

30-015-37455



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Yale State #19

Yale State #19

OH - Job #32D11111092



Survey: MWD Survey

SDI Standard Survey Report

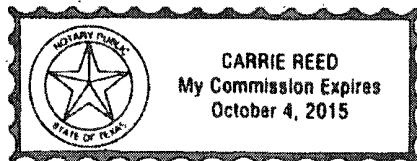
This survey is correct to the best of my knowledge and is supported by actual field data.

[Signature]

Notarized this date 24 of December, 2011.

[Signature]

Notary Signature
County of Midland
State of Texas





Scientific Drilling International, Inc.
SDI Standard Survey Report



Company: COG OPERATING LLC
Project: Eddy County, NM (NAN27 NME)
Site: Yale State #19
Well: Yale State #19
Wellbore: OH - Job #32D1111092
Design: Actual

Local Co-ordinate Reference: Site Yale State #19
TVD Reference: KB Elev (12') @ 3761.0usft (Basic #35)
MD Reference: KB Elev (12') @ 3761.0usft (Basic #35)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Regulatory

Project: Eddy County, NM (NAN27 NME)

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site: Yale State #19

Site Position: Northing: 677,132.40 usft Latitude: 32° 51' 39.292 N
From: Map Easting: 619,554.50 usft Longitude: 103° 56' 38.352 W
Position Uncertainty: 0.0 usft Slot Radius: 0" Grid Convergence: 0.21"

Well: Yale State #19

Well Position: +N/-S 0.0 usft Northing: 677,132.40 usft Latitude: 32° 51' 39.292 N
+E/-W 0.0 usft Easting: 619,554.50 usft Longitude: 103° 56' 38.352 W
Position Uncertainty: 0.0 usft Wellhead Elevation: usft Ground Level: 3,749.0 usft

Wellbore: OH - Job #32D1111092

Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	11/11/2011	7.76	60.70	48,915

Design: Actual

Audit Notes:

Version: 1.0 Phase: ACTUAL Tie On Depth: 0.0

Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	259.03

Survey Program Date: 12/27/2011

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	1,293.0	Gyro Survey (OH - Job #32D1111092)	Keeper	Standard Wireline Keeper ver 1.0.2
1,403.0	6,195.0	MWD Survey (OH - Job #32D1111092)	MWD	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
100.0	0.17	272.62	100.0	0.0	-0.1	272.62	0.1
200.0	0.72	239.35	200.0	-0.3	-0.8	249.87	0.9
300.0	0.39	217.19	300.0	-0.9	-1.6	240.43	1.8
400.0	0.80	106.45	400.0	-1.4	-1.1	219.31	1.8
500.0	1.08	90.06	500.0	-1.6	0.5	162.53	1.6
600.0	0.85	85.21	600.0	-1.5	2.2	124.69	2.6
700.0	0.97	86.94	699.9	-1.4	3.8	110.40	4.0
800.0	0.84	83.23	799.9	-1.3	5.3	103.36	5.5
900.0	1.15	82.23	899.9	-1.0	7.1	98.42	7.1
1,000.0	1.08	68.20	999.9	-0.6	8.9	93.58	8.9



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Wellbore: OH - Job #32D11111092
Design: Actual

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MD Reference: KB Elev (12) @ 3761.0usft (Basic #35)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Regulatory

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,100.0	1.20	75.49	1,099.9	0.1	10.8	89.71	10.8
1,200.0	1.45	66.04	1,199.9	0.8	13.0	86.34	13.0
1,293.0	1.82	66.41	1,292.8	1.9	15.4	82.97	15.5



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SDI Standard Survey Report



Company: COG OPERATING LLC
Project: Eddy County, NM (NAN27 NME)
Site: Yale State #19
Well: Yale State #19
Wellbore: OH - Job #32D1111092
Design: Actual

Local Co-ordinate Reference: Site Yale State #19
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Database: EDM-Regulatory

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Well: Yale State #19

Well Position: +N/-S 0.0 usft Northing: 677,132.40 usft Latitude: 32° 51' 39.292 N
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Wellbore: OH - Job #32D1111092

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/11/2011	7.76	80.70	48,915

Design: Actual

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	259.03

Survey/Program: Date: 12/27/2011

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	1,293.0	Gyro Survey (OH - Job #32D1111092)	Keeper	Standard Wireline Keeper ver 1.0.2
1,403.0	6,195.0	MWD Survey (OH - Job #32D1111092)	MWD	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,293.0	1.82	68.41	1,292.8	1.9	15.4	82.97	15.5
Gyro Tie-In							
1,403.0	1.67	70.84	1,402.8	3.1	18.5	80.43	18.8
1,466.0	0.92	28.21	1,465.8	3.9	19.6	78.84	20.0
1,529.0	0.56	344.51	1,528.7	4.6	19.8	76.88	20.3
1,593.0	1.50	275.63	1,592.7	5.0	18.9	75.17	19.5
1,656.0	2.31	261.28	1,655.7	4.9	16.8	73.78	17.5
1,720.0	3.17	260.79	1,719.6	4.4	13.8	72.26	14.5
1,783.0	3.79	260.19	1,782.5	3.8	10.0	69.33	10.7
1,847.0	4.76	257.91	1,846.3	2.9	5.3	61.77	6.0
1,910.0	5.83	257.40	1,909.1	1.6	-0.4	347.51	1.7



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Site:	Yale State #19	MD Reference:	KB Elev (12') @ 3761.0usft (Basic #35)
Well:	Yale State #19	North Reference:	Grid
Wellbore:	OH - Job #32D11111092	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
2,005.0	5.50	257.19	2,003.6	-0.5	-9.5	267.28	9.5
2,100.0	5.28	257.28	2,098.2	-2.4	-18.2	262.42	18.4
2,195.0	4.70	255.05	2,192.8	-4.4	-26.2	260.50	26.6
2,290.0	5.48	256.34	2,287.4	-6.5	-34.4	259.36	35.0
2,385.0	5.07	256.47	2,382.0	-8.5	-42.9	258.77	43.7
2,481.0	5.40	256.36	2,477.6	-10.6	-51.4	258.37	52.5
2,576.0	4.86	256.83	2,572.3	-12.5	-59.7	258.12	61.0
2,671.0	5.47	261.89	2,666.9	-14.1	-68.1	258.30	69.5
2,765.0	5.42	263.48	2,760.4	-15.2	-76.9	258.79	78.4
2,861.0	5.12	264.25	2,856.0	-16.2	-85.7	259.30	87.2
2,956.0	6.11	256.52	2,950.6	-17.8	-94.8	259.38	96.5
3,050.0	5.80	256.08	3,044.1	-20.1	-104.3	259.09	106.2
3,146.0	5.62	255.14	3,139.6	-22.5	-113.5	258.81	115.7
3,240.0	5.44	254.22	3,233.2	-24.9	-122.3	258.51	124.8
3,336.0	5.54	254.98	3,328.7	-27.3	-131.1	258.24	133.9
3,431.0	5.64	256.18	3,423.3	-29.6	-140.1	258.07	143.2
3,526.0	5.68	255.47	3,517.8	-31.9	-149.2	257.93	152.6
3,622.0	5.51	255.81	3,613.4	-34.2	-158.2	257.80	161.9
3,717.0	5.52	255.86	3,707.9	-36.5	-167.1	257.69	171.0
3,812.0	5.24	255.62	3,802.5	-38.6	-175.7	257.60	179.9
3,906.0	5.63	270.14	3,896.1	-39.7	-184.5	257.86	188.7
4,001.0	5.36	269.87	3,990.6	-39.7	-193.6	258.41	197.6
4,096.0	5.54	268.73	4,085.2	-39.8	-202.6	258.88	206.5
4,191.0	5.36	265.13	4,179.8	-40.3	-211.6	259.22	215.4
4,287.0	5.17	270.14	4,275.4	-40.7	-220.4	259.55	224.1
4,382.0	5.19	268.29	4,370.0	-40.8	-229.0	259.90	232.6
4,477.0	5.19	267.50	4,464.6	-41.1	-237.6	260.19	241.1
4,572.0	5.01	270.95	4,559.2	-41.2	-246.0	260.49	249.4
4,668.0	6.18	261.55	4,654.8	-41.9	-255.3	260.68	258.7
4,763.0	5.80	258.80	4,749.2	-43.6	-265.1	260.66	268.6
4,857.0	5.66	260.05	4,842.8	-45.3	-274.3	260.62	278.0
4,952.0	5.32	258.63	4,937.3	-47.0	-283.2	260.58	287.1
5,048.0	5.28	257.06	5,032.9	-48.9	-291.9	260.50	296.0
5,143.0	5.45	259.06	5,127.5	-50.7	-300.6	260.43	304.8
5,238.0	5.28	258.43	5,222.1	-52.4	-309.3	260.38	313.7
5,331.0	5.10	253.35	5,314.7	-54.5	-317.5	260.27	322.1
5,427.0	5.01	253.26	5,410.3	-56.9	-325.6	260.09	330.5
5,522.0	4.92	253.35	5,505.0	-59.3	-333.4	259.92	338.7
5,618.0	5.27	253.51	5,600.6	-61.7	-341.6	259.76	347.1
5,712.0	5.21	253.74	5,694.2	-64.1	-349.9	259.62	355.7
5,808.0	4.63	253.92	5,789.9	-66.4	-357.8	259.49	363.9
5,903.0	5.34	253.92	5,884.5	-68.7	-365.7	259.36	372.1
5,998.0	5.33	259.38	5,979.1	-70.7	-374.3	259.30	380.9
6,093.0	4.89	254.58	6,073.7	-72.6	-382.5	259.25	389.4



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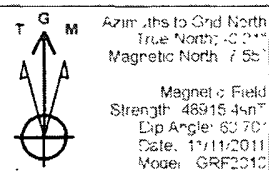
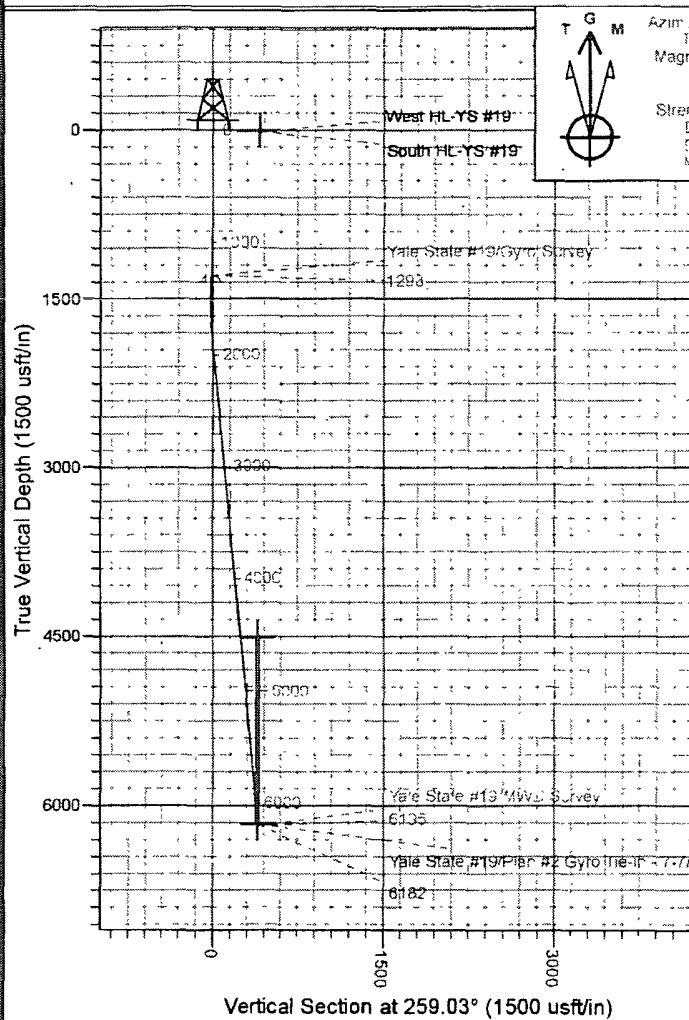
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Yale State #19
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3761.0usft (Basic #35)
Site:	Yale State #19	MD Reference:	KB Elev (12') @ 3761.0usft (Basic #35)
Well:	Yale State #19	North Reference:	Grid
Wellbore:	OH - Job #32D11111092	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
6,147.0	4.48	258.18	6,127.5	-73.7	-386.8	259.22	393.8
Last MWD Survey							
6,195.0	4.48	258.18	6,175.4	-74.4	-390.5	259.21	397.5
Projection to Bit							

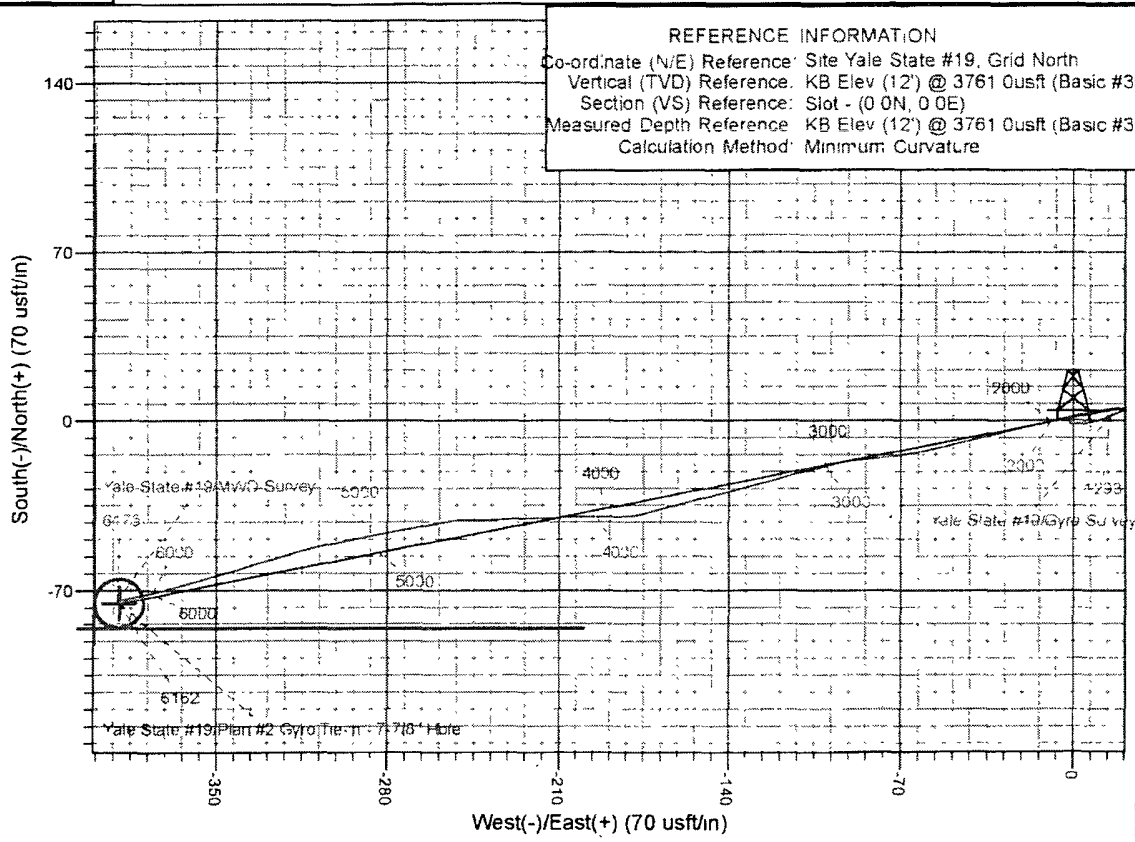
Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,293.0	1,292.8	1.9	15.4	Gyro Tie-in
6,147.0	6,127.5	-73.7	-386.8	Last MWD Survey
6,195.0	6,175.4	-74.4	-390.5	Projection to Bit



Project: Eddy County, NM (NAN27 NME)
 Site: Yale State #19
 Well: Yale State #19
 Wellbore: OH - Job #32D11111092
 Design: Plan #2 Gyro Tie-in - 7-7/8" Hole



WELL DETAILS: Yale State #19					
KB Elev (12') @ 3761.0usft (Basic #35)					
Ground Level:		3749.0			
Easting		Latitude		Longitude	
619554.50		32° 51' 39.292 N		103° 56' 38.352 W	
+N/-S		+E/-W		Northing	
0.0		0.0		677132.40	



REFERENCE INFORMATION
 Co-ordinate (N/E) Reference: Site Yale State #19, Grid North
 Vertical (TVD) Reference: KB Elev (12') @ 3761.0usft (Basic #35)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: KB Elev (12') @ 3761.0usft (Basic #35)
 Calculation Method: Minimum Curvature

COMPANY DETAILS: COG OPERATING LLC
 223032
 Calculation Method: Minimum Curvature
 Error System: ISCWSA
 Scan Method: Closest Approach 3D
 Error Surface: Elliptical Conic
 Warning Method: Error Ratio

PROJECT DETAILS: Eddy County, NM (NAN27 NME)
 Geodetic System: US State Plane 1927 (Exact solution)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: New Mexico East 3001
 System Datum: Mean Sea Level

SITE DETAILS: Yale State #19
 Site Centre Latitude: 32° 51' 39.292 N
 Longitude: 103° 56' 38.352 W
 Positional Uncertainty: 0.0
 Convergence: 0.21
 Local North: Grid