497.80	2,867.45	4.28	4.23	-0.62
14,343.00	91.62	354.40	11,336.94	2,889.37	493.43	2,913.89	3.91	3.74	-1.13
14,390.00	91.62	354.45	11,335.61	2,936.13	488.87	2,960.28	0.11	0.00	0.11
14,437.00	91.65	356.44	11,334.27	2,982.96	485.13	3,006.80	4.23	0.06	4.23
14,484.00	92.02	358.36	11,332.77	3,029.89	483.00	3,053.52	4.16	0.79	4.09
14,531.00	91.93	358.91	11,331.15	3,076.85	481.88	3,100.32	1.19	-0.19	1.17
14,625.00	91.79	359.58	11,328.10	3,170.79	480.65	3,194.02	0.73	-0.15	0.71
14,719.00	91.46	0.11	11,325.43	3,264.75	480.39	3,287.79	0.66	-0.35	0.56
14,813.00	91.62	359.39	11,322.90	3,358.71	479.98	3,381.56	0.78	0.17	-0.77
14,907.00	92.66	358.67	11,319.39	3,452.63	478.39	3,475.21	1.35	1.11	-0.77
15,001.00	92.86	358.52	11,314.87	3,546.50	476.09	3,568.76	0.27	0.21	-0.16



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
MD Reference: RKB @ 3828.40usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,095.00	92.55	358.53	11,310.43	3,640.36	473.67	3,662.31	0.33	-0.33	0.01
15,189.00	92.75	359.59	11,306.08	3,734.25	472.13	3,755.93	1.15	0.21	1.13
15,283.00	92.63	0.13	11,301.67	3,828.14	471.90	3,849.64	0.59	-0.13	0.57
15,377.00	92.44	0.49	11,297.52	3,922.05	472.41	3,943.41	0.43	-0.20	0.38
15,472.00	92.27	0.94	11,293.61	4,016.96	473.60	4,038.22	0.51	-0.18	0.47
15,565.00	91.12	0.58	11,290.86	4,109.91	474.83	4,131.07	1.30	-1.24	-0.39
15,660.00	90.48	0.68	11,289.53	4,204.89	475.87	4,225.95	0.68	-0.67	0.11
15,753.00	90.22	1.18	11,288.97	4,297.88	477.38	4,318.86	0.61	-0.28	0.54
15,847.00	89.92	1.53	11,288.85	4,391.85	479.61	4,412.79	0.49	-0.32	0.37
15,941.00	90.62	0.26	11,288.41	4,485.84	481.07	4,506.69	1.54	0.74	-1.35
16,035.00	90.62	0.34	11,287.39	4,579.83	481.57	4,600.55	0.09	0.00	0.09
16,129.00	90.48	358.45	11,286.49	4,673.82	480.57	4,694.30	2.02	-0.15	-2.01
16,222.00	91.68	358.18	11,284.74	4,766.76	477.84	4,786.91	1.32	1.29	-0.29
16,316.00	91.68	358.36	11,281.98	4,860.68	475.00	4,880.48	0.19	0.00	0.19
16,411.00	91.90	358.72	11,279.01	4,955.60	472.58	4,975.09	0.44	0.23	0.38
16,505.00	91.01	358.65	11,276.63	5,049.54	470.43	5,068.73	0.95	-0.95	-0.07
16,599.00	92.07	358.94	11,274.10	5,143.49	468.45	5,162.38	1.17	1.13	0.31
16,693.00	92.94	358.69	11,269.99	5,237.38	466.51	5,255.98	0.96	0.93	-0.27
16,787.00	93.53	358.84	11,264.69	5,331.20	464.49	5,349.52	0.65	0.63	0.16
16,881.00	91.96	359.38	11,260.19	5,425.08	463.03	5,443.14	1.77	-1.67	0.57
16,976.00	91.04	359.50	11,257.70	5,520.04	462.10	5,537.87	0.98	-0.97	0.13
17,070.00	90.90	359.96	11,256.11	5,614.03	461.66	5,631.66	0.51	-0.15	0.49
17,164.00	88.24	359.78	11,256.81	5,708.02	461.44	5,725.46	2.84	-2.83	-0.19
17,257.00	87.90	359.90	11,259.94	5,800.96	461.18	5,818.22	0.39	-0.37	0.13
17,351.00	87.73	0.44	11,263.53	5,894.89	461.46	5,912.00	0.60	-0.18	0.57
17,445.00	87.79	0.69	11,267.20	5,988.82	462.39	6,005.81	0.27	0.06	0.27
17,538.00	88.54	1.05	11,270.18	6,081.76	463.80	6,098.66	0.89	0.81	0.39
17,633.00	88.60	0.66	11,272.55	6,176.72	465.22	6,193.54	0.42	0.06	-0.41
17,727.00	89.33	0.34	11,274.25	6,270.70	466.04	6,287.39	0.85	0.78	-0.34
17,821.00	89.50	0.19	11,275.21	6,364.69	466.47	6,381.24	0.24	0.18	-0.16
17,914.00	89.27	0.51	11,276.21	6,457.69	467.04	6,474.10	0.42	-0.25	0.34
18,008.00	90.34	0.63	11,276.53	6,551.68	467.98	6,567.98	1.15	1.14	0.13
18,102.00	90.14	0.13	11,276.13	6,645.68	468.60	6,661.84	0.57	-0.21	-0.53
18,196.00	90.03	359.05	11,275.99	6,739.67	467.93	6,755.63	1.15	-0.12	-1.15
18,290.00	90.25	358.21	11,275.76	6,833.64	465.68	6,849.29	0.92	0.23	-0.89
18,385.00	91.09	359.79	11,274.65	6,928.62	464.02	6,943.99	1.88	0.88	1.66
18,479.00	91.43	0.59	11,272.59	7,022.59	464.33	7,037.82	0.92	0.36	0.85
18,572.00	91.32	1.03	11,270.35	7,115.56	465.65	7,130.69	0.49	-0.12	0.47
18,666.00	91.15	1.45	11,268.33	7,209.51	467.68	7,224.60	0.48	-0.18	0.45
18,673.00	91.16	1.48	11,268.19	7,216.51	467.86	7,231.59	0.52	0.15	0.50
LTP: 18673' MD									
18,718.00	91.23	1.71	11,267.25	7,261.48	469.11	7,276.56	0.52	0.15	0.50
Final Phoenix MWD Survey									



Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH / 63528
Design: Surveys (Ensign 155)

Local Co-ordinate Reference: Well 4H
TVD Reference: RKB @ 3828.40usft (Ensign 155)
MD Reference: RKB @ 3828.40usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
18,783.00	91.23	1.71	11,265.85	7,326.44	471.05	7,341.51	0.00	0.00	0.00

Projection to TD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,700.00	10,673.74	-294.02	496.19	Tie In
10,780.00	10,753.73	-294.01	497.01	First Phoenix MWD Survey
11,380.00	11,268.81	-50.22	477.00	FTP: 11380' MD
18,673.00	11,268.19	7,216.51	467.86	LTP: 18673' MD
18,718.00	11,267.25	7,261.48	469.11	Final Phoenix MWD Survey
18,783.00	11,265.85	7,326.44	471.05	Projection to TD

From Bottom to Top		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	18,675	22	4	18,482	57	4	18,266	38	4	18,081	26	4	17,880	29	4
	18,653	22	4	18,452	24	4	18,255	25	4	18,057	28	4	17,864	29	4
	18,631	23	4	18,428	25	4	18,230	21	4	18,029	21	4	17,835	25	4
	18,608	22	4	18,403	25	4	18,209	23	4	18,008	25	4	17,810	24	4
	18,586	22	4	18,378	24	4	18,186		4	17,983	25	4	17,786	25	4
	18,564	22	4	18,354	25	4	18,155	24	4	17,958	24	4	17,761	25	4
	18,542	23	3	18,329	25	3	18,131	24	3	17,934	25	3	17,736	24	3
	18,519		3	18,304		3	18,107		3	17,909		3	17,712		3
	Plug to Plug	92	30	Plug to Plug	64	30	Plug to Plug	67	30	Plug to Plug	84	30	Plug to Plug	84	30
Frac Plug		18,700	Total Shot	Frac Plug	18,467	Total Shot	Frac Plug	18,276	Total Shot	Frac Plug	18,092	Total Shot	Frac Plug	17,894	Total Shot

From Bottom to Top		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	17,681	31	4	17,484	32	4	17,292	24	4	17,094	25	4	16,890	31	4
	17,662	25	4	17,465	25	4	17,267	25	4	17,069	24	4	16,874	27	4
	17,637	24	4	17,440	25	4	17,242	24	4	17,045	25	4	16,847	24	4
	17,613	25	4	17,415	24	4	17,218	25	4	17,020	25	4	16,823	25	4
	17,588	25	4	17,391	25	4	17,193	27	4	16,995	25	4	16,798	25	4
	17,563	24	4	17,366	25	4	17,166	22	4	16,970	24	4	16,773	25	4
	17,539	23	3	17,341	25	3	17,144	25	3	16,946	25	3	16,748	24	3
	17,516		3	17,316		3	17,119		3	16,921		3	16,724		3
	Plug to Plug	83	30	Plug to Plug	87	30	Plug to Plug	88	30	Plug to Plug	87	30	Plug to Plug	79	30
Frac Plug		17,696	Total Shot	Frac Plug	17,502	Total Shot	Frac Plug	17,306	Total Shot	Frac Plug	17,107	Total Shot	Frac Plug	16,902	Total Shot

From Bottom to Top		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	16,699	25	4	16,485	41	4	16,304	25	4	16,104	29	4	15,909	25	4
	16,674	24	4	16,470	18	4	16,277	22	4	16,082	25	4	15,884	24	4
	16,650	25	4	16,452	25	4	16,255	25	4	16,057	25	4	15,860	25	4
	16,625	25	4	16,427	24	4	16,230	25	4	16,032	24	4	15,835	25	4
	16,600	27	4	16,403	25	4	16,205	24	4	16,008	30	4	15,810	25	4
	16,573	22	4	16,378	25	4	16,181	22	4	15,978	20	4	15,785	24	4
	16,551	25	3	16,353	24	3	16,159	26	3	15,958	24	3	15,761	25	3
	16,526		3	16,329		3	16,133		3	15,934		3	15,736		3
	Plug to Plug	86	30	Plug to Plug	73	30	Plug to Plug	86	30	Plug to Plug	87	30	Plug to Plug	86	30
Frac Plug		16,711	Total Shot	Frac Plug	16,500	Total Shot	Frac Plug	16,316	Total Shot	Frac Plug	16,119	Total Shot	Frac Plug	15,921	Total Shot

From Bottom to Top		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	15,704	32	4	15,502	37	4	15,316	25	4	15,119	24	4	14,920	32	4
	15,687	25	4	15,489	25	4	15,292	25	4	15,094	23	4	14,897	25	4
	15,662	25	4	15,464	26	4	15,267	25	4	15,071	26	4	14,872	25	4
	15,637	22	4	15,438	23	4	15,242	24	4	15,045	25	4	14,847	25	4
	15,615	27	4	15,415	25	4	15,218	22	4	15,020	25	4	14,822	24	4
	15,588	25	4	15,390	24	4	15,196	24	4	14,995	24	4	14,798	25	4
	15,563	24	3	15,366	25	3	15,172	29	3	14,971	19	3	14,773	25	3
	15,539		3	15,341		3	15,143		3	14,952		3	14,748		3
	Plug to Plug	83	30	Plug to Plug	78	30	Plug to Plug	87	30	Plug to Plug	86	30	Plug to Plug	87	30
Frac Plug		15,720	Total Shot	Frac Plug	15,516	Total Shot	Frac Plug	15,329	Total Shot	Frac Plug	15,131	Total Shot	Frac Plug	14,934	Total Shot

From Bottom to Top		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	14,718	32	4	14,526	25	4	14,322	31	4	14,131	25	4	13,921	35	4
	14,694	20	4	14,501	24	4	14,304	24	4	14,104	24	4	13,904	20	4
	14,674	24	4	14,477	25	4	14,280	26	4	14,080	23	4	13,884	25	4
	14,650	25	4	14,452	25	4	14,254	24	4	14,057	25	4	13,859	24	4
	14,625	25	4	14,427	24	4	14,230	25	4	14,032	24	4	13,835	29	4
	14,600	22	4	14,403	25	4	14,205	25	4	14,008	24	4	13,806	21	4
	14,578	27	3	14,378	25	3	14,180	24	3	13,984	28	3	13,785	24	3
	14,551		3	14,353		3	14,156		3	13,956		3	13,761		3
	Plug to Plug	80	30	Plug to Plug	86	30	Plug to Plug	82	30	Plug to Plug	86	30	Plug to Plug	75	30
Frac Plug		14,730	Total Shot	Frac Plug	14,538	Total Shot	Frac Plug	14,336	Total Shot	Frac Plug	14,143	Total Shot	Frac Plug	13,934	Total Shot

From Bottom to Top		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	13,736	25	4	13,538	25	4	13,341	25	4	13,143	25	4	12,946	24	4
	13,711	24	4	13,512	23	4	13,310	19	4	13,119	25	4	12,921	21	4
	13,687	25	4	13,489	25	4	13,291	24	4	13,094	25	4	12,900	28	4
	13,662	25	4	13,464	21	4	13,267	25	4	13,069	24	4	12,872	25	4
	13,637	25	4	13,443	28	4	13,242	25	4	13,045	30	4	12,847	25	4
	13,612	24	4	13,415	25	4	13,217	24	4	13,015	20	4	12,822	24	4
	13,588	25	3	13,390	24	3	13,193	25	3	12,995	25	3	12,798	23	3
	13,563		3	13,366		3	13,168		3	12,970		3	12,775		3
	Plug to Plug	86	30	Plug to Plug	87	30	Plug to Plug	86	30	Plug to Plug	87	30	Plug to Plug	86	30
Frac Plug		13,748	Total Shot	Frac Plug	13,551	Total Shot	Frac Plug	13,353	Total Shot	Frac Plug	13,156	Total Shot	Frac Plug	12,958	Total Shot

From Bottom to Top		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots		Distance Between Perfs	Shots
	12,748	27	4	12,541	34	4	12,353	25	4	12,151	29	4	11,958	25	4
	12,724	25	4	12,526	25	4	12,328	24	4	12,131	25	4	11,933	24	4
	12,699	25	4	12,501	24	4	12,304	25	4	12,106	24	4	11,909	25	4
	12,674	25	4	12,477	25	4	12,279	25	4	12,082	25	4	11,884	25	4
	12,649	24	4	12,452	25	4	12,254	24	4	12,057	27	4	11,859	24	4
	12,625	25	4	12,427	24	4	12,239	25	4	12,030	23	4	11,835	25	4
	12,600	25	3	12,403	25	3	12,205	25	3	12,007	24	3	11,810	25	3
	12,575		3	12,378		3	12,180		3	11,983		3	11,785		3
	Plug to Plug	87	30	Plug to Plug	76	30	Plug to Plug	86	30	Plug to Plug	86	30	Plug to Plug	86	30
	Frac Plug	12,761	Total Shots	Frac Plug	12,553	Total Shots	Frac Plug	12,365	Total Shots	Frac Plug	12,168	Total Shots	Frac Plug	11,970	Total Shots

From Bottom to Top		Distance Between Perfs	Shots	Stage 37	Distance Between Perfs	Shots	Stage 38	Distance Between Perfs	Shots	Stage 39	Distance Between Perfs	Shots	Stage 40	Distance Between Perfs	Shots
	11,761	24	4		11606			0			0			0	
	11,736	25	4												
	11,711	25	4												
	11,686	24	4												
	11,662	56	4												
	11,606		3												
	Plug to Plug	87	23	Plug to Plug	0	0	Plug to Plug	0	0	Plug to Plug	0	0	Plug to Plug	0	0
	Frac Plug	11,773	Total Shots	Frac Plug		Total Shots	Frac Plug		Total Shots	Frac Plug		Total Shots	Frac Plug		Total Shots

Little Bear Federal Com #4H

<u>Perfs</u>	<u>7 1/2% Acid (Gal)</u>	<u>Sand (#)</u>	<u>Fluid (Gal)</u>
1	1512	399150	455532
2	3024	400090	367584
3	3024	400630	362334
4	3024	399020	370944
5	3024	399440	350154
6	3024	402450	352842
7	3024	398990	371910
8	3024	399420	360024
9	3024	396820	378588
10	3024	398770	476826
11	3024	403500	469938
12	3024	399720	353430
13	3024	400810	370440
14	3024	400860	343518
15	3024	400780	341670
16	3024	401220	338310
17	3024	399120	472500
18	3024	397640	354900
19	3024	401200	372582
20	3024	401740	385728
21	3024	401050	344442
22	3024	400910	539826
23	3024	401300	334362
24	3024	399990	341880
25	3024	406450	351414
26	3024	401821	360864
27	3024	400380	331254
28	3024	375050	345156
29	3024	405180	374472
30	3024	403050	348816
31	3024	399770	341166
32	3024	399190	355614
33	3024	406890	348390
34	3024	399850	339234
35	3024	401640	351966
36	2520	357120	300594
Totals	106,848	14,361,011	13,359,204