



NM OIL CONSERVATION
ARTESIA DISTRICT

SEP 17 2015

RECEIVED

9/8/15

State of New Mexico
County of Eddy

30 015 40413

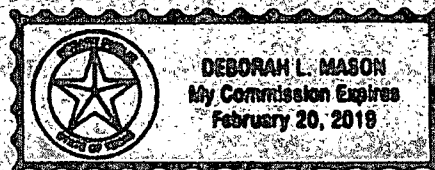
I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 07/04/2015 through 07/09/2015 conduct or supervise the taking of a MWD survey from a depth of 3733 feet to a depth of 8860 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Terra Directional Services LLC; that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating, LLC for the Hogan State Com #15H Well API 30-015-40413 in Eddy County, New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Terra Directional Services LLC.

Donald D. Mason
President

State of Texas

County of Burnet

Before me, a notary public, on this day personally appeared Donald D. Mason known to me to be the person whose name is subscribed to the foregoing document and, being by me first duly sworn, declared that the statements therein contained are true and correct.



Notary Public's Signature



Customer Name: COG
 Well Name: Hogan State Com #15H
 API Number: 30-015-40413
 County / Parish: Eddy Co

M.W.D. Operator: Justin Campos
 Directional Driller: John Overton
 Total Magnetic Correction: 7.2
 Job #: NM-547

Vertical Section: 273.47

Tie In Survey(s) Provided By:

	Meas. Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N / -S	+E / -W	Dist.	Angle	DLS
Tie - In										
0	3670.00	0.59	266.09	3669.79	-2.63	14.24	3.50	14.66	13.82	0.52
1	3733.00	0.70	277.20	3732.79	-1.93	14.27	2.79	14.54	11.08	0.26
2	3766.00	0.70	284.70	3765.78	-1.53	14.34	2.40	14.54	9.50	0.28
3	3797.00	2.30	289.70	3796.77	-0.74	14.60	1.63	14.69	6.37	5.17
4	3829.00	5.20	292.20	3828.70	1.25	15.36	-0.32	15.37	358.82	9.07
5	3861.00	8.90	295.20	3860.45	4.92	16.97	-3.90	17.41	347.05	11.62
6	3893.00	13.00	292.40	3891.86	10.63	19.39	-9.47	21.58	333.97	12.92
7	3925.00	17.00	289.90	3922.77	18.52	22.36	-17.20	28.21	322.43	12.66
8	3958.00	20.50	289.00	3954.01	28.72	25.88	-27.20	37.55	313.58	10.64
9	3990.00	23.70	289.30	3983.66	40.31	29.83	-38.57	48.76	307.72	10.01
10	4022.00	26.80	290.50	4012.60	53.40	34.49	-51.40	61.90	303.86	9.82
11	4054.00	29.90	292.50	4040.75	67.84	40.07	-65.53	76.81	301.44	10.13
12	4087.00	32.10	294.30	4069.04	83.81	46.82	-81.13	93.67	299.99	7.23
13	4119.00	34.30	295.20	4095.82	100.14	54.16	-97.04	111.13	299.17	7.05
14	4151.00	37.60	293.60	4121.72	117.68	61.91	-114.14	129.85	298.48	10.72
15	4184.00	40.40	290.40	4147.36	137.37	69.67	-133.40	150.50	297.58	10.45
16	4216.00	43.50	288.40	4171.16	157.94	76.77	-153.57	171.69	296.56	10.55
17	4248.00	47.70	287.20	4193.55	180.09	83.75	-175.34	194.31	295.53	13.40
18	4280.00	52.10	285.50	4214.15	203.94	90.62	-198.82	218.50	294.50	14.34
19	4313.00	54.90	286.80	4233.78	229.82	98.01	-224.30	244.78	293.60	9.06
20	4344.00	56.60	288.30	4251.23	254.67	105.73	-248.73	270.27	293.03	6.79
21	4376.00	60.00	288.70	4268.04	280.96	114.37	-274.54	297.41	292.62	10.68
22	4408.00	64.70	289.40	4282.89	308.26	123.63	-301.33	325.70	292.31	14.81
23	4440.00	68.10	289.90	4295.70	336.41	133.49	-328.94	354.99	292.09	10.72
24	4473.00	70.20	289.90	4307.44	365.99	143.98	-357.93	385.81	291.91	6.36
25	4505.00	72.30	289.30	4317.73	395.10	154.15	-386.48	416.09	291.74	6.80
26	4537.00	74.20	287.60	4326.95	424.70	163.84	-415.54	446.68	291.52	7.82
27	4570.00	77.20	284.80	4335.10	455.88	172.76	-446.25	478.52	291.16	12.26
28	4602.00	81.40	282.80	4341.04	486.81	180.25	-476.77	509.71	290.71	14.49
29	4634.00	86.30	281.90	4344.47	518.24	187.05	-507.84	541.20	290.22	15.57
30	4667.00	89.50	281.60	4345.68	550.86	193.77	-540.13	573.83	289.74	9.74
31	4692.00	89.80	281.30	4345.83	575.62	198.73	-564.63	598.58	289.39	1.70
32	4789.00	89.80	281.20	4346.17	671.73	217.65	-659.76	694.74	288.26	0.10
33	4885.00	89.40	281.40	4346.84	766.83	236.46	-753.90	790.12	287.41	0.47
34	4982.00	91.10	280.90	4346.42	862.96	255.22	-849.07	886.59	286.73	1.83
35	5078.00	92.10	280.00	4343.73	958.21	272.63	-943.43	982.04	286.12	1.40
36	5174.00	92.70	276.00	4339.71	1053.80	285.97	-1038.40	1077.06	285.40	4.21
37	5271.00	91.10	271.00	4336.50	1150.71	291.89	-1135.13	1172.06	284.42	5.41
38	5368.00	91.30	270.60	4334.46	1247.59	293.24	-1232.10	1266.51	283.39	0.46
39	5464.00	91.00	267.60	4332.54	1343.28	291.73	-1328.06	1359.72	282.39	3.14
40	5561.00	90.90	267.20	4330.93	1439.72	287.33	-1424.94	1453.62	281.40	0.43

41	5658.00	90.40	269.80	4329.83	1536.34	284.80	-1521.89	1548.31	280.60	2.73
42	5754.00	90.40	269.90	4329.16	1632.15	284.54	-1617.89	1642.72	279.97	0.10
43	5851.00	90.20	269.70	4328.65	1728.95	284.21	-1714.89	1738.28	279.41	0.29
44	5947.00	90.10	269.40	4328.40	1824.72	283.45	-1810.89	1832.94	278.90	0.33
45	6044.00	90.00	269.50	4328.31	1921.48	282.52	-1907.88	1928.69	278.42	0.15
46	6140.00	89.90	270.30	4328.40	2017.30	282.35	-2003.88	2023.67	278.02	0.84
47	6237.00	90.90	271.00	4327.72	2114.17	283.45	-2100.87	2119.91	277.68	1.26
48	6334.00	90.80	271.40	4326.28	2211.09	285.48	-2197.84	2216.30	277.40	0.43
49	6430.00	92.70	271.40	4323.35	2306.98	287.83	-2293.76	2311.75	277.15	1.98
50	6527.00	92.40	270.90	4319.03	2403.80	289.77	-2390.64	2408.14	276.91	0.60
51	6623.00	92.10	270.20	4315.27	2499.60	290.69	-2486.56	2503.50	276.67	0.79
52	6719.00	91.60	269.30	4312.17	2595.35	290.28	-2582.51	2598.77	276.41	1.07
53	6816.00	91.60	269.20	4309.46	2692.05	289.01	-2679.47	2695.01	276.16	0.10
54	6911.00	92.00	268.80	4306.47	2786.71	287.35	-2774.40	2789.25	275.91	0.60
55	7008.00	91.90	268.50	4303.17	2883.31	285.06	-2871.32	2885.44	275.67	0.33
56	7104.00	90.20	269.80	4301.41	2979.02	283.64	-2967.29	2980.81	275.46	2.23
57	7198.00	90.00	269.50	4301.25	3072.81	283.07	-3061.29	3074.35	275.28	0.38
58	7294.00	90.10	270.10	4301.17	3168.61	282.73	-3157.29	3169.92	275.12	0.63
59	7391.00	91.70	271.80	4299.64	3265.50	284.34	-3254.25	3266.65	274.99	2.41
60	7488.00	92.00	271.60	4296.51	3362.40	287.22	-3351.16	3363.45	274.90	0.37
61	7585.00	92.10	271.40	4293.04	3459.28	289.75	-3448.07	3460.22	274.80	0.23
62	7681.00	92.00	270.70	4289.61	3555.13	291.51	-3543.99	3555.96	274.70	0.74
63	7777.00	91.80	270.30	4286.42	3650.95	292.35	-3639.93	3651.65	274.59	0.47
64	7874.00	91.60	270.30	4283.55	3747.76	292.86	-3736.89	3748.34	274.48	0.21
65	7970.00	91.70	269.80	4280.78	3843.55	292.94	-3832.85	3844.02	274.37	0.53
66	8067.00	92.00	270.00	4277.65	3940.31	292.77	-3929.80	3940.69	274.26	0.37
67	8163.00	90.50	268.90	4275.56	4036.05	291.85	-4025.76	4036.33	274.15	1.94
68	8258.00	91.10	269.20	4274.23	4130.76	290.27	-4120.74	4130.95	274.03	0.71
69	8354.00	90.80	269.00	4272.64	4226.46	288.77	-4216.72	4226.59	273.92	0.38
70	8450.00	90.30	268.20	4271.72	4322.11	286.42	-4312.68	4322.18	273.80	0.98
71	8544.00	89.50	266.80	4271.88	4415.60	282.32	-4406.59	4415.62	273.67	1.72
72	8639.00	89.00	266.20	4273.12	4509.89	276.52	-4501.40	4509.89	273.52	0.82
73	8734.00	90.00	266.00	4273.95	4604.10	270.06	-4596.18	4604.11	273.36	1.07
TD	8797.00	90.90	266.30	4273.46	4666.58	265.83	-4659.03	4666.61	273.27	1.51
PTB	8860.00	90.90	266.30	4272.47	4729.08	261.77	-4721.89	4729.14	273.17	0.00



COG Operating LLC

Eddy County, NM

Hogan State Com #15H

SHL: 2010' FSL, 220' FEL, Sec 2, T17S, R29E, Unit I

EOC: 2190.4' FSL, 721.5' FEL, Sec 2, T17S, R29E, Unit I

BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L

Design: BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L

Standard Survey Report

10 July, 2015





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Hogan State Com #15H
Project:	Eddy County, NM	TVD Reference:	KB @ 3678.0usft (United 43)
Site:	Hogan State Com #15H	MD Reference:	KB @ 3678.0usft (United 43)
Well:	SHL: 2010' FSL, 220' FEL, Sec 2, T17S, R29E, Unit I	North Reference:	Grid
Wellbore:	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L	Database:	EDM 5000.1 Single User Db

Project	Eddy County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Hogan State Com #15H				
Site Position:		Northing:	677,332.00 usft	Latitude:	32° 51' 42.185 N
From:	Map	Easting:	590,979.30 usft	Longitude:	104° 2' 13.354 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.16 °

Well	SHL: 2010' FSL, 220' FEL, Sec 2, T17S, R29E, Unit I					
Well Position	+N/-S	0.0 usft	Northing:	677,332.00 usft	Latitude:	32° 51' 42.185 N
	+E/-W	0.0 usft	Easting:	590,979.30 usft	Longitude:	104° 2' 13.354 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,666.0 usft

Wellbore	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/19/2015	7.37	60.60	48,554

Design	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:		Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
		0.0	0.0	0.0	273.47

Survey Program	Date 7/10/2015				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	3,670.0	Gyro #1 (BHL: 2290' FSL, 350' FWL, Sec 2	NS-GYRO-SS	NS Gyro single shots	
3,733.0	8,860.0	MWD #2 (BHL: 2290' FSL, 350' FWL, Sec	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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.30	108.59	100.0	-0.1	0.2	-0.3	0.30	0.30	0.00
200.0	0.65	127.53	200.0	-0.5	0.9	-1.0	0.38	0.35	18.94
300.0	0.50	122.37	300.0	-1.1	1.8	-1.8	0.16	-0.15	-5.16
400.0	0.36	131.37	400.0	-1.5	2.4	-2.5	0.16	-0.14	9.00
500.0	0.35	126.20	500.0	-1.9	2.9	-3.0	0.03	-0.01	-5.17
600.0	0.16	124.59	600.0	-2.2	3.2	-3.3	0.19	-0.19	-1.61



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Hogan State Com #15H
Project:	Eddy County, NM	TVD Reference:	KB @ 3678.0usft (United 43)
Site:	Hogan State Com #15H	MD Reference:	KB @ 3678.0usft (United 43)
Well:	SHL: 2010' FSL, 220' FEL, Sec 2, T17S, R29E, Unit I	North Reference:	Grid
Wellbore:	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L	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)	
700.0	0.32	117.34	700.0	-2.4	3.6	-3.7	0.16	0.16	-7.25	
800.0	0.49	105.92	800.0	-2.6	4.2	-4.4	0.19	0.17	-11.42	
900.0	1.07	92.59	900.0	-2.8	5.6	-5.7	0.60	0.58	-13.33	
1,000.0	1.14	88.28	1,000.0	-2.8	7.5	-7.7	0.11	0.07	-4.31	
1,100.0	1.33	86.44	1,099.9	-2.7	9.7	-9.8	0.19	0.19	-1.84	
1,200.0	0.95	70.68	1,199.9	-2.4	11.6	-11.7	0.49	-0.38	-15.76	
1,300.0	0.44	68.44	1,299.9	-1.9	12.7	-12.8	0.51	-0.51	-2.24	
1,400.0	0.28	43.04	1,399.9	-1.6	13.3	-13.3	0.22	-0.16	-25.40	
1,500.0	0.59	31.32	1,499.9	-1.0	13.7	-13.7	0.32	0.31	-11.72	
1,600.0	0.58	18.50	1,599.9	-0.1	14.1	-14.1	0.13	-0.01	-12.82	
1,700.0	0.61	20.94	1,699.9	0.9	14.5	-14.4	0.04	0.03	2.44	
1,800.0	0.54	9.08	1,799.9	1.9	14.7	-14.6	0.14	-0.07	-11.86	
1,900.0	0.48	356.39	1,899.9	2.7	14.8	-14.6	0.13	-0.06	-12.69	
2,000.0	0.42	351.47	1,999.9	3.5	14.7	-14.5	0.07	-0.06	-4.92	
2,100.0	0.57	343.59	2,099.9	4.4	14.5	-14.2	0.16	0.15	-7.88	
2,200.0	0.42	324.90	2,199.9	5.1	14.2	-13.8	0.22	-0.15	-18.69	
2,300.0	0.76	324.78	2,299.9	6.0	13.6	-13.2	0.34	0.34	-0.12	
2,400.0	0.64	325.72	2,399.9	7.0	12.9	-12.4	0.12	-0.12	0.94	
2,500.0	0.81	321.52	2,499.8	8.0	12.1	-11.6	0.18	0.17	-4.20	
2,600.0	0.72	318.95	2,599.8	9.0	11.3	-10.7	0.10	-0.09	-2.57	
2,700.0	0.73	327.64	2,699.8	10.0	10.5	-9.9	0.11	0.01	8.69	
2,800.0	0.73	316.83	2,799.8	11.0	9.7	-9.0	0.14	0.00	-10.81	
2,900.0	0.45	308.55	2,899.8	11.7	9.0	-8.3	0.29	-0.28	-8.28	
3,000.0	0.70	281.79	2,999.8	12.1	8.1	-7.3	0.36	0.25	-26.76	
3,100.0	0.21	290.54	3,099.8	12.3	7.3	-6.6	0.49	-0.49	8.75	
3,200.0	0.68	297.17	3,199.8	12.6	6.6	-5.8	0.47	0.47	6.63	
3,300.0	0.50	314.46	3,299.8	13.2	5.8	-5.0	0.25	-0.18	17.29	
3,400.0	0.46	304.34	3,399.8	13.7	5.1	-4.3	0.09	-0.04	-10.12	
3,500.0	0.40	292.67	3,499.8	14.1	4.5	-3.6	0.11	-0.06	-11.67	
3,600.0	0.23	273.41	3,599.8	14.3	4.0	-3.1	0.20	-0.17	-19.26	
3,670.0	0.59	266.09	3,669.8	14.2	3.5	-2.6	0.52	0.51	-10.46	
TIE-IN to VES Gyro										
3,733.0	0.70	277.20	3,732.8	14.3	2.8	-1.9	0.26	0.17	17.63	
3,766.0	0.70	284.70	3,765.8	14.3	2.4	-1.5	0.28	0.00	22.73	
3,797.0	2.30	289.70	3,796.8	14.6	1.6	-0.7	5.17	5.16	16.13	
3,829.0	5.20	292.20	3,828.7	15.4	-0.4	1.3	9.07	9.06	7.81	
3,861.0	8.90	295.20	3,860.5	17.0	-3.9	5.0	11.62	11.56	9.38	
3,893.0	13.00	292.40	3,891.9	19.4	-9.5	10.7	12.92	12.81	-8.75	
3,925.0	17.00	289.90	3,922.8	22.4	-17.2	18.6	12.66	12.50	-7.81	
3,958.0	20.50	289.00	3,954.0	25.9	-27.2	28.8	10.64	10.61	-2.73	
3,990.0	23.70	289.30	3,983.7	29.8	-38.6	40.3	10.01	10.00	0.94	
4,022.0	26.80	290.50	4,012.6	34.5	-51.4	53.4	9.82	9.69	3.75	



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Hogan State Com #15H
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Design:	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L	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)
4,054.0	29.90	292.50	4,040.8	40.1	-65.6	67.9	10.13	9.69	6.25
4,087.0	32.10	294.30	4,069.0	46.8	-81.2	83.9	7.23	6.67	5.45
4,119.0	34.30	295.20	4,095.8	54.2	-97.1	100.2	7.05	6.88	2.81
4,151.0	37.60	293.60	4,121.7	61.9	-114.2	117.7	10.72	10.31	-5.00
4,184.0	40.40	290.40	4,147.4	69.7	-133.4	137.4	10.45	8.48	-9.70
4,216.0	43.50	288.40	4,171.2	76.8	-153.6	158.0	10.55	9.69	-6.25
4,248.0	47.70	287.20	4,193.5	83.7	-175.4	180.1	13.40	13.13	-3.75
4,280.0	52.10	285.50	4,214.2	90.6	-198.9	204.0	14.34	13.75	-5.31
4,313.0	54.90	286.80	4,233.8	98.0	-224.3	229.9	9.06	8.48	3.94
4,344.0	56.60	288.30	4,251.2	105.7	-248.8	254.7	6.79	5.48	4.84
4,376.0	60.00	288.70	4,268.0	114.4	-274.6	281.0	10.68	10.63	1.25
4,408.0	64.70	289.40	4,282.9	123.6	-301.4	308.3	14.81	14.69	2.19
4,440.0	68.10	289.90	4,295.7	133.5	-329.0	336.5	10.72	10.63	1.56
4,473.0	70.20	289.90	4,307.4	144.0	-358.0	366.0	6.36	6.36	0.00
4,505.0	72.30	289.30	4,317.7	154.1	-386.5	395.1	6.80	6.56	-1.88
4,537.0	74.20	287.60	4,326.9	163.8	-415.6	424.7	7.82	5.94	-5.31
4,570.0	77.20	284.80	4,335.1	172.8	-446.3	455.9	12.26	9.09	-8.48
4,602.0	81.40	282.80	4,341.0	180.3	-476.8	486.8	14.49	13.13	-6.25
4,634.0	86.30	281.90	4,344.5	187.1	-507.9	518.3	15.57	15.31	-2.81
4,667.0	89.50	281.60	4,345.7	193.8	-540.2	550.9	9.74	9.70	-0.91
4,692.0	89.80	281.30	4,345.8	198.7	-564.7	575.7	1.70	1.20	-1.20
4,789.0	89.80	281.20	4,346.2	217.7	-659.8	671.8	0.10	0.00	-0.10
4,885.0	89.40	281.40	4,346.8	236.5	-753.9	766.9	0.47	-0.42	0.21
4,982.0	91.10	280.90	4,346.4	255.2	-849.1	863.0	1.83	1.75	-0.52
5,078.0	92.10	280.00	4,343.7	272.6	-943.5	958.2	1.40	1.04	-0.94
5,174.0	92.70	276.00	4,339.7	286.0	-1,038.4	1,053.8	4.21	0.63	-4.17
5,271.0	91.10	271.00	4,336.5	291.9	-1,135.2	1,150.7	5.41	-1.65	-5.15
5,368.0	91.30	270.60	4,334.5	293.2	-1,232.1	1,247.6	0.46	0.21	-0.41
5,464.0	91.00	267.60	4,332.5	291.7	-1,328.1	1,343.3	3.14	-0.31	-3.13
5,561.0	90.90	267.20	4,330.9	287.3	-1,425.0	1,439.8	0.43	-0.10	-0.41
5,658.0	90.40	269.80	4,329.8	284.8	-1,521.9	1,536.4	2.73	-0.52	2.68
5,754.0	90.40	269.90	4,329.2	284.5	-1,617.9	1,632.2	0.10	0.00	0.10
5,851.0	90.20	269.70	4,328.6	284.2	-1,714.9	1,729.0	0.29	-0.21	-0.21
5,947.0	90.10	269.40	4,328.4	283.5	-1,810.9	1,824.8	0.33	-0.10	-0.31
6,044.0	90.00	269.50	4,328.3	282.5	-1,907.9	1,921.5	0.15	-0.10	0.10
6,140.0	89.90	270.30	4,328.4	282.4	-2,003.9	2,017.3	0.84	-0.10	0.83
6,237.0	90.90	271.00	4,327.7	283.5	-2,100.9	2,114.2	1.26	1.03	0.72
6,334.0	90.80	271.40	4,326.3	285.5	-2,197.9	2,211.1	0.43	-0.10	0.41
6,430.0	92.70	271.40	4,323.3	287.8	-2,293.8	2,307.0	1.98	1.98	0.00
6,527.0	92.40	270.90	4,319.0	289.8	-2,390.7	2,403.8	0.60	-0.31	-0.52
6,623.0	92.10	270.20	4,315.3	290.7	-2,486.6	2,499.6	0.79	-0.31	-0.73
6,719.0	91.60	269.30	4,312.2	290.3	-2,582.6	2,595.4	1.07	-0.52	-0.94



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Hogan State Com #15H
Project:	Eddy County, NM	TVD Reference:	KB @ 3678.0usft (United 43)
Site:	Hogan State Com #15H	MD Reference:	KB @ 3678.0usft (United 43)
Well:	SHL: 2010' FSL, 220' FEL, Sec 2, T17S, R29E, Unit I	North Reference:	Grid
Wellbore:	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2290' FSL, 350' FWL, Sec 2, T17S, R29E, Unit L	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)
6,816.0	91.60	269.20	4,309.5	289.0	-2,679.5	2,692.1	0.10	0.00	-0.10
6,911.0	92.00	268.80	4,306.5	287.3	-2,774.4	2,786.7	0.60	0.42	-0.42
7,008.0	91.90	268.50	4,303.2	285.1	-2,871.4	2,883.3	0.33	-0.10	-0.31
7,104.0	90.20	269.80	4,301.4	283.6	-2,967.3	2,979.1	2.23	-1.77	1.35
7,198.0	90.00	269.50	4,301.2	283.1	-3,061.3	3,072.8	0.38	-0.21	-0.32
7,294.0	90.10	270.10	4,301.2	282.7	-3,157.3	3,168.6	0.63	0.10	0.63
7,391.0	91.70	271.80	4,299.6	284.3	-3,254.3	3,265.5	2.41	1.65	1.75
7,488.0	92.00	271.60	4,296.5	287.2	-3,351.2	3,362.4	0.37	0.31	-0.21
7,585.0	92.10	271.40	4,293.0	289.8	-3,448.1	3,459.3	0.23	0.10	-0.21
7,681.0	92.00	270.70	4,289.6	291.5	-3,544.0	3,555.2	0.74	-0.10	-0.73
7,777.0	91.80	270.30	4,286.4	292.3	-3,640.0	3,651.0	0.47	-0.21	-0.42
7,874.0	91.60	270.30	4,283.5	292.9	-3,736.9	3,747.8	0.21	-0.21	0.00
7,970.0	91.70	269.80	4,280.8	292.9	-3,832.9	3,843.6	0.53	0.10	-0.52
8,067.0	92.00	270.00	4,277.7	292.8	-3,929.8	3,940.3	0.37	0.31	0.21
8,163.0	90.50	268.90	4,275.6	291.9	-4,025.8	4,036.1	1.94	-1.56	-1.15
8,258.0	91.10	269.20	4,274.2	290.3	-4,120.8	4,130.8	0.71	0.63	0.32
8,354.0	90.80	269.00	4,272.6	288.8	-4,216.8	4,226.5	0.38	-0.31	-0.21
8,450.0	90.30	268.20	4,271.7	286.4	-4,312.7	4,322.2	0.98	-0.52	-0.83
8,544.0	89.50	266.80	4,271.9	282.3	-4,406.6	4,415.6	1.72	-0.85	-1.49
8,639.0	89.00	266.20	4,273.1	276.5	-4,501.4	4,509.9	0.82	-0.53	-0.63
8,734.0	90.00	266.00	4,274.0	270.1	-4,596.2	4,604.1	1.07	1.05	-0.21
8,797.0	90.90	266.30	4,273.5	265.8	-4,659.1	4,666.6	1.51	1.43	0.48
Final MWD Survey									
8,860.0	90.90	266.30	4,272.5	261.8	-4,721.9	4,729.1	0.00	0.00	0.00
Projection to Bit/MD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
3,670.0	3,669.8	14.2	3.5	TIE-IN to VES Gyro
8,797.0	4,273.5	265.8	-4,659.1	Final MWD Survey
8,860.0	4,272.5	261.8	-4,721.9	Projection to Bit/MD

Checked By: _____ Approved By: _____ Date: _____