



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Electra Federal #52

Electra Federal #52

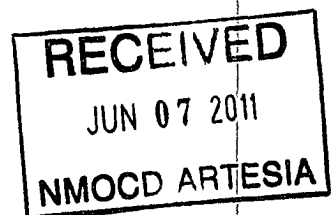
OH

30-015-38 353

Survey: MWD Survey

SDI Standard Survey Report

17 May, 2011



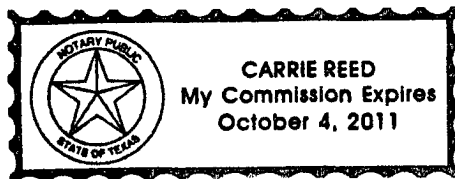
This survey is correct to the best of my knowledge and is supported by actual field data.

Luhanth

Notarized this date 17th of May, 2011.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling
Directional Drilling Operations



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Electra Federal #52
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (14') @ 3744 0usft (UDI #40)
Site:	Electra Federal #52	MD Reference:	KB Elev (14') @ 3744 0usft (UDI #40)
Well:	Electra Federal #52	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	Electra Federal #52		
Site Position:		Northing:	673,105 00 usft
From:	Map	Easting:	614,730 30 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 59 613 N
		Longitude:	103° 57' 35 076 W
		Grid Convergence:	0 20 °

Well	Electra Federal #52		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 59 613 N
		Longitude:	103° 57' 35 076 W
		Ground Level:	3,730 0 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	4/17/2011	(°)
			Dip Angle
			(°)
			Field Strength
			(nT)
			7 83
			60 70
			48,964

Design	Actual		
Audit Notes:			
Version:	1 0	Phase:	ACTUAL
		Tie On Depth:	0 0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0 0	0 0	0 0
			Direction
			(°)
			263 93

Survey Program	Date 5/17/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
100 0	1,255 0	Gyro Survey (OH)	Keeper
1,370 0	4,786 0	MWD Survey (OH)	MWD
			Standard Wireline Keeper ver 1 0 2
			MWD - Standard

Survey							
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)
0 0	0 00	0 00	0 0	0 0	0 0	0 00	0 0
100 0	0 39	345 54	100 0	0 3	-0 1	345 54	0 3
200 0	0 44	349 48	200 0	1 0	-0 2	346 96	1 1
300 0	0 80	207 29	300 0	0 8	-0 6	321 55	1 0
400 0	1 24	210 35	400 0	-0 8	-1 5	243 07	1 7
500 0	1 72	210 39	499 9	-3 0	-2 8	223 16	4 1
600 0	1 69	210 79	599 9	-5 6	-4 3	217 88	7 0
700 0	1 47	214 23	699 9	-7 9	-5 8	216 33	9 8
800 0	1 18	191 62	799 8	-9 9	-6 7	214 05	12 0
900 0	0 98	160 48	899 8	-11 8	-6 6	209 46	13 5
1,000 0	1 05	137 70	999 8	-13 2	-5 7	203 44	14 4



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Site:	Electra Federal #52	MD Reference:	KB Elev (14') @ 3744 0usft (UDI #40)
Well:	Electra Federal #52	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 40	119 73	1,099 8	-14 5	-4 1	195 63	15 1
1,200 0	1 27	134 48	1,199 8	-15 9	-2 2	187 92	16 1
1,255 0	1 43	130 46	1,254 7	-16 8	-1 3	184 28	16 8



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Site:	Electra Federal #52	MD Reference:	KB Elev (14') @ 3744 0usft (UDI #40)
Well:	Electra Federal #52	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	Electra Federal #52		
Site Position:		Northing:	673,105.00 usft
From:	Map	Easting:	614,730.30 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 59.613 N
		Longitude:	103° 57' 35.076 W
		Grid Convergence:	0.20 °

Well	Electra Federal #52		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 59.613 N
		Longitude:	103° 57' 35.076 W
		Ground Level:	3,730.0 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	4/17/2011	(°)
			7.83
			Dip Angle
			(°)
			60.70
			Field Strength
			(nT)
			48,964

Design	Actual		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			263.93

Survey Program	Date	5/17/2011
From	To	
(usft)	(usft)	
100.0	1,255.0	Gyro Survey (OH)
1,370.0	4,786.0	MWD Survey (OH)
Tool Name	Description	
Keeper	Standard Wireline Keeper ver 1.0.2	
MWD	MWD - Standard	

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,255.0	1.43	130.46	1,254.7	-16.8	-1.3	184.28	16.8
Gyro Tie-in							
1,370.0	1.33	150.58	1,369.7	-18.9	0.5	178.51	18.9
1,465.0	2.15	199.36	1,464.7	-21.5	0.4	178.82	21.5
1,560.0	2.02	255.51	1,559.6	-23.6	-1.8	184.28	23.7
1,655.0	2.38	284.77	1,654.5	-23.5	-5.3	192.69	24.1
1,750.0	3.53	284.43	1,749.4	-22.3	-10.0	204.23	24.5
1,846.0	4.69	283.53	1,845.2	-20.6	-16.7	218.99	26.6
1,941.0	4.57	283.61	1,939.9	-18.8	-24.2	232.05	30.7
2,037.0	4.35	278.80	2,035.6	-17.4	-31.5	241.08	36.0
2,132.0	4.00	277.49	2,130.3	-16.4	-38.3	246.82	41.7



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
2,226 0	3 67	267 70	2,224 1	-16 1	-44 6	250 14	47 4
2,321 0	3 49	267 49	2,318 9	-16 4	-50 5	252 06	53 1
2,416 0	4 64	257 21	2,413 7	-17 3	-57 2	253 13	59 7
2,511 0	4 26	255 44	2,508 4	-19 1	-64 3	253 49	67 1
2,606 0	4 77	267 64	2,603 1	-20 1	-71 7	254 32	74 4
2,701 0	4 61	269 39	2,697 8	-20 3	-79 4	255 65	82 0
2,803 0	4 24	269 87	2,799 5	-20 4	-87 3	256 87	89 7
2,898 0	4 03	267 25	2,894 2	-20 5	-94 2	257 69	96 4
2,993 0	4 08	267 12	2,989 0	-20 9	-100 9	258 31	103 0
3,088 0	3 94	266 12	3,083 8	-21 3	-107 5	258 81	109 6
3,183 0	4 45	275 39	3,178 5	-21 1	-114 4	259 53	116 4
3,278 0	4 33	276 95	3,273 2	-20 4	-121 7	260 50	123 3
3,373 0	4 18	275 25	3,368 0	-19 6	-128 7	261 34	130 1
3,468 0	4 12	274 65	3,462 7	-19 0	-135 5	262 01	136 8
3,563 0	4 01	274 70	3,557 5	-18 5	-142 2	262 60	143 4
3,658 0	4 01	274 34	3,652 2	-17 9	-148 8	263 13	149 9
3,754 0	4 63	262 45	3,748 0	-18 2	-156 0	263 35	157 1
3,859 0	4 55	262 30	3,852 6	-19 3	-164 4	263 30	165 5
3,944 0	4 30	260 87	3,937 4	-20 3	-170 8	263 24	172 0
4,039 0	3 95	256 92	4,032 1	-21 6	-177 5	263 07	178 9
4,134 0	4 34	262 46	4,126 9	-22 8	-184 3	262 95	185 7
4,229 0	4 17	261 32	4,221 6	-23 8	-191 3	262 91	192 8
4,324 0	3 03	275 98	4,316 4	-24 0	-197 2	263 05	198 6
4,419 0	1 84	294 83	4,411 4	-23 1	-201 1	263 44	202 4
4,514 0	0 41	353 52	4,506 3	-22 2	-202 5	263 76	203 7
4,609 0	0 47	339 07	4,601 3	-21 5	-202 7	263 96	203 8
4,704 0	0 41	358 21	4,696 3	-20 7	-202 8	264 16	203 9
4,738 0	0 38	340 78	4,730 3	-20 5	-202 9	264 22	203 9
Last MWD Survey							
4,786 0	0 35	343 76	4,778 3	-20 2	-203 0	264 31	204 0
Projection to Bit							

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,255 0	1,254 7	-16 8	-1 3	Gyro Tie-in
4,738 0	4,730 3	-20 5	-202 9	Last MWD Survey
4,786 0	4,778 3	-20 2	-203 0	Projection to Bit