



COG OPERATING, LLC

Eddy /Lea County, NM (NAD27) NMEZ

Dodd Federal Unit #920H #920H DFU920H

SL 2310 FSL, 195 FEL Sec14/T17S/R29E/Unitl

PP - 2290'FSL, 682'FEL Sec14/T17S/R29E/Unitl

Latera

30-015-44368

Planned BHL 2290'FSL, 10'FWL Sec 14/T17S/R29E/UnitL

Actual BHL 2296'FSL, 12'FWL Sec 14/T17S/R29E/UnitL

NM OIL CONSERVATION
ARTESIA DISTRICT

DEC 14 2017

RECEIVED

12-20-17



Survey Report

Company: COG OPERATING, LLC
Project: Eddy /Lea County, NM (NAD27) NMEZ
Site: Dodd Federal Unit #920H
Well: #920H
Wellbore: Lateral
Design: Lateral

Local Co-ordinate Reference: Site Dodd Federal Unit #920H
TVD Reference: 3621+18 @ 3639.00ft (SO3)
MD Reference: 3621+18 @ 3639.00ft (SO3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: VON_EDM

Project	Eddy /Lea County, NM (NAD27) NMEZ		
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		Dodd Federal Unit #920H			
Site Position:		Northing:	667,074.40 ft	Latitude:	32° 50' 0.669 N
From:	Map	Easting:	591,028.00 ft	Longitude:	104° 2' 13.135 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.20 in	Grid Convergence:	0.16 °

Well	#920H - Slot DFU920H					
Well Position	+N/-S	0.00 ft	Northing:	667,074.40 ft	Latitude:	32° 50' 0.669 N
	+E/-W	0.00 ft	Easting:	591,028.00 ft	Longitude:	104° 2' 13.135 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,621.00 ft

Wellbore	Lateral				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	08/24/17	7.20	60.54	48,229

Design	Lateral				
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	269.96	

Survey Program	Date	09/16/17			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	925.00	Survey #1 (Lateral)	GYD_DP_MS	Gyrodata gyro-compassing and drop	
1,061.00	9,719.00	Survey #2 (Lateral)	MWD	MWD v3: standard declination	
9,813.00	9,813.00	Survey #3 (Lateral)	Projection	Projection	

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
BKU 920H SL									
100.00	0.15	77.30	100.00	0.03	0.13	-0.13	0.15	0.15	0.00
200.00	0.07	194.61	200.00	0.00	0.24	-0.24	0.19	-0.08	117.31
300.00	0.75	332.75	300.00	0.52	-0.08	0.07	0.80	0.68	138.14
400.00	0.95	328.45	399.99	1.81	-0.81	0.81	0.21	0.20	-4.30
500.00	1.07	343.41	499.97	3.41	-1.51	1.51	0.29	0.12	14.96
600.00	1.15	8.32	599.95	5.30	-1.63	1.63	0.49	0.08	24.91
700.00	1.33	14.51	699.93	7.42	-1.19	1.19	0.22	0.18	6.19



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800.00	1.29	20.45	799.90	9.59	-0.51	0.50	0.14	-0.04	5.94
900.00	1.18	23.71	899.88	11.59	0.30	-0.31	0.13	-0.11	3.26
925.00	1.16	35.22	924.87	12.03	0.55	-0.55	0.94	-0.08	46.04
1,061.00	0.89	26.05	1,060.85	14.11	1.80	-1.81	0.23	-0.20	-6.74
1,154.00	1.75	97.05	1,153.83	14.58	3.53	-3.54	1.81	0.92	76.34
1,249.00	3.67	104.69	1,248.72	13.63	7.91	-7.92	2.05	2.02	8.04
1,344.00	4.02	105.05	1,343.51	12.00	14.07	-14.08	0.37	0.37	0.38
1,439.00	3.79	107.66	1,438.29	10.18	20.28	-20.28	0.31	-0.24	2.75
1,534.00	3.46	110.51	1,533.10	8.22	25.95	-25.96	0.40	-0.35	3.00
1,629.00	3.90	92.66	1,627.90	7.07	31.87	-31.87	1.29	0.46	-18.79
1,724.00	4.03	90.51	1,722.68	6.89	38.43	-38.44	0.21	0.14	-2.26
1,818.00	3.64	93.52	1,816.47	6.68	44.71	-44.72	0.47	-0.41	3.20
1,917.00	3.59	93.19	1,915.27	6.31	50.94	-50.95	0.05	-0.05	-0.33
2,010.00	3.36	93.98	2,008.10	5.96	56.57	-56.57	0.25	-0.25	0.85
2,105.00	2.69	96.37	2,102.97	5.52	61.56	-61.57	0.72	-0.71	2.52
2,200.00	3.76	91.54	2,197.81	5.19	66.89	-66.90	1.16	1.13	-5.08
2,293.00	4.02	90.67	2,290.60	5.07	73.20	-73.20	0.29	0.28	-0.94
2,389.00	4.09	94.63	2,386.36	4.75	79.98	-79.98	0.30	0.07	4.13
2,483.00	3.87	93.30	2,480.13	4.30	86.49	-86.49	0.25	-0.23	-1.41
2,577.00	3.76	97.67	2,573.92	3.70	92.71	-92.71	0.33	-0.12	4.65
2,672.00	3.73	94.46	2,668.72	3.05	98.87	-98.88	0.22	-0.03	-3.38
2,767.00	5.43	95.70	2,763.41	2.36	106.43	-106.43	1.79	1.79	1.31
2,862.00	5.99	96.19	2,857.94	1.38	115.83	-115.83	0.59	0.59	0.52
2,957.00	6.60	100.96	2,952.37	-0.19	126.12	-126.12	0.85	0.64	5.02
3,052.00	5.85	111.06	3,046.81	-2.97	136.00	-135.99	1.39	-0.79	10.63
3,147.00	5.75	117.62	3,141.33	-6.92	144.73	-144.73	0.71	-0.11	6.91
3,242.00	4.75	111.14	3,235.93	-10.54	152.62	-152.61	1.22	-1.05	-6.82
3,337.00	5.04	105.83	3,330.58	-13.10	160.30	-160.29	0.57	0.31	-5.59
3,432.00	4.90	104.55	3,425.23	-15.26	168.24	-168.23	0.19	-0.15	-1.35
3,527.00	4.16	113.98	3,519.93	-17.67	175.32	-175.30	1.10	-0.78	9.93
3,622.00	4.26	116.43	3,614.67	-20.65	181.62	-181.61	0.22	0.11	2.58
3,716.00	2.99	113.63	3,708.48	-23.18	187.00	-186.98	1.36	-1.35	-2.98
3,810.00	1.87	122.92	3,802.40	-25.00	190.53	-190.51	1.26	-1.19	9.88
3,905.00	0.50	285.15	3,897.38	-25.73	191.43	-191.41	2.47	-1.44	170.77
4,000.00	0.65	284.63	3,992.38	-25.49	190.51	-190.49	0.16	0.16	-0.55
4,007.70	0.64	283.72	4,000.08	-25.47	190.43	-190.41	0.15	-0.07	-11.79
BKU 920H Tgt p2									
4,007.80	0.64	283.71	4,000.17	-25.47	190.43	-190.41	0.15	-0.07	-11.88
BKU 920H Tgt									
4,094.00	0.60	272.63	4,086.37	-25.33	189.50	-189.49	0.15	-0.05	-12.85
4,156.00	1.14	293.88	4,148.37	-25.07	188.61	-188.60	1.00	0.87	34.27
4,188.00	2.24	288.65	4,180.35	-24.74	187.73	-187.71	3.47	3.44	-16.34
4,220.00	3.89	282.81	4,212.30	-24.30	186.08	-186.06	5.24	5.16	-18.25
4,251.00	6.31	277.17	4,243.18	-23.85	183.36	-183.35	7.96	7.81	-18.19



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4,283.00	8.57	272.31	4,274.91	-23.54	179.24	-179.22	7.32	7.06	-15.19
4,315.00	10.97	273.61	4,306.44	-23.25	173.81	-173.80	7.53	7.50	4.06
4,347.00	13.67	274.61	4,337.70	-22.75	167.01	-166.99	8.46	8.44	3.13
4,378.00	17.65	276.07	4,367.55	-21.96	158.68	-158.66	12.90	12.84	4.71
4,410.00	22.51	273.58	4,397.59	-21.06	147.73	-147.72	15.42	15.19	-7.78
4,442.00	27.10	270.05	4,426.63	-20.68	134.32	-134.31	15.07	14.34	-11.03
4,474.00	31.32	266.34	4,454.56	-21.20	118.73	-118.71	14.34	13.19	-11.59
4,506.00	35.20	265.11	4,481.31	-22.52	101.23	-101.21	12.31	12.13	-3.84
4,537.00	39.15	265.46	4,506.01	-24.05	82.56	-82.55	12.76	12.74	1.13
4,569.00	43.12	265.72	4,530.11	-25.67	61.58	-61.56	12.42	12.41	0.81
4,601.00	44.95	266.17	4,553.11	-27.24	39.39	-39.37	5.80	5.72	1.41
4,696.00	47.68	270.73	4,618.74	-29.04	-29.24	29.26	4.51	2.87	4.80
4,759.00	47.87	271.02	4,661.08	-28.32	-75.89	75.91	0.46	0.30	0.46
4,791.00	47.71	270.60	4,682.58	-27.99	-99.59	99.61	1.09	-0.50	-1.31
4,823.00	48.11	270.10	4,704.03	-27.84	-123.33	123.35	1.70	1.25	-1.56
4,853.00	50.48	270.07	4,723.59	-27.81	-146.07	146.09	7.90	7.90	-0.10
4,885.00	53.94	270.45	4,743.19	-27.69	-171.36	171.38	10.85	10.81	1.19
4,917.00	57.94	271.03	4,761.11	-27.35	-197.86	197.88	12.59	12.50	1.81
4,948.00	61.90	271.45	4,776.65	-26.77	-224.67	224.69	12.83	12.77	1.35
4,980.00	65.39	271.80	4,790.85	-25.95	-253.33	253.35	10.95	10.91	1.09
5,012.00	67.86	272.32	4,803.55	-24.90	-282.68	282.70	7.86	7.72	1.63
5,044.00	70.80	270.62	4,814.84	-24.13	-312.61	312.63	10.45	9.19	-5.31
5,075.00	74.13	269.14	4,824.18	-24.20	-342.16	342.18	11.67	10.74	-4.77
5,107.00	76.95	268.54	4,832.17	-24.83	-373.14	373.16	9.00	8.81	-1.88
5,138.00	80.40	269.43	4,838.26	-25.36	-403.53	403.54	11.48	11.13	2.87
5,170.00	85.13	269.35	4,842.29	-25.70	-435.26	435.28	14.78	14.78	-0.25
5,202.00	89.51	270.16	4,843.78	-25.84	-467.22	467.24	13.92	13.69	2.53
5,221.15	90.38	270.19	4,843.80	-25.78	-486.37	486.39	4.55	4.55	0.16
BKU 920H LP p2									
5,231.41	90.85	270.21	4,843.69	-25.74	-496.62	496.64	4.55	4.55	0.16
BKU 920H LP									
5,233.00	90.92	270.21	4,843.67	-25.74	-498.22	498.23	4.55	4.55	0.16
5,333.00	92.75	268.46	4,840.46	-26.90	-598.15	598.17	2.53	1.83	-1.75
5,428.00	91.12	270.48	4,837.26	-27.77	-693.08	693.10	2.73	-1.72	2.13
5,521.00	90.97	271.58	4,835.56	-26.10	-786.05	786.07	1.19	-0.16	1.18
5,616.00	90.25	272.30	4,834.55	-22.89	-880.99	881.01	1.07	-0.76	0.76
5,711.00	91.44	271.31	4,833.15	-19.89	-975.93	975.94	1.63	1.25	-1.04
5,806.00	93.99	270.93	4,828.65	-18.04	-1,070.80	1,070.81	2.71	2.68	-0.40
5,838.00	92.46	271.39	4,826.85	-17.39	-1,102.74	1,102.75	4.99	-4.78	1.44
5,869.00	90.99	270.93	4,825.91	-16.76	-1,133.72	1,133.73	4.97	-4.74	-1.48
5,901.00	90.03	270.43	4,825.63	-16.38	-1,165.71	1,165.73	3.38	-3.00	-1.56
5,933.00	90.19	270.63	4,825.57	-16.09	-1,197.71	1,197.72	0.80	0.50	0.63
5,964.00	90.25	270.68	4,825.45	-15.73	-1,228.71	1,228.72	0.25	0.19	0.16



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5,996.00	90.50	270.79	4,825.24	-15.32	-1,260.71	1,260.72	0.85	0.78	0.34
6,090.00	90.96	271.04	4,824.04	-13.82	-1,354.69	1,354.70	0.56	0.49	0.27
6,185.00	88.76	270.84	4,824.27	-12.26	-1,449.67	1,449.68	2.33	-2.32	-0.21
6,280.00	87.96	269.49	4,826.99	-11.99	-1,544.63	1,544.63	1.65	-0.84	-1.42
6,374.00	87.95	270.02	4,830.35	-12.39	-1,638.56	1,638.57	0.56	-0.01	0.56
6,469.00	88.08	268.47	4,833.64	-13.64	-1,733.50	1,733.51	1.64	0.14	-1.63
6,564.00	88.79	268.50	4,836.23	-16.15	-1,828.43	1,828.44	0.75	0.75	0.03
6,596.00	88.72	268.49	4,836.93	-16.99	-1,860.41	1,860.42	0.22	-0.22	-0.03
6,628.00	89.58	268.41	4,837.40	-17.86	-1,892.39	1,892.41	2.70	2.69	-0.25
6,659.00	91.13	268.03	4,837.21	-18.82	-1,923.38	1,923.39	5.15	5.00	-1.23
6,691.00	91.63	267.71	4,836.44	-20.01	-1,955.35	1,955.36	1.85	1.56	-1.00
6,722.00	91.31	267.71	4,835.64	-21.25	-1,986.31	1,986.32	1.03	-1.03	0.00
6,754.00	91.01	267.97	4,835.00	-22.46	-2,018.28	2,018.30	1.24	-0.94	0.81
6,786.00	90.95	268.11	4,834.45	-23.55	-2,050.26	2,050.27	0.48	-0.19	0.44
6,817.00	91.62	268.29	4,833.75	-24.52	-2,081.23	2,081.25	2.24	2.16	0.58
6,849.00	91.50	268.31	4,832.88	-25.47	-2,113.21	2,113.23	0.38	-0.38	0.06
6,881.00	90.93	268.76	4,832.20	-26.29	-2,145.19	2,145.21	2.27	-1.78	1.41
6,912.00	90.41	268.54	4,831.84	-27.02	-2,176.18	2,176.20	1.82	-1.68	-0.71
6,944.00	90.97	268.70	4,831.46	-27.79	-2,208.17	2,208.19	1.82	1.75	0.50
6,976.00	91.03	269.02	4,830.90	-28.43	-2,240.16	2,240.18	1.02	0.19	1.00
7,007.00	90.87	269.18	4,830.38	-28.91	-2,271.15	2,271.17	0.73	-0.52	0.52
7,039.00	91.60	269.23	4,829.69	-29.36	-2,303.14	2,303.16	2.29	2.28	0.16
7,071.00	91.82	269.58	4,828.74	-29.69	-2,335.12	2,335.14	1.29	0.69	1.09
7,102.00	91.78	269.75	4,827.77	-29.87	-2,366.11	2,366.13	0.56	-0.13	0.55
7,133.00	91.66	269.84	4,826.84	-29.98	-2,397.09	2,397.11	0.48	-0.39	0.29
7,165.00	91.45	269.96	4,825.97	-30.04	-2,429.08	2,429.10	0.76	-0.66	0.38
7,196.00	91.39	270.14	4,825.20	-30.01	-2,460.07	2,460.09	0.61	-0.19	0.58
7,228.00	92.03	270.40	4,824.24	-29.86	-2,492.06	2,492.08	2.16	2.00	0.81
7,260.00	92.13	270.50	4,823.08	-29.61	-2,524.03	2,524.05	0.44	0.31	0.31
7,291.00	91.83	270.63	4,822.01	-29.30	-2,555.01	2,555.03	1.05	-0.97	0.42
7,323.00	91.49	270.38	4,821.08	-29.02	-2,587.00	2,587.02	1.32	-1.06	-0.78
7,355.00	91.58	270.68	4,820.23	-28.73	-2,618.99	2,619.01	0.98	0.28	0.94
7,386.00	91.60	270.64	4,819.37	-28.37	-2,649.97	2,649.99	0.14	0.06	-0.13
7,417.00	91.29	270.85	4,818.58	-27.97	-2,680.96	2,680.98	1.21	-1.00	0.68
7,449.00	91.17	270.94	4,817.90	-27.47	-2,712.95	2,712.97	0.47	-0.38	0.28
7,480.00	91.26	271.35	4,817.24	-26.85	-2,743.93	2,743.95	1.35	0.29	1.32
7,512.00	92.01	271.26	4,816.33	-26.12	-2,775.91	2,775.93	2.36	2.34	-0.28
7,544.00	92.19	271.42	4,815.16	-25.37	-2,807.88	2,807.90	0.75	0.56	0.50
7,575.00	92.12	271.80	4,813.99	-24.50	-2,838.85	2,838.87	1.25	-0.23	1.23
7,607.00	92.23	271.85	4,812.77	-23.48	-2,870.81	2,870.83	0.38	0.34	0.16
7,638.00	92.06	271.06	4,811.61	-22.70	-2,901.78	2,901.79	2.60	-0.55	-2.55
7,670.00	91.82	270.65	4,810.53	-22.22	-2,933.76	2,933.77	1.48	-0.75	-1.28
7,702.00	91.84	270.73	4,809.51	-21.83	-2,965.74	2,965.75	0.26	0.06	0.25
7,733.00	91.87	271.04	4,808.51	-21.36	-2,996.72	2,996.73	1.00	0.10	1.00



Survey Report

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Wellbore: Lateral
Design: Lateral

Local Co-ordinate Reference: Site Dodd Federal Unit #920H
TVD Reference: 3621+18 @ 3639.00ft (SO3)
MD Reference: 3621+18 @ 3639.00ft (SO3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: VON_EDM

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)
7,765.00	91.31	269.87	4,807.62	-21.10	-3,028.70	3,028.72	4.05	-1.75	-3.66
7,796.00	91.13	269.23	4,806.96	-21.34	-3,059.69	3,059.71	2.14	-0.58	-2.06
7,828.00	90.86	268.98	4,806.40	-21.84	-3,091.69	3,091.70	1.15	-0.84	-0.78
7,859.00	90.68	269.23	4,805.99	-22.33	-3,122.68	3,122.69	0.99	-0.58	0.81
7,891.00	91.15	268.91	4,805.47	-22.85	-3,154.67	3,154.69	1.78	1.47	-1.00
7,923.00	90.97	268.83	4,804.88	-23.48	-3,186.66	3,186.67	0.62	-0.56	-0.25
7,955.00	90.87	268.97	4,804.37	-24.09	-3,218.65	3,218.67	0.54	-0.31	0.44
7,986.00	91.83	269.45	4,803.64	-24.52	-3,249.64	3,249.65	3.46	3.10	1.55
8,017.00	91.93	269.54	4,802.62	-24.79	-3,280.62	3,280.64	0.43	0.32	0.29
8,049.00	91.89	269.63	4,801.56	-25.03	-3,312.60	3,312.62	0.31	-0.13	0.28
8,080.00	91.60	269.60	4,800.61	-25.23	-3,343.59	3,343.60	0.94	-0.94	-0.10
8,112.00	91.78	269.96	4,799.67	-25.36	-3,375.57	3,375.59	1.26	0.56	1.13
8,143.00	92.15	270.53	4,798.60	-25.22	-3,406.55	3,406.57	2.19	1.19	1.84
8,175.00	92.26	271.35	4,797.37	-24.70	-3,438.52	3,438.54	2.58	0.34	2.56
8,206.00	92.04	272.12	4,796.21	-23.76	-3,469.49	3,469.50	2.58	-0.71	2.48
8,238.00	90.84	270.92	4,795.41	-22.91	-3,501.47	3,501.48	5.30	-3.75	-3.75
8,270.00	90.37	270.17	4,795.07	-22.61	-3,533.46	3,533.48	2.77	-1.47	-2.34
8,301.00	90.53	270.28	4,794.82	-22.49	-3,564.46	3,564.48	0.63	0.52	0.35
8,333.00	90.89	270.83	4,794.43	-22.18	-3,596.46	3,596.47	2.05	1.13	1.72
8,364.00	90.47	270.91	4,794.06	-21.71	-3,627.45	3,627.47	1.38	-1.35	0.26
8,395.00	90.08	270.92	4,793.91	-21.21	-3,658.45	3,658.46	1.26	-1.26	0.03
8,427.00	90.09	270.68	4,793.86	-20.76	-3,690.44	3,690.46	0.75	0.03	-0.75
8,458.00	89.83	270.46	4,793.89	-20.46	-3,721.44	3,721.46	1.10	-0.84	-0.71
8,490.00	89.66	270.45	4,794.03	-20.20	-3,753.44	3,753.45	0.53	-0.53	-0.03
8,522.00	89.72	269.25	4,794.20	-20.29	-3,785.44	3,785.45	3.75	0.19	-3.75
8,553.00	89.68	269.03	4,794.36	-20.75	-3,816.44	3,816.45	0.72	-0.13	-0.71
8,585.00	89.96	269.23	4,794.46	-21.24	-3,848.43	3,848.45	1.08	0.88	0.63
8,616.00	91.05	269.74	4,794.19	-21.52	-3,879.43	3,879.44	3.88	3.52	1.65
8,647.00	91.49	270.35	4,793.50	-21.49	-3,910.42	3,910.43	2.43	1.42	1.97
8,679.00	91.72	270.81	4,792.61	-21.17	-3,942.41	3,942.42	1.61	0.72	1.44
8,710.00	91.61	270.79	4,791.71	-20.73	-3,973.39	3,973.40	0.36	-0.35	-0.06
8,742.00	91.17	270.72	4,790.93	-20.31	-4,005.38	4,005.39	1.39	-1.38	-0.22
8,774.00	90.42	270.54	4,790.49	-19.96	-4,037.37	4,037.39	2.41	-2.34	-0.56
8,805.00	89.98	268.82	4,790.38	-20.13	-4,068.37	4,068.38	5.73	-1.42	-5.55
8,837.00	89.85	268.23	4,790.43	-20.96	-4,100.36	4,100.37	1.89	-0.41	-1.84
8,868.00	90.59	268.26	4,790.31	-21.91	-4,131.34	4,131.36	2.39	2.39	0.10
8,900.00	91.16	269.05	4,789.82	-22.66	-4,163.33	4,163.35	3.04	1.78	2.47
8,932.00	90.88	268.90	4,789.25	-23.23	-4,195.32	4,195.34	0.99	-0.88	-0.47
8,963.00	90.32	268.30	4,788.92	-23.99	-4,226.31	4,226.33	2.65	-1.81	-1.94
8,994.00	91.09	268.36	4,788.54	-24.89	-4,257.29	4,257.31	2.49	2.48	0.19
9,026.00	91.42	269.02	4,787.84	-25.62	-4,289.28	4,289.30	2.31	1.03	2.06
9,057.00	91.52	269.51	4,787.05	-26.02	-4,320.27	4,320.28	1.61	0.32	1.58
9,089.00	91.72	270.31	4,786.14	-26.07	-4,352.25	4,352.27	2.58	0.63	2.50



Survey Report

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Design: Lateral

Local Co-ordinate Reference: Site Dodd Federal Unit #920H
TVD Reference: 3621+18 @ 3639.00ft (SO3)
MD Reference: 3621+18 @ 3639.00ft (SO3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: VON_EDM

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)
9,120.00	91.83	270.51	4,785.18	-25.85	-4,383.24	4,383.25	0.74	0.35	0.65
9,152.00	91.96	270.40	4,784.12	-25.59	-4,415.22	4,415.24	0.53	0.41	-0.34
9,184.00	91.93	270.52	4,783.04	-25.34	-4,447.20	4,447.22	0.39	-0.09	0.38
9,215.00	91.46	270.59	4,782.12	-25.04	-4,478.18	4,478.20	1.53	-1.52	0.23
9,246.00	91.07	270.53	4,781.44	-24.74	-4,509.17	4,509.19	1.27	-1.26	-0.19
9,277.00	91.15	270.86	4,780.84	-24.36	-4,540.17	4,540.18	1.10	0.26	1.06
9,309.00	91.88	270.57	4,779.99	-23.96	-4,572.15	4,572.17	2.45	2.28	-0.91
9,340.00	91.93	270.39	4,778.96	-23.70	-4,603.13	4,603.15	0.60	0.16	-0.58
9,372.00	91.88	270.03	4,777.89	-23.58	-4,635.12	4,635.13	1.14	-0.16	-1.13
9,403.00	91.97	270.13	4,776.85	-23.54	-4,666.10	4,666.11	0.43	0.29	0.32
9,435.00	92.05	270.48	4,775.73	-23.37	-4,698.08	4,698.09	1.12	0.25	1.09
9,467.00	92.14	270.56	4,774.56	-23.08	-4,730.06	4,730.07	0.38	0.28	0.25
9,498.00	92.17	270.63	4,773.40	-22.76	-4,761.03	4,761.05	0.25	0.10	0.23
9,530.00	91.94	270.66	4,772.25	-22.40	-4,793.01	4,793.02	0.72	-0.72	0.09
9,562.00	91.44	270.60	4,771.30	-22.05	-4,824.99	4,825.01	1.57	-1.56	-0.19
9,594.00	91.23	270.81	4,770.56	-21.65	-4,856.98	4,857.00	0.93	-0.66	0.66
9,625.00	91.16	270.93	4,769.91	-21.18	-4,887.97	4,887.99	0.45	-0.23	0.39
9,656.00	91.17	271.05	4,769.28	-20.65	-4,918.96	4,918.97	0.39	0.03	0.39
9,688.00	91.26	271.06	4,768.60	-20.06	-4,950.95	4,950.96	0.28	0.28	0.03
9,695.33	91.24	271.07	4,768.44	-19.92	-4,958.28	4,958.29	0.32	-0.26	0.19
BKU 920H PBHL									
9,719.00	91.18	271.12	4,767.94	-19.47	-4,981.94	4,981.95	0.32	-0.26	0.19
9,813.00	91.18	271.12	4,766.01	-17.63	-5,075.90	5,075.91	0.00	0.00	0.00
BKU 920H PBHL p2 - BKU 920H BHL									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
BKU 920H SL	0.00	0.00	0.00	0.00	0.00	667,074.40	591,028.00	32° 50' 0.669 N	104° 2' 13.135 W
- actual wellpath hits target center									
- Point									
BKU 920H BHL	0.00	0.00	4,766.01	-17.63	-5,075.90	667,056.77	585,952.10	32° 50' 0.632 N	104° 3' 12.626 W
- actual wellpath hits target center									
- Point									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
4,839.00	4,714.58	-27.83	-135.36	Wellpath Crosses 330'HL @ Heel
9,496.00	4,773.47	-22.78	-4,759.03	Wellpath Crosses 330'HL @ Toe
9,813.00	4,766.01	-17.63	-5,075.90	TD @ 2296'FSL, 12'FWL

25' of open hole - TD 9838'



Survey Report

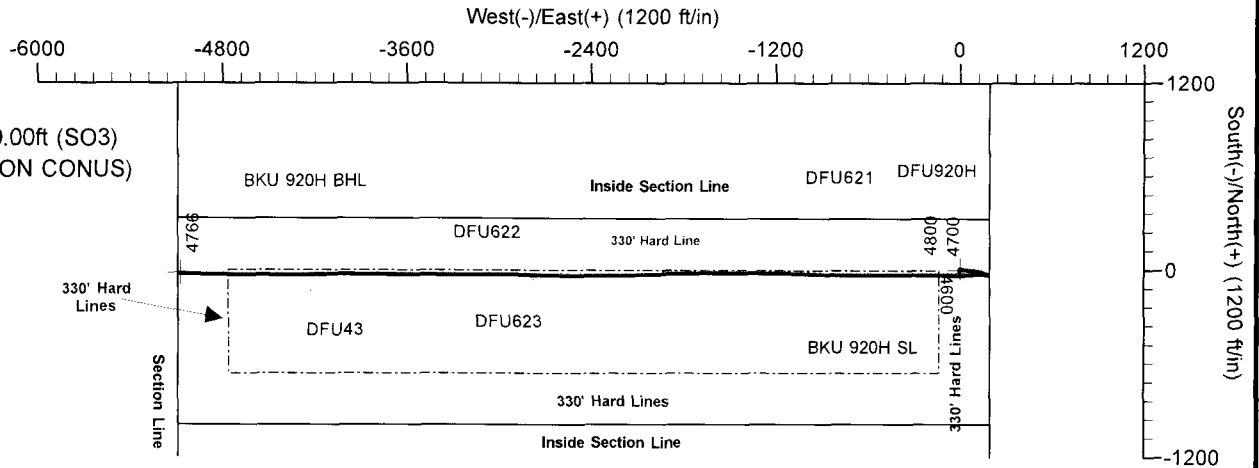
Company: COG OPERATING, LLC
Project: Eddy /Lea County, NM (NAD27) NMEZ
Site: Dodd Federal Unit #920H
Well: #920H
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MD Reference: 3621+18 @ 3639.00ft (SO3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: VON_EDM

Checked By: _____	Approved By: _____	Date: _____
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COG OPERATING, LLC

Project: Eddy /Lea County, NM (NAD27) NMEZ
 Site: Dodd Federal Unit #920H
 Well: #920H
 Wellbore: Lateral
 Design: Lateral



SLOTS

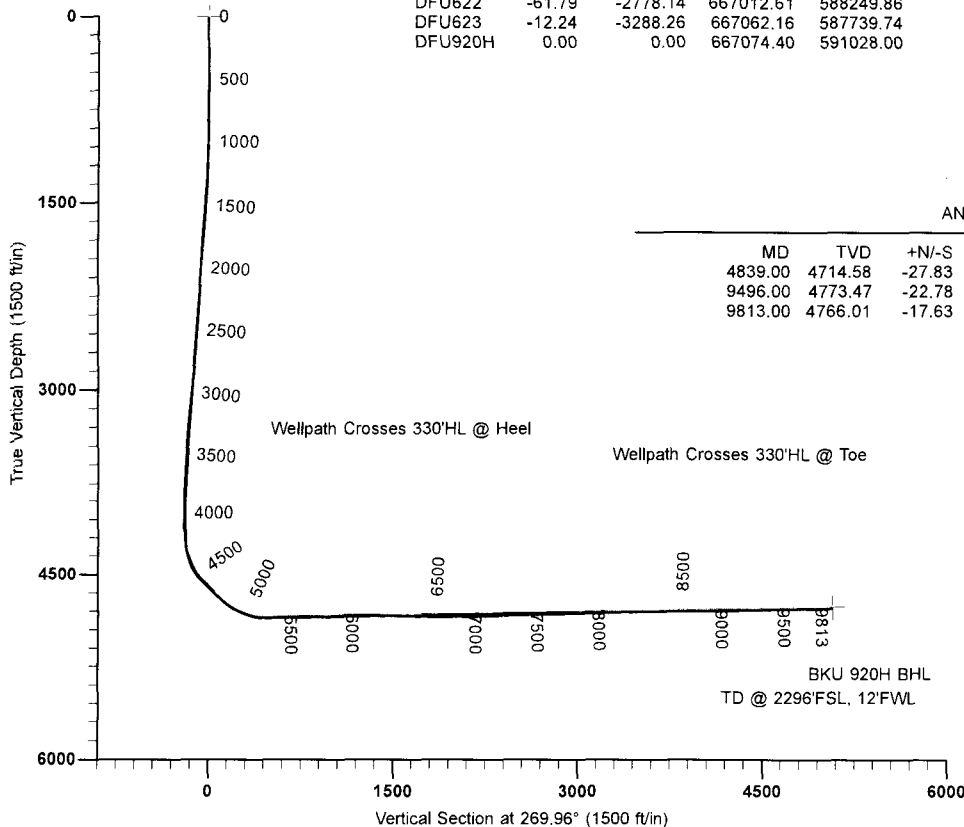
Slot Name	+N/-S	+E/-W	Northing	Easting
DFU43	-133.06	-4227.97	666941.34	586800.03
DFU621	-0.40	-464.61	667074.00	590563.38
DFU622	-61.79	-2778.14	667012.61	588249.86
DFU623	-12.24	-3288.26	667062.16	587739.74
DFU920H	0.00	0.00	667074.40	591028.00



Azimuths to Grid North
 True North: -0.16°
 Magnetic North: 7.04°
 Magnetic Field
 Strength: 48228.8snT
 Dip Angle: 60.54°
 Date: 08/24/2017
 Model: IGRF2015

ANNOTATIONS

MD	TVD	+N/-S	+E/-W	Annotation
4839.00	4714.58	-27.83	-135.36	Wellpath Crosses 330'HL @ Heel
9496.00	4773.47	-22.78	-4759.03	Wellpath Crosses 330'HL @ Toe
9813.00	4766.01	-17.63	-5075.90	TD @ 2296'FSL, 12'FWL



TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
BKU 920H SL	0.00	0.00	0.00	667074.40	591028.00	Point
BKU 920H BHL	4766.01	-17.63	-5075.90	667056.77	585952.10	Point

Design: Lateral (#920H/Lateral)
 Created By: Mekka Williams
 eSomina Well Design
 mekka@esominawell.com
 8:04, September 16 2017

VON DIRECTIONAL
 12074 FM 3083 Conroe, Texas 77301
 936-756-2400

