

30-015-43829



11/2/16

State of New Mexico
County of Eddy

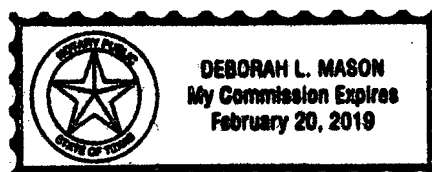
I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 09/04/2016 through 09/25/2016 conduct or supervise the taking of a MWD survey from a depth of 962 feet to a depth of 9697 feet; that the data is true, correct, complete and within the limitations 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 Cadillac 15 State #102H Well API 30-015-43829 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.

A handwritten signature in black ink, appearing to read "Donald D. Mason", written over a horizontal line.

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.

A handwritten signature in black ink, appearing to read "Deborah L. Mason", written over a horizontal line.
Notary Public's Signature



NM OIL CONSERVATION

ARTESIA DISTRICT

NOV 07 2016

RECEIVED

COG Operating LLC

Eddy County, NM (NAD-27 2015)

Cadillac 15 State #102H

API #: 30-015-43829

SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C

PP: 330' FSL, 1982' FWL, Sec 15, T17S, R29E, Unit N

BHL: 361' FNL, 1991' FWL, Sec 15, T17S, R29E, Unit C

Design: BHL: 330' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C

Standard Survey Report

26 September, 2016





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3576.00usft (Silver Oak 3)
Site:	Cadillac 15 State #102H	MD Reference:	KB @ 3576.00usft (Silver Oak 3)
Well:	SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 330' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	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	Cadillac 15 State #102H		
Site Position:		Northing:	664,457.50 usft
From:	Map	Easting:	582,783.40 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 49' 35.006 N
		Longitude:	104° 3' 49.827 W
		Grid Convergence:	0.15 °

Well	SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C		
Well Position	+N/-S	0.00 usft	Northing: 664,457.50 usft
	+E/-W	0.00 usft	Easting: 582,783.40 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 49' 35.006 N
		Longitude:	104° 3' 49.827 W
		Ground Level:	3,558.00 usft

Wellbore	BHL: 350' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C		
Magnetics	Model Name	Sample Date	Declination
	IGRF2015	5/9/2016	7.35
			Dip Angle
			60.55
			Field Strength
			48,356

Design	BHL: 330' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			358.31

Survey Program	Date 9/26/2016		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	898.00	VES Gyro #1 (BHL: 350' FNL, 1980' FWL,	VES-ISCWSA-GYRO-3
962.00	9,697.00	TDS MWD #2 (BHL: 350' FNL, 1980' FWL	MWD
			Description
			Biaxial Semi-Cont. Gyro
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.17	245.29	100.00	-0.06	-0.13	-0.06	0.17	0.17	0.00
200.00	0.30	249.50	200.00	-0.22	-0.51	-0.20	0.13	0.13	4.21
300.00	0.35	129.55	300.00	-0.50	-0.52	-0.49	0.56	0.05	-119.95
400.00	0.64	83.58	399.99	-0.63	0.27	-0.64	0.47	0.29	-45.97
500.00	0.92	106.68	499.99	-0.80	1.59	-0.85	0.42	0.28	23.10
600.00	1.05	99.59	599.97	-1.18	3.26	-1.28	0.18	0.13	-7.09

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3576.00usft (Silver Oak 3)
Site:	Cadillac 15 State #102H	MD Reference:	KB @ 3576.00usft (Silver Oak 3)
Well:	SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 330' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	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)
700.00	1.10	86.19	699.95	-1.27	5.12	-1.42	0.26	0.05	-13.40
800.00	1.02	108.18	799.94	-1.49	6.93	-1.69	0.41	-0.08	21.99
898.00	0.96	87.84	897.92	-1.73	8.58	-1.98	0.36	-0.06	-20.76
Tie-In to VES Gyro									
962.00	1.00	97.60	961.91	-1.78	9.67	-2.07	0.27	0.06	15.25
First TDS MWD Survey									
1,024.00	0.80	218.00	1,023.91	-2.20	9.94	-2.49	2.52	-0.32	194.19
1,118.00	3.00	252.00	1,117.85	-3.47	7.19	-3.68	2.53	2.34	36.17
1,211.00	2.90	251.60	1,210.73	-4.97	2.64	-5.04	0.11	-0.11	-0.43
1,304.00	2.70	253.30	1,303.62	-6.34	-1.69	-6.29	0.23	-0.22	1.83
1,397.00	2.70	250.70	1,396.52	-7.69	-5.85	-7.52	0.13	0.00	-2.80
1,491.00	2.40	249.00	1,490.42	-9.13	-9.78	-8.84	0.33	-0.32	-1.81
1,584.00	2.30	252.90	1,583.34	-10.38	-13.38	-9.98	0.20	-0.11	4.19
1,679.00	3.30	267.40	1,678.23	-11.06	-17.93	-10.53	1.28	1.05	15.26
1,774.00	3.10	269.10	1,773.08	-11.23	-23.23	-10.54	0.23	-0.21	1.79
1,868.00	3.10	271.20	1,866.95	-11.21	-28.32	-10.37	0.12	0.00	2.23
1,961.00	2.80	271.00	1,959.82	-11.12	-33.10	-10.14	0.32	-0.32	-0.22
2,056.00	2.70	273.00	2,054.71	-10.96	-37.66	-9.85	0.15	-0.11	2.11
2,151.00	2.40	273.80	2,149.62	-10.71	-41.87	-9.47	0.32	-0.32	0.84
2,245.00	4.00	251.80	2,243.47	-11.61	-46.95	-10.22	2.12	1.70	-23.40
2,338.00	4.30	252.60	2,336.23	-13.66	-53.36	-12.08	0.33	0.32	0.86
2,432.00	4.10	251.40	2,429.98	-15.79	-59.91	-14.01	0.23	-0.21	-1.28
2,526.00	4.00	254.90	2,523.74	-17.71	-66.26	-15.75	0.28	-0.11	3.72
2,620.00	4.10	252.90	2,617.51	-19.56	-72.64	-17.41	0.18	0.11	-2.13
2,713.00	4.00	256.30	2,710.27	-21.30	-78.97	-18.96	0.28	-0.11	3.66
2,806.00	3.20	255.10	2,803.09	-22.74	-84.63	-20.23	0.86	-0.86	-1.29
2,899.00	3.30	257.10	2,895.94	-24.00	-89.74	-21.35	0.16	0.11	2.15
2,993.00	3.30	255.00	2,989.79	-25.31	-94.99	-22.49	0.13	0.00	-2.23
3,087.00	3.50	259.40	3,083.62	-26.54	-100.43	-23.56	0.35	0.21	4.68
3,180.00	3.50	259.40	3,176.45	-27.58	-106.01	-24.44	0.00	0.00	0.00
3,273.00	3.60	256.70	3,269.27	-28.77	-111.64	-25.47	0.21	0.11	-2.90
3,367.00	3.40	259.20	3,363.09	-29.97	-117.25	-26.50	0.27	-0.21	2.66
3,461.00	3.20	260.10	3,456.94	-30.95	-122.57	-27.32	0.22	-0.21	0.96
3,555.00	3.40	260.80	3,550.78	-31.84	-127.91	-28.06	0.22	0.21	0.74
3,648.00	3.20	260.90	3,643.63	-32.70	-133.19	-28.75	0.22	-0.22	0.11
3,742.00	3.50	264.90	3,737.47	-33.37	-138.64	-29.26	0.40	0.32	4.26
3,834.00	3.30	248.60	3,829.31	-34.58	-143.91	-30.32	1.07	-0.22	-17.72
3,928.00	1.70	232.60	3,923.21	-36.42	-147.53	-32.05	1.84	-1.70	-17.02
4,022.00	0.20	68.20	4,017.20	-37.20	-148.49	-32.81	2.01	-1.60	-174.89
4,052.00	0.20	66.50	4,047.20	-37.16	-148.39	-32.77	0.02	0.00	-5.67
4,083.00	1.10	25.40	4,078.20	-36.87	-148.21	-32.48	3.09	2.90	-132.58



TDS
Survey Report



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Site:	Cadillac 15 State #102H	MD Reference:	KB @ 3576.00usft (Silver Oak 3)
Well:	SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 330' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	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)
4,114.00	3.40	11.20	4,109.17	-35.70	-147.91	-31.32	7.58	7.42	-45.81
4,145.00	6.80	4.20	4,140.05	-32.97	-147.59	-28.60	11.13	10.97	-22.58
4,177.00	10.30	2.50	4,171.69	-28.22	-147.33	-23.86	10.96	10.94	-5.31
4,208.00	13.90	3.80	4,201.99	-21.73	-146.96	-17.39	11.65	11.61	4.19
4,239.00	17.80	4.70	4,231.81	-13.29	-146.33	-8.97	12.61	12.58	2.90
4,270.00	21.50	5.00	4,261.00	-2.91	-145.44	1.38	11.94	11.94	0.97
4,301.00	25.30	5.80	4,289.44	9.35	-144.28	13.60	12.30	12.26	2.58
4,332.00	29.00	6.60	4,317.02	23.41	-142.75	27.61	11.99	11.94	2.58
4,363.00	32.20	5.40	4,343.70	39.10	-141.10	43.24	10.51	10.32	-3.87
4,394.00	34.70	2.80	4,369.57	56.14	-139.90	60.24	9.29	8.06	-8.39
4,425.00	37.00	0.50	4,394.69	74.28	-139.38	78.36	8.60	7.42	-7.42
4,457.00	39.30	359.50	4,419.86	94.05	-139.39	98.12	7.44	7.19	-3.13
4,488.00	42.80	359.60	4,443.23	114.40	-139.55	118.47	11.29	11.29	0.32
4,519.00	45.50	359.60	4,465.47	135.99	-139.70	140.05	8.71	8.71	0.00
4,550.00	46.30	359.40	4,487.05	158.25	-139.89	162.31	2.62	2.58	-0.65
4,581.00	46.80	359.80	4,508.37	180.76	-140.05	184.81	1.87	1.61	1.29
4,612.00	47.20	359.40	4,529.51	203.43	-140.21	207.48	1.60	1.29	-1.29
4,643.00	47.50	359.60	4,550.51	226.23	-140.41	230.27	1.08	0.97	0.65
4,674.00	47.90	359.40	4,571.37	249.16	-140.61	253.20	1.38	1.29	-0.65
4,705.00	48.40	359.40	4,592.06	272.25	-140.85	276.28	1.61	1.61	0.00
4,736.00	49.90	359.30	4,612.33	295.69	-141.11	299.73	4.84	4.84	-0.32
4,767.00	53.10	359.60	4,631.63	319.95	-141.35	323.98	10.35	10.32	0.97
4,798.00	56.70	359.60	4,649.45	345.31	-141.52	349.33	11.61	11.61	0.00
4,829.00	60.70	359.40	4,665.55	371.79	-141.75	375.81	12.91	12.90	-0.65
4,861.00	63.60	358.90	4,680.50	400.08	-142.18	404.10	9.17	9.06	-1.56
4,892.00	66.00	358.60	4,693.70	428.12	-142.79	432.14	7.79	7.74	-0.97
4,923.00	68.10	358.60	4,705.78	456.65	-143.49	460.69	6.77	6.77	0.00
4,954.00	70.90	359.30	4,716.64	485.68	-144.02	489.72	9.28	9.03	2.26
4,986.00	74.80	359.70	4,726.07	516.25	-144.28	520.28	12.25	12.19	1.25
5,016.00	77.60	0.00	4,733.23	545.38	-144.36	549.40	9.38	9.33	1.00
5,047.00	80.10	359.80	4,739.22	575.80	-144.41	579.81	8.09	8.06	-0.65
5,078.00	82.60	359.60	4,743.89	606.44	-144.57	610.44	8.09	8.06	-0.65
5,101.36	84.48	359.68	4,746.51	629.65	-144.72	633.65	8.07	8.06	0.32
As-Drilled PP									
5,109.00	85.10	359.70	4,747.21	637.26	-144.76	641.25	8.07	8.06	0.32
5,140.00	87.70	0.10	4,749.15	668.20	-144.81	672.18	8.49	8.39	1.29
5,233.00	91.90	0.70	4,749.48	761.17	-144.16	765.09	4.56	4.52	0.65
5,328.00	92.70	0.80	4,745.67	856.09	-142.92	859.93	0.85	0.84	0.11
5,422.00	90.50	0.20	4,743.04	950.04	-142.10	953.82	2.43	-2.34	-0.64
5,515.00	90.20	0.80	4,742.47	1,043.03	-141.29	1,046.75	0.72	-0.32	0.65
5,609.00	90.20	1.50	4,742.14	1,137.01	-139.40	1,140.63	0.74	0.00	0.74



TDS
Survey Report



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Design:	BHL: 330' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	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)
5,702.00	91.10	0.00	4,741.09	1,230.00	-138.19	1,233.54	1.88	0.97	-1.61
5,795.00	92.20	0.80	4,738.41	1,322.95	-137.54	1,326.43	1.46	1.18	0.86
5,889.00	91.60	359.10	4,735.29	1,416.90	-137.62	1,420.34	1.92	-0.64	-1.81
5,983.00	91.40	359.60	4,732.83	1,510.86	-138.69	1,514.29	0.57	-0.21	0.53
6,077.00	91.40	0.30	4,730.54	1,604.83	-138.77	1,608.23	0.74	0.00	0.74
6,170.00	90.50	359.50	4,729.00	1,697.82	-138.93	1,701.18	1.29	-0.97	-0.86
6,263.00	90.70	0.00	4,728.02	1,790.81	-139.34	1,794.14	0.58	0.22	0.54
6,357.00	89.90	358.70	4,727.53	1,884.80	-140.40	1,888.12	1.62	-0.85	-1.38
6,450.00	89.90	359.10	4,727.69	1,977.78	-142.19	1,981.12	0.43	0.00	0.43
6,543.00	90.00	359.60	4,727.77	2,070.78	-143.24	2,074.10	0.55	0.11	0.54
6,637.00	90.20	358.50	4,727.61	2,164.76	-144.80	2,168.09	1.19	0.21	-1.17
6,730.00	89.70	358.60	4,727.69	2,257.73	-147.16	2,261.09	0.55	-0.54	0.11
6,824.00	91.10	358.70	4,727.03	2,351.70	-149.37	2,355.08	1.49	1.49	0.11
6,917.00	91.80	359.40	4,724.68	2,444.66	-150.91	2,448.04	1.06	0.75	0.75
7,011.00	92.00	359.70	4,721.56	2,538.60	-151.65	2,541.97	0.38	0.21	0.32
7,104.00	91.70	0.30	4,718.56	2,631.55	-151.65	2,634.88	0.72	-0.32	0.65
7,198.00	91.60	0.90	4,715.85	2,725.51	-150.67	2,728.77	0.65	-0.11	0.64
7,291.00	91.90	1.40	4,713.01	2,818.45	-148.80	2,821.61	0.63	0.32	0.54
7,384.00	91.10	0.20	4,710.58	2,911.40	-147.50	2,914.49	1.55	-0.86	-1.29
7,478.00	91.50	0.30	4,708.45	3,005.38	-147.09	3,008.41	0.44	0.43	0.11
7,571.00	92.20	1.30	4,705.45	3,098.32	-145.79	3,101.27	1.31	0.75	1.08
7,664.00	89.80	0.30	4,703.82	3,191.29	-144.50	3,194.16	2.80	-2.58	-1.08
7,758.00	89.80	0.90	4,704.15	3,285.28	-143.51	3,288.08	0.64	0.00	0.64
7,851.00	89.00	0.90	4,705.12	3,378.26	-142.05	3,380.98	0.86	-0.86	0.00
7,944.00	90.40	0.70	4,705.61	3,471.25	-140.75	3,473.89	1.52	1.51	-0.22
8,038.00	90.50	359.00	4,704.87	3,565.24	-141.00	3,567.85	1.81	0.11	-1.81
8,131.00	90.50	359.30	4,704.06	3,658.23	-142.38	3,660.84	0.32	0.00	0.32
8,224.00	91.10	359.70	4,702.76	3,751.22	-143.19	3,753.81	0.78	0.65	0.43
8,319.00	91.10	0.40	4,700.94	3,846.20	-143.11	3,848.75	0.74	0.00	0.74
8,413.00	91.80	359.00	4,698.56	3,940.16	-143.60	3,942.69	1.66	0.74	-1.49
8,507.00	92.00	359.40	4,695.44	4,034.10	-144.91	4,036.62	0.48	0.21	0.43
8,600.00	91.90	358.80	4,692.28	4,127.04	-146.37	4,129.56	0.65	-0.11	-0.65
8,693.00	91.70	359.70	4,689.36	4,219.98	-147.59	4,222.50	0.99	-0.22	0.97
8,785.00	92.60	0.20	4,685.91	4,311.92	-147.67	4,314.40	1.12	0.98	0.54
8,879.00	92.00	359.60	4,682.13	4,405.84	-147.83	4,408.28	0.90	-0.64	-0.64
8,972.00	92.50	0.10	4,678.48	4,498.77	-148.08	4,501.18	0.76	0.54	0.54
9,065.00	91.30	359.40	4,675.40	4,591.71	-148.48	4,594.09	1.49	-1.29	-0.75
9,159.00	91.90	0.20	4,672.77	4,685.67	-148.81	4,688.03	1.06	0.64	0.85
9,252.00	90.90	359.80	4,670.50	4,778.65	-148.81	4,780.96	1.16	-1.08	-0.43
9,345.00	90.90	0.10	4,669.04	4,871.63	-148.89	4,873.91	0.32	0.00	0.32
9,438.00	91.20	0.60	4,667.34	4,964.62	-148.32	4,966.83	0.63	0.32	0.54

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3576.00usft (Silver Oak 3)
Site:	Cadillac 15 State #102H	MD Reference:	KB @ 3576.00usft (Silver Oak 3)
Well:	SHL: 300' FNL, 2125' FWL, Sec 22, T17S, R29E, Unit C	North Reference:	Grid
Wellbore:	BHL: 350' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 330' FNL, 1980' FWL, Sec 15, T17S, R29E, Unit C	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)
9,531.00	91.60	1.50	4,665.07	5,057.57	-146.62	5,059.70	1.06	0.43	0.97
9,625.00	90.50	0.90	4,663.34	5,151.53	-144.65	5,153.56	1.33	-1.17	-0.64
Last TDS MWD Survey									
9,697.00	90.50	0.90	4,662.71	5,223.52	-143.52	5,225.48	0.00	0.00	0.00
Projection to Bit/TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates	
		+N-S (usft)	+E-W (usft)
898.00	897.92	-1.73	8.58
962.00	961.91	-1.78	9.67
5,101.36	4,746.51	629.65	-144.72
9,625.00	4,663.34	5,151.53	-144.65
9,697.00	4,662.71	5,223.52	-143.52
			Comment
			Tie-In to VES Gyro
			First TDS MWD Survey
			As-Drilled PP
			Last TDS MWD Survey
			Projection to Bit/TD

Checked By:

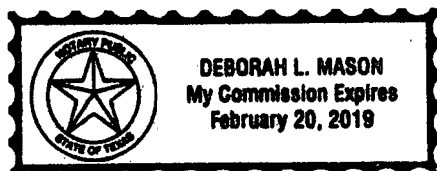
Deborah Mason

Approved By:

Donal J. H.

Date:

11/2/2016





September 19, 2016

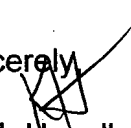
Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: **Cadillac 15 State No. 102H**

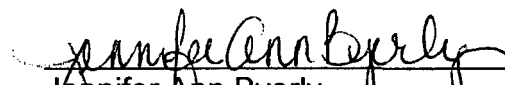
Please find enclosed a copy of the survey from 0' to 898' ran on the above referenced well.

Sincerely,

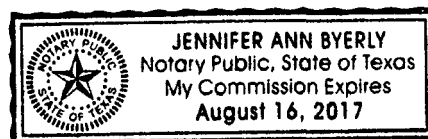

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 19th day of September, A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas

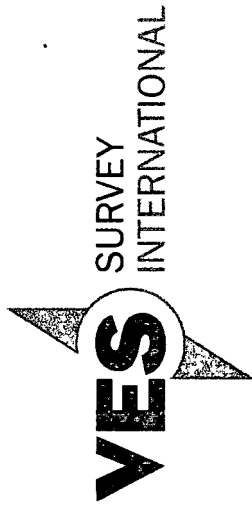
VES Survey International
P.O. Box 261021, Corpus Christi, Texas 78426
T (361) 767-0602 F (361) 767-0612
www.vessurvey.com





Company: COG OPERATING
Lease/Well: CADILLAC 15 STATE No./102H

Rig Name: SILVER OAK 3
State/County: NEW MEXICO/EDDY
VS-Azi: 253.00 Degrees
Latitude: 32.82639, Longitude: -104.06384
Grid North = True North -0.15 degs (NAD 27)
Grid Correction Applied = -0.15 degs



Depth Reference : RKB=18 FEET

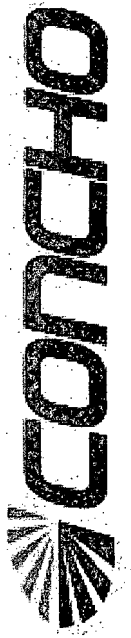
DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: e-line gyro-de_01.ut
Minimum Curvature Method
Report Date/Time: 9/19/2016 / 13:45

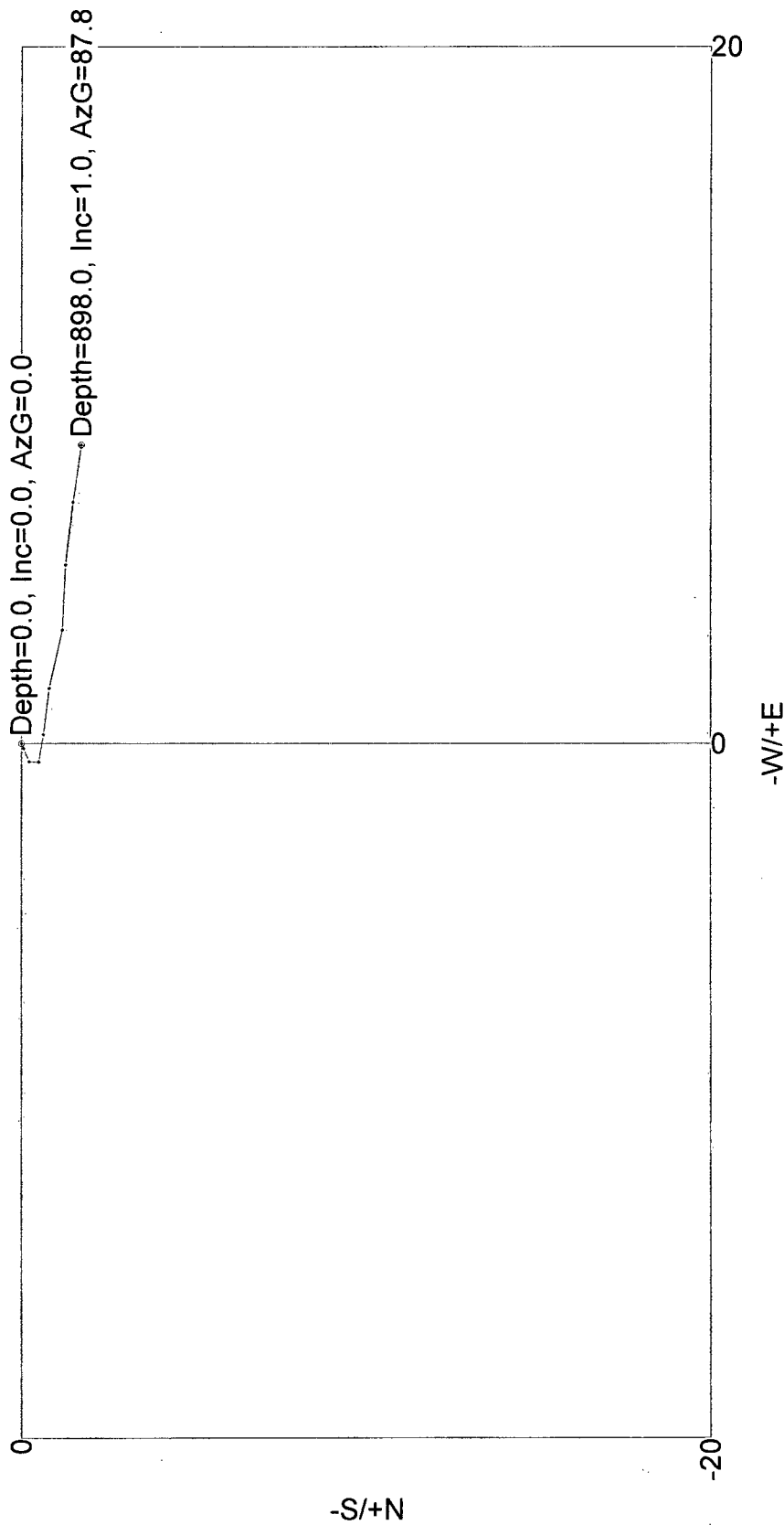
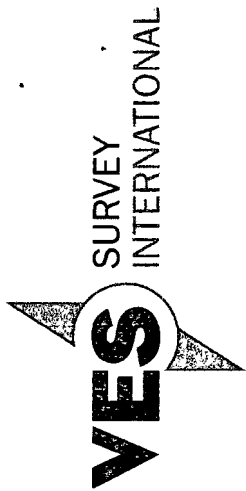
VES Survey International
Midland, Texas
432-563-5444

Surveyor: Michael Cook
Cadillac 15 State No. 102H / API 30-015-43829

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.17	245.29	100.00	-0.06	-0.14	0.15	0.15	245.29	0.17
200.00	0.30	249.50	200.00	-0.22	-0.52	0.56	0.56	247.25	0.13
300.00	0.35	129.55	300.00	-0.50	-0.53	0.66	0.73	226.65	0.56
400.00	0.64	83.58	399.99	-0.63	0.25	-0.06	0.68	158.11	0.47
500.00	0.92	106.68	499.99	-0.80	1.58	-1.27	1.77	116.93	0.42
600.00	1.05	99.59	599.97	-1.18	3.25	-2.76	3.46	110.03	0.18
700.00	1.10	86.19	699.95	-1.27	5.11	-4.51	5.27	103.99	0.26
800.00	1.02	108.18	799.94	-1.49	6.91	-6.18	7.07	102.13	0.41
898.00	0.96	87.84	897.92	-1.73	8.56	-7.68	8.73	101.41	0.36



VES Survey International
Midland, Texas
432-563-5444
Surveyor: Michael Cook
Cadillac 15 State No. 102H / API 30-015-43829





I Michael Cook certify that I am employed by VES Survey International. That I did on the day(s) of 09/13/16 through 09/13/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 898.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating for the Cadillac 15 State Well # 102H API # 30-015-43829 in Eddy County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by VES Survey International.

M Cook

Michael Cook
Service Technician
VES Survey International