

30-015-37319

COG OPERATING LLC

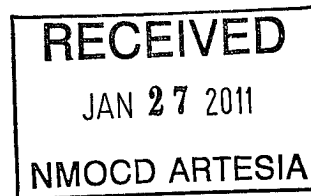
Eddy County, NM (NAN27 NME)

Miranda Federal #4H

Miranda Federal #4H

OH

SDI Standard Survey Report



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

Richardson

Notorized this date 7th of November, 2010.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Miranda Federal #4H
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RKB Elev (13') @ 3705.0usft (JW #4)
Site:	Miranda Federal #4H	MD Reference:	RKB Elev (13') @ 3705.0usft (JW #4)
Well:	Miranda Federal #4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Project	Eddy County, NM (NAN27 NME)		
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	Miranda Federal #4H		
Site Position:		Northing:	674,385.60 usft
From:	Map	Easting:	608,842.80 usft
Position Uncertainty:	0.0 usft	Slot Radius:	0"
		Latitude:	32° 51' 12.485 N
		Longitude:	103° 58' 44.041 W
		Grid Convergence:	0.19 °

Well	Miranda Federal #4H		
Well Position	+N/-S	0.0 usft	Northing: 674,385.60 usft
	+E/-W	0.0 usft	Easting: 608,842.80 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 12.485 N
		Longitude:	103° 58' 44.041 W
		Ground Level:	3,692.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	10/8/2010	7.89	60.74	49,050

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	89.93

Survey Program	Date	11/8/2010		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	2,427.0	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2
2,536.0	7,255.0	MWD Survey (OH)	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	342.17	100.0	0.1	0.0	342.17	0.1
200.0	0.17	328.79	200.0	0.4	-0.2	337.72	0.4
300.0	0.26	196.07	300.0	0.3	-0.3	315.99	0.4
400.0	1.00	187.70	400.0	-0.8	-0.5	212.50	0.9
500.0	1.30	193.17	500.0	-2.7	-0.9	197.51	2.9
600.0	1.22	188.54	599.9	-4.9	-1.3	194.65	5.1
700.0	1.27	184.08	699.9	-7.0	-1.5	192.14	7.2
800.0	1.31	177.18	799.9	-9.3	-1.5	189.40	9.4
900.0	1.27	165.27	899.9	-11.5	-1.2	185.95	11.6
1,000.0	1.00	108.58	999.9	-12.9	-0.1	180.41	12.9

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Well:	Miranda Federal #4H	North Reference:	Grid
Wellbore:	OH	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)
1,100.0	1.60	90.97	1,099.8	-13.2	2.1	170.80	13.3
1,200.0	1.70	84.92	1,199.8	-13.1	5.0	159.02	14.0
1,300.0	1.81	90.01	1,299.7	-12.9	8.1	148.04	15.2
1,400.0	1.74	95.00	1,399.7	-13.1	11.2	139.49	17.2
1,500.0	2.05	95.64	1,499.6	-13.4	14.4	132.77	19.7
1,600.0	2.71	101.44	1,599.6	-14.0	18.5	127.07	23.2
1,700.0	3.48	103.26	1,699.4	-15.2	23.8	122.50	28.2
1,800.0	4.53	106.62	1,799.2	-17.0	30.6	119.09	35.0
1,900.0	5.87	109.02	1,898.7	-19.8	39.2	116.81	43.9
2,000.0	7.66	108.91	1,998.0	-23.6	50.3	115.15	55.6
2,100.0	9.85	108.32	2,096.9	-28.5	64.7	113.74	70.7
2,200.0	12.05	105.63	2,195.1	-34.0	82.9	112.28	89.6
2,300.0	14.09	103.34	2,292.5	-39.6	104.8	110.69	112.0
2,400.0	13.94	101.69	2,389.5	-44.8	128.5	109.24	136.1
2,427.0	13.80	101.99	2,415.7	-46.2	134.8	108.91	142.5

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
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Survey Program	Date	11/8/2010		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
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2,536.0	7,186.0	MWD Survey (OH)	MWD	MWD - Standard

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
2,427.0	13.80	101.99	2,415.7	-46.2	134.8	108.91	142.5
2,536.0	11.78	100.13	2,522.0	-50.8	158.5	107.78	166.4
2,631.0	10.74	98.15	2,615.2	-53.8	176.8	106.92	184.8
2,726.0	9.31	99.31	2,708.7	-56.3	193.1	106.25	201.1
2,821.0	8.15	100.30	2,802.6	-58.7	207.3	105.82	215.5
2,916.0	6.14	97.84	2,896.9	-60.6	219.0	105.48	227.2
3,011.0	3.86	95.53	2,991.5	-61.6	227.2	105.18	235.4
3,106.0	2.39	108.60	3,086.3	-62.6	232.3	105.08	240.5
3,201.0	1.92	205.60	3,181.3	-64.6	233.4	105.48	242.2
3,296.0	1.98	259.40	3,276.3	-66.4	231.1	106.02	240.5
3,391.0	2.13	259.41	3,371.2	-67.0	227.8	106.39	237.4

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Well:	Miranda Federal #4H	North Reference:	Grid
Wellbore:	OH	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)
3,487.0	1.72	283.44	3,467.1	-67.0	224.6	106.61	234.4
3,582.0	1.93	287.45	3,562.1	-66.2	221.7	106.62	231.4
3,678.0	1.93	291.00	3,658.0	-65.1	218.7	106.58	228.2
3,773.0	0.54	302.70	3,753.0	-64.3	216.8	106.52	226.1
3,869.0	0.38	303.30	3,849.0	-63.9	216.2	106.47	225.4
3,962.0	0.39	291.40	3,942.0	-63.6	215.6	106.44	224.8
4,057.0	0.42	299.90	4,037.0	-63.3	215.0	106.41	224.1
4,122.0	0.44	285.20	4,102.0	-63.1	214.6	106.39	223.7
4,153.0	2.09	34.82	4,133.0	-62.6	214.8	106.26	223.7
4,185.0	6.41	41.45	4,164.9	-60.8	216.3	105.70	224.7
4,216.0	11.24	43.94	4,195.5	-57.3	219.5	104.64	226.9
4,248.0	16.19	46.98	4,226.6	-52.0	225.0	103.03	230.9
4,279.0	19.43	50.03	4,256.1	-45.8	232.1	101.16	236.5
4,311.0	22.43	53.05	4,286.0	-38.7	241.0	99.12	244.1
4,343.0	25.20	53.95	4,315.3	-31.0	251.4	97.03	253.3
4,374.0	28.45	53.81	4,342.9	-22.8	262.7	94.95	263.7
4,406.0	31.28	55.26	4,370.7	-13.5	275.7	92.81	276.0
4,438.0	34.10	57.04	4,397.6	-3.9	290.1	90.77	290.1
4,469.0	37.62	60.23	4,422.7	5.5	305.6	88.97	305.6
4,561.0	48.89	67.29	4,489.7	32.9	362.1	84.80	363.6
4,593.0	52.66	70.18	4,509.9	41.9	385.2	83.79	387.5
4,625.0	56.03	71.45	4,528.6	50.5	409.8	82.98	412.9
4,657.0	59.04	73.99	4,545.7	58.5	435.6	82.36	439.5
4,688.0	61.16	77.53	4,561.2	65.1	461.6	81.98	466.2
4,719.0	63.96	80.50	4,575.5	70.3	488.6	81.81	493.6
4,751.0	67.16	82.30	4,588.7	74.6	517.4	81.79	522.8
4,783.0	70.73	83.91	4,600.2	78.2	547.0	81.86	552.6
4,814.0	73.75	85.35	4,609.7	81.0	576.4	82.00	582.1
4,846.0	77.05	86.85	4,617.7	83.1	607.3	82.21	613.0
4,878.0	80.93	88.19	4,623.8	84.4	638.7	82.47	644.3
4,910.0	85.08	88.86	4,627.7	85.3	670.4	82.75	675.8
4,941.0	88.03	90.18	4,629.6	85.5	701.4	83.05	706.6
5,004.0	87.84	90.76	4,631.9	85.0	764.3	83.65	769.1
5,099.0	87.04	90.69	4,636.1	83.8	859.2	84.43	863.3
5,194.0	86.64	90.95	4,641.3	82.4	954.1	85.06	957.6
5,288.0	85.82	91.41	4,647.5	80.5	1,047.9	85.61	1,050.9
5,384.0	87.52	91.41	4,653.1	78.2	1,143.7	86.09	1,146.3
5,478.0	87.31	91.42	4,657.3	75.8	1,237.5	86.49	1,239.9
5,573.0	86.51	91.42	4,662.5	73.5	1,332.4	86.84	1,334.4
5,668.0	86.79	91.15	4,668.0	71.4	1,427.2	87.14	1,429.0
5,763.0	87.68	90.60	4,672.6	69.9	1,522.1	87.37	1,523.7
5,858.0	87.04	89.85	4,677.0	69.5	1,617.0	87.54	1,618.5
5,954.0	86.40	90.18	4,682.5	69.5	1,712.8	87.68	1,714.2
6,049.0	87.48	88.94	4,687.5	70.2	1,807.7	87.77	1,809.0

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Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RKB Elev (13') @ 3705.0usft (JW #4)
Site:	Miranda Federal #4H	MD Reference:	RKB Elev (13') @ 3705.0usft (JW #4)
Well:	Miranda Federal #4H	North Reference:	Grid
Wellbore:	OH	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)
6,144.0	86.97	89.55	4,692.1	71.5	1,902.5	87.85	1,903.9
6,239.0	86.57	89.57	4,697.5	72.2	1,997.4	87.93	1,998.7
6,332.0	88.66	88.30	4,701.4	73.9	2,090.3	87.97	2,091.6
6,427.0	91.14	88.38	4,701.5	76.7	2,185.2	87.99	2,186.6
6,522.0	92.45	91.78	4,698.6	76.6	2,280.2	88.08	2,281.5
6,617.0	91.68	91.09	4,695.1	74.2	2,375.1	88.21	2,376.2
6,712.0	89.93	89.77	4,693.8	73.5	2,470.1	88.30	2,471.2
6,807.0	91.24	93.61	4,692.8	70.7	2,565.0	88.42	2,566.0
6,901.0	92.12	93.60	4,690.1	64.8	2,658.8	88.60	2,659.6
6,996.0	92.19	94.33	4,686.5	58.2	2,753.5	88.79	2,754.1
7,091.0	91.85	94.43	4,683.1	51.0	2,848.1	88.98	2,848.6
7,186.0	91.17	92.60	4,680.6	45.1	2,942.9	89.12	2,943.3

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,427.0	2,415.7	-46.2	134.8	Gyro Tie-in
7,186.0	4,680.6	45.1	2,942.9	Last MWD Survey
7,255.0	4,679.2	42.0	3,011.8	Projection to Bit