



COG Operating LLC

NM OIL CONSERVATION
ARTESIA DISTRICT

JUN 12 2017

RECEIVED

COG Operating LLC

Eddy County, NM (NAD-27 2015)

Dodd Federal Unit #918H

API #: 30-015-42940

SHL: 1650' FNL, 190' FEL, Sec 15, T17S, R29E, Unit H

PP: 1675' FNL, 330' FWL, Sec 14, T17S, R29E, Unit E

BHL: 1662' FNL, 246' FEL, Sec 14, T17S, R29E, Unit H

Design: BHL: 1670' FNL, 220' FEL, Sec 14, T17S, R29E, Unit H

Standard Survey Report

19 March, 2017

Provide signature page for survey





TDS
Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Dodd Federal Unit #918H
Well: SHL: 1650' FNL, 190' FEL, Sec 15, T17S, R29E, Unit H
Wellbore: BHL: 1670' FNL, 220' FEL, Sec 14, T17S, R29E, Unit H
Design: BHL: 1670' FNL, 220' FEL, Sec 14, T17S, R29E, Unit H

Local Co-ordinate Reference: Well SHL: 1650' FNL, 190' FEL, Sec 15, T17S, R29E, Unit H
TVD Reference: KB @ 3626.00usft (Silver Oak 3)
MD Reference: KB @ 3626.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project	Eddy County, NM (NAD-27 2015)		
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 #918H

Site Position: Northing: 668.394.90 usft Latitude: 32° 50' 13.891 N
From: Map Easting: 585.746.40 usft Longitude: 104° 3' 14.981 W
Position Uncertainty: 0.00 usft Slot Radius: 13.20 in Grid Convergence: 0.15 °

Well SHL: 1650' FNL, 190' FEL, Sec 15, T17S, R29E, Unit H

Well Position +N/-S 0.00 usft Northing: 668.394.90 usft Latitude: 32° 50' 13.891 N
+E/-W 0.00 usft Easting: 585.746.40 usft Longitude: 104° 3' 14.981 W
Position Uncertainty 0.00 usft Wellhead Elevation: 0.00 usft Ground Level: 3,608.00 usft

Wellbore BHL: 1670' FNL, 220' FEL, Sec 14, T17S, R29E, Unit H

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	2/28/2017	7.26	60.55	48,279

Design BHL: 1670' FNL, 220' FEL, Sec 14, T17S, R29E, Unit H

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	90.24

Survey Program Date 3/19/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
25.00	925.00	VES Gyro #1 (BHL: 1670' FNL, 220' FEL,	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro
1,009.00	9,852.00	TDS MWD #2 (BHL: 1670' FNL, 220' FEL,	MWD	MWD - Standard

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
25.00	0.18	80.80	25.00	0.01	0.04	0.04	0.72	0.72	0.00
50.00	0.09	78.41	50.00	0.02	0.10	0.10	0.36	-0.36	-9.56
75.00	0.12	82.50	75.00	0.02	0.14	0.14	0.12	0.12	16.36
100.00	0.19	135.68	100.00	0.00	0.20	0.20	0.61	0.28	212.72
125.00	0.26	168.63	125.00	-0.09	0.24	0.24	0.58	0.28	131.80
150.00	0.24	169.63	150.00	-0.19	0.26	0.26	0.08	-0.08	4.00



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175.00	0.09	115.60	175.00	-0.25	0.28	0.29	0.80	-0.60	-216.12
200.00	0.21	193.28	200.00	-0.31	0.29	0.29	0.84	0.48	310.72
225.00	0.11	211.11	225.00	-0.37	0.27	0.27	0.44	-0.40	71.32
250.00	0.10	105.54	250.00	-0.40	0.28	0.28	0.67	-0.04	-422.28
275.00	0.29	58.35	275.00	-0.37	0.35	0.35	0.94	0.76	-188.76
300.00	0.37	51.10	300.00	-0.29	0.47	0.47	0.36	0.32	-29.00
325.00	0.36	47.76	325.00	-0.18	0.59	0.59	0.09	-0.04	-13.36
350.00	0.34	45.63	350.00	-0.08	0.70	0.70	0.10	-0.08	-8.52
375.00	0.36	58.04	375.00	0.01	0.82	0.82	0.31	0.08	49.64
400.00	0.42	52.94	400.00	0.11	0.96	0.96	0.28	0.24	-20.40
425.00	0.46	58.82	425.00	0.22	1.12	1.12	0.24	0.16	23.52
450.00	0.47	48.80	449.99	0.34	1.28	1.28	0.33	0.04	-40.08
475.00	0.48	56.27	474.99	0.46	1.45	1.45	0.25	0.04	29.88
500.00	0.45	46.92	499.99	0.59	1.61	1.60	0.33	-0.12	-37.40
525.00	0.38	38.61	524.99	0.72	1.73	1.73	0.37	-0.28	-33.24
550.00	0.49	50.99	549.99	0.85	1.86	1.86	0.58	0.44	49.52
575.00	0.44	53.10	574.99	0.98	2.02	2.02	0.21	-0.20	8.44
600.00	0.40	52.51	599.99	1.09	2.17	2.17	0.16	-0.16	-2.36
625.00	0.45	47.94	624.99	1.21	2.31	2.31	0.24	0.20	-18.28
650.00	0.54	46.14	649.99	1.35	2.47	2.46	0.37	0.36	-7.20
675.00	0.60	46.19	674.99	1.53	2.65	2.64	0.24	0.24	0.20
700.00	0.62	47.43	699.99	1.71	2.84	2.84	0.10	0.08	4.96
725.00	0.69	29.34	724.98	1.93	3.02	3.01	0.87	0.28	-72.36
750.00	0.81	33.99	749.98	2.21	3.19	3.18	0.54	0.48	18.60
775.00	0.78	36.31	774.98	2.49	3.39	3.38	0.18	-0.12	9.28
800.00	0.83	44.82	799.98	2.76	3.62	3.61	0.52	0.20	34.04
825.00	0.86	40.43	824.97	3.03	3.87	3.85	0.29	0.12	-17.56
850.00	0.83	48.22	849.97	3.29	4.12	4.11	0.47	-0.12	31.16
875.00	0.80	50.18	874.97	3.52	4.39	4.38	0.16	-0.12	7.84
900.00	0.58	55.07	899.97	3.71	4.63	4.61	0.91	-0.88	19.56
925.00	0.57	74.60	924.97	3.81	4.85	4.84	0.78	-0.04	78.12
Tie-In to VES Gyro									
1,009.00	0.60	72.60	1,008.96	4.06	5.68	5.66	0.04	0.04	-2.38
First TDS MWD Survey									
1,040.00	0.40	67.80	1,039.96	4.15	5.93	5.91	0.66	-0.65	-15.48
1,136.00	1.20	291.30	1,135.95	4.64	5.30	5.29	1.58	0.83	-142.19
1,231.00	3.10	265.60	1,230.89	4.80	1.82	1.80	2.19	2.00	-27.05
1,326.00	3.40	265.10	1,325.73	4.36	-3.55	-3.57	0.32	0.32	-0.53
1,421.00	3.20	267.70	1,420.57	4.02	-9.01	-9.02	0.26	-0.21	2.74
1,516.00	2.90	266.20	1,515.44	3.75	-14.05	-14.07	0.33	-0.32	-1.58
1,611.00	2.60	269.60	1,610.33	3.58	-18.61	-18.62	0.36	-0.32	3.58



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1,706.00	2.40	268.90	1,705.24	3.52	-22.75	-22.77	0.21	-0.21	-0.74
1,801.00	1.90	271.00	1,800.17	3.51	-26.31	-26.33	0.53	-0.53	2.21
1,896.00	3.90	262.80	1,895.05	3.14	-31.09	-31.11	2.14	2.11	-8.63
1,990.00	3.70	264.60	1,988.84	2.45	-37.29	-37.30	0.25	-0.21	1.91
2,085.00	3.40	264.30	2,083.66	1.88	-43.14	-43.15	0.32	-0.32	-0.32
2,180.00	2.90	262.90	2,178.51	1.31	-48.33	-48.33	0.53	-0.53	-1.47
2,275.00	2.70	264.90	2,273.40	0.81	-52.94	-52.94	0.23	-0.21	2.11
2,370.00	2.50	262.00	2,368.30	0.32	-57.22	-57.22	0.25	-0.21	-3.05
2,465.00	2.60	262.30	2,463.21	-0.26	-61.41	-61.41	0.11	0.11	0.32
2,560.00	2.40	263.90	2,558.12	-0.76	-65.52	-65.52	0.22	-0.21	1.68
2,654.00	3.80	247.40	2,651.98	-2.16	-70.36	-70.35	1.75	1.49	-17.55
2,749.00	4.10	245.10	2,746.75	-4.80	-76.34	-76.32	0.36	0.32	-2.42
2,843.00	4.10	249.90	2,840.51	-7.37	-82.55	-82.51	0.36	0.00	5.11
2,938.00	4.20	252.40	2,935.27	-9.59	-89.05	-89.01	0.22	0.11	2.63
3,033.00	4.20	253.60	3,030.01	-11.62	-95.70	-95.66	0.09	0.00	1.26
3,128.00	4.10	253.70	3,124.76	-13.56	-102.30	-102.24	0.11	-0.11	0.11
3,223.00	4.30	257.80	3,219.51	-15.27	-109.04	-108.98	0.38	0.21	4.32
3,318.00	3.20	251.70	3,314.30	-16.85	-115.04	-114.97	1.23	-1.16	-6.42
3,413.00	3.20	251.10	3,409.15	-18.54	-120.07	-119.99	0.04	0.00	-0.63
3,508.00	2.50	233.00	3,504.04	-20.65	-124.23	-124.14	1.19	-0.74	-19.05
3,603.00	2.50	232.30	3,598.95	-23.16	-127.52	-127.43	0.03	0.00	-0.74
3,698.00	2.50	232.10	3,693.86	-25.70	-130.80	-130.69	0.01	0.00	-0.21
3,793.00	2.50	229.30	3,788.77	-28.33	-134.00	-133.88	0.13	0.00	-2.95
3,888.00	1.90	253.60	3,883.70	-30.12	-137.09	-136.96	1.15	-0.63	25.58
3,983.00	0.50	311.60	3,978.68	-30.29	-138.91	-138.78	1.78	-1.47	61.05
4,078.00	0.40	322.50	4,073.67	-29.75	-139.42	-139.29	0.14	-0.11	11.47
4,110.00	0.70	132.40	4,105.67	-29.80	-139.34	-139.22	3.43	0.94	530.94
4,141.00	3.30	137.50	4,136.65	-30.58	-138.60	-138.47	8.40	8.39	16.45
4,173.00	7.00	140.00	4,168.52	-32.75	-136.72	-136.58	11.58	11.56	7.81
4,204.00	10.80	135.20	4,199.14	-36.26	-133.46	-133.31	12.48	12.26	-15.48
4,236.00	14.40	132.10	4,230.36	-41.06	-128.39	-128.22	11.44	11.25	-9.69
4,268.00	18.10	131.10	4,261.08	-47.00	-121.69	-121.50	11.60	11.56	-3.13
4,299.00	21.30	128.00	4,290.26	-53.63	-113.63	-113.40	10.86	10.32	-10.00
4,331.00	24.00	123.50	4,319.79	-60.80	-103.62	-103.36	10.02	8.44	-14.06
4,362.00	26.00	115.70	4,347.90	-67.23	-92.23	-91.95	12.43	6.45	-25.16
4,394.00	28.10	105.70	4,376.41	-72.32	-78.65	-78.35	15.63	6.56	-31.25
4,426.00	30.90	96.30	4,404.27	-75.26	-63.22	-62.90	16.88	8.75	-29.38
4,457.00	34.90	89.90	4,430.30	-76.12	-46.42	-46.10	17.08	12.90	-20.65
4,489.00	40.00	87.50	4,455.70	-75.65	-26.98	-26.66	16.57	15.94	-7.50
4,521.00	43.60	85.10	4,479.55	-74.26	-5.70	-5.39	12.31	11.25	-7.50
4,552.00	45.40	84.00	4,501.66	-72.19	15.92	16.23	6.32	5.81	-3.55



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4,584.00	45.60	84.20	4,524.09	-69.85	38.63	38.92	0.77	0.63	0.63
4,616.00	45.60	84.50	4,546.48	-67.60	61.38	61.66	0.67	0.00	0.94
4,647.00	45.70	84.40	4,568.15	-65.45	83.44	83.72	0.40	0.32	-0.32
4,679.00	45.60	84.40	4,590.52	-63.22	106.22	106.48	0.31	-0.31	0.00
4,710.00	45.30	84.80	4,612.27	-61.14	128.21	128.46	1.33	-0.97	1.29
4,742.00	46.60	84.30	4,634.52	-58.96	151.10	151.35	4.21	4.06	-1.56
4,773.00	50.40	81.20	4,655.06	-56.01	174.12	174.36	14.36	12.26	-10.00
4,805.00	55.00	79.60	4,674.44	-51.75	199.21	199.43	14.91	14.38	-5.00
4,837.00	59.90	80.60	4,691.66	-47.13	225.78	225.97	15.54	15.31	3.13
4,868.00	64.20	82.00	4,706.18	-42.99	252.84	253.02	14.43	13.87	4.52
4,900.00	68.00	83.30	4,719.15	-39.25	281.85	282.01	12.44	11.88	4.06
4,931.00	71.70	84.10	4,729.82	-36.06	310.77	310.92	12.18	11.94	2.58
4,963.00	75.50	85.30	4,738.86	-33.23	341.33	341.47	12.41	11.88	3.75
4,995.00	78.90	86.40	4,745.95	-30.98	372.45	372.58	11.14	10.63	3.44
5,026.00	82.60	87.10	4,750.93	-29.24	402.99	403.11	12.14	11.94	2.26
5,058.00	84.90	87.60	4,754.41	-27.77	434.77	434.88	7.35	7.19	1.56
5,090.00	87.40	88.30	4,756.56	-26.63	466.67	466.78	8.11	7.81	2.19
5,121.00	88.40	88.20	4,757.70	-25.68	497.64	497.74	3.24	3.23	-0.32
5,141.14	88.26	88.18	4,758.28	-25.05	517.76	517.86	0.71	-0.70	-0.10
As-Drilled PP									
5,221.00	87.70	88.10	4,761.10	-22.46	597.53	597.61	0.71	-0.70	-0.10
5,316.00	88.90	89.30	4,763.92	-20.30	692.46	692.53	1.79	1.26	1.26
5,411.00	88.60	89.60	4,765.99	-19.39	787.43	787.50	0.45	-0.32	0.32
5,505.00	88.20	89.80	4,768.61	-18.90	881.39	881.46	0.48	-0.43	0.21
5,600.00	89.40	90.30	4,770.60	-18.98	976.37	976.44	1.37	1.26	0.53
5,695.00	90.20	91.50	4,770.94	-20.47	1,071.35	1,071.43	1.52	0.84	1.26
5,790.00	88.50	90.10	4,772.01	-21.80	1,166.33	1,166.41	2.32	-1.79	-1.47
5,885.00	89.70	89.20	4,773.51	-21.22	1,261.32	1,261.39	1.58	1.26	-0.95
5,979.00	90.40	90.00	4,773.42	-20.56	1,355.31	1,355.39	1.13	0.74	0.85
6,074.00	90.00	90.30	4,773.09	-20.81	1,450.31	1,450.39	0.53	-0.42	0.32
6,169.00	89.70	90.40	4,773.34	-21.39	1,545.31	1,545.38	0.33	-0.32	0.11
6,264.00	89.90	90.40	4,773.67	-22.06	1,640.31	1,640.38	0.21	0.21	0.00
6,359.00	89.70	91.10	4,774.00	-23.30	1,735.30	1,735.38	0.77	-0.21	0.74
6,454.00	90.20	91.60	4,774.09	-25.54	1,830.27	1,830.36	0.74	0.53	0.53
6,549.00	89.60	89.60	4,774.25	-26.53	1,925.26	1,925.35	2.20	-0.63	-2.11
6,644.00	89.80	90.00	4,774.75	-26.20	2,020.26	2,020.35	0.47	0.21	0.42
6,739.00	89.70	90.40	4,775.16	-26.53	2,115.25	2,115.35	0.43	-0.11	0.42
6,834.00	89.40	90.50	4,775.91	-27.28	2,210.25	2,210.34	0.33	-0.32	0.11
6,929.00	89.10	90.90	4,777.15	-28.44	2,305.23	2,305.33	0.53	-0.32	0.42
7,023.00	89.00	88.60	4,778.71	-28.03	2,399.21	2,399.31	2.45	-0.11	-2.45
7,118.00	89.00	88.60	4,780.37	-25.71	2,494.17	2,494.26	0.00	0.00	0.00



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Project: Eddy County, NM (NAD-27 2015)

Site: Dodd Federal Unit #918H

Well: SHL: 1650' FNL, 190' FEL, Sec 15, T17S, R29E, Unit H

Wellbore: BHL: 1670' FNL, 220' FEL, Sec 14, T17S, R29E, Unit H

Design: BHL: 1670' FNL, 220' FEL, Sec 14, T17S, R29E, Unit H

Local Co-ordinate Reference:

Well SHL: 1650' FNL, 190' FEL, Sec 15, T17S, R29E, Unit H

TVD Reference:

KB @ 3626.00usft (Silver Oak 3)

MD Reference:

KB @ 3626.00usft (Silver Oak 3)

North Reference:

Grid

Survey Calculation Method:

Minimum Curvature

Database:

EDM 5000.1 Single User Db

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)
7,213.00	89.10	88.80	4,781.95	-23.55	2,589.13	2,589.21	0.24	0.11	0.21
7,308.00	89.10	89.00	4,783.44	-21.73	2,684.10	2,684.17	0.21	0.00	0.21
7,403.00	89.10	89.30	4,784.93	-20.32	2,779.08	2,779.14	0.32	0.00	0.32
7,498.00	89.40	88.90	4,786.17	-18.83	2,874.06	2,874.11	0.53	0.32	-0.42
7,593.00	89.60	89.60	4,787.00	-17.59	2,969.05	2,969.10	0.77	0.21	0.74
7,687.00	90.00	89.80	4,787.33	-17.09	3,063.05	3,063.09	0.48	0.43	0.21
7,782.00	90.00	90.40	4,787.33	-17.26	3,158.05	3,158.09	0.63	0.00	0.63
7,877.00	90.20	90.40	4,787.16	-17.92	3,253.04	3,253.09	0.21	0.21	0.00
7,972.00	90.30	90.70	4,786.75	-18.83	3,348.04	3,348.09	0.33	0.11	0.32
8,066.00	90.30	91.30	4,786.26	-20.48	3,442.02	3,442.08	0.64	0.00	0.64
8,161.00	89.30	89.90	4,786.59	-21.47	3,537.01	3,537.07	1.81	-1.05	-1.47
8,256.00	89.10	90.10	4,787.92	-21.47	3,632.00	3,632.06	0.30	-0.21	0.21
8,351.00	89.30	90.30	4,789.24	-21.80	3,726.99	3,727.05	0.30	0.21	0.21
8,446.00	89.50	90.50	4,790.24	-22.46	3,821.99	3,822.05	0.30	0.21	0.21
8,541.00	89.90	90.80	4,790.73	-23.54	3,916.98	3,917.04	0.53	0.42	0.32
8,635.00	89.00	88.90	4,791.64	-23.30	4,010.97	4,011.03	2.24	-0.96	-2.02
8,730.00	89.30	89.00	4,793.05	-21.56	4,105.94	4,106.00	0.33	0.32	0.11
8,825.00	89.40	89.60	4,794.12	-20.40	4,200.93	4,200.98	0.64	0.11	0.63
8,920.00	89.60	89.80	4,794.95	-19.90	4,295.92	4,295.97	0.30	0.21	0.21
9,015.00	89.80	90.20	4,795.45	-19.90	4,390.92	4,390.97	0.47	0.21	0.42
9,110.00	89.00	88.70	4,796.45	-18.99	4,485.91	4,485.95	1.79	-0.84	-1.58
9,205.00	89.10	89.20	4,798.02	-17.25	4,580.88	4,580.91	0.54	0.11	0.53
9,300.00	89.40	89.20	4,799.26	-15.92	4,675.86	4,675.89	0.32	0.32	0.00
9,395.00	89.20	89.40	4,800.42	-14.76	4,770.85	4,770.87	0.30	-0.21	0.21
9,489.00	89.20	89.60	4,801.74	-13.94	4,864.83	4,864.85	0.21	0.00	0.21
9,584.00	89.30	89.60	4,802.98	-13.28	4,959.82	4,959.84	0.11	0.11	0.00
9,679.00	89.50	90.30	4,803.98	-13.19	5,054.82	5,054.83	0.77	0.21	0.74
9,774.00	89.60	90.40	4,804.72	-13.77	5,149.81	5,149.83	0.15	0.11	0.11

Last TDS MWD Survey

9,852.00	89.60	90.40	4,805.27	-14.32	5,227.81	5,227.82	0.00	0.00	0.00
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Projection to Bit/TD



Survey Report

TDS Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Dodd Federal Unit #918H
Well: SHL: 1650' FNL, 190' FEL, Sec 15, T17S, R29E, Unit H
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
925.00	924.97	3.81	4.85	Tie-In to VES Gyro
1,009.00	1,008.96	4.06	5.68	First TDS MWD Survey
5,141.14	4,758.28	-25.05	517.76	As-Drilled PP
9,774.00	4,804.72	-13.77	5,149.81	Last TDS MWD Survey
9,852.00	4,805.27	-14.32	5,227.81	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____