

30-015-39176



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

McCoy State #20

McCoy State #20

OH - Job #32D0911921

Survey: MWD Survey

SDI Standard Survey Report

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

Richard

Notarized this date 4th of October, 2011.

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 McCoy State #20
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (18') @ 3647.0usft (Silver Oak #4)
Site:	McCoy State #20	MD Reference:	KB Elev (18') @ 3647.0usft (Silver Oak #4)
Well:	McCoy State #20	North Reference:	Grid
Wellbore:	OH - Job #32D0911921	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	McCoy State #20		
Site Position:		Northing:	674,317.30 usft
From:	Map	Easting:	572,500.30 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 51' 12.815 N
		Longitude:	104° 5' 50.080 W
		Grid Convergence:	0 13 °

Well	McCoy State #20		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 12.815 N
		Longitude:	104° 5' 50.080 W
		Ground Level:	3,629.0 usft

Wellbore	OH - Job #32D0911921				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/27/2011	7.84	60.67	48,907

Design	Actual			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	266.31

Survey Program	Date	10/24/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	810.0	Gyro Survey (OH - Job #32D0911921)	Keeper	Standard Wireline Keeper ver 1.0.2	
911.0	4,349.0	MWD Survey (OH - Job #32D0911921)	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	0.84	342.60	100.0	0.7	-0.2	342.60	0.7	
200.0	1.55	0.13	200.0	2.8	-0.4	351.01	2.8	
300.0	1.69	358.21	299.9	5.6	-0.5	355.10	5.6	
400.0	1.90	12.52	399.9	8.7	-0.2	358.91	8.7	
500.0	1.96	28.96	499.8	11.8	1.0	4.96	11.8	
600.0	1.92	36.66	599.8	14.6	2.9	11.03	14.9	
700.0	1.83	39.74	699.7	17.2	4.9	15.82	17.9	
800.0	1.57	55.57	799.7	19.2	7.0	20.09	20.4	
810.0	1.49	54.60	809.7	19.4	7.2	20.52	20.7	



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site McCoy State #20
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (18') @ 3647.0usft (Silver Oak #4)
Site:	McCoy State #20	MD Reference:	KB Elev (18') @ 3647.0usft (Silver Oak #4)
Well:	McCoy State #20	North Reference:	Grid
Wellbore:	OH - Job #32D0911921	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	McCoy State #20		
Site Position:		Northing:	674,317.30 usft
From:	Map	Easting:	572,500.30 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 51' 12.815 N
		Longitude:	104° 5' 50.080 W
		Grid Convergence:	0 13 °

Well	McCoy State #20		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 12.815 N
		Longitude:	104° 5' 50.080 W
		Ground Level:	3,629.0 usft

Wellbore	OH - Job #32D0911921				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	9/27/2011	7.84	60.67	48,907

Design	Actual			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0 0	0 0	266.31

Survey Program	Date 10/24/2011				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.0	810.0	Gyro Survey (OH - Job #32D0911921)	Keeper	Standard Wireline Keeper ver 1.0.2	
911.0	4,349.0	MWD Survey (OH - Job #32D0911921)	MWD	MWD - Standard	

Survey								
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)	
810.0	1.49	54.60	809.7	19.4	7.2	20.52	20.7	
Gyro Tie-in								
911.0	1.40	58.66	910.6	20.8	9.4	24.29	22.8	
1,007.0	0.74	341.90	1,006.6	22.0	10.2	24.87	24.2	
1,102.0	1.07	282.91	1,101.6	22.7	9.1	21.86	24.5	
1,198.0	1.99	264.75	1,197.6	22.8	6.6	16.12	23.7	
1,293.0	2.95	265.20	1,292.5	22.4	2.5	6.38	22.6	
1,389.0	4.11	255.71	1,388.3	21.4	-3.3	351.25	21.6	
1,485.0	3.97	257.86	1,484.1	19.8	-9.9	333.53	22.1	
1,580.0	3.58	259.70	1,578.9	18.6	-16.0	319.29	24.5	
1,676.0	3.52	261.39	1,674.7	17.6	-21.9	308.87	28.1	



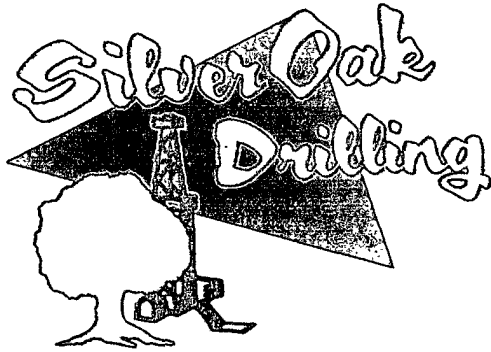
Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site McCoy State #20
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (18') @ 3647.0usft (Silver Oak #4)
Site:	McCoy State #20	MD Reference:	KB Elev (18') @ 3647.0usft (Silver Oak #4)
Well:	McCoy State #20	North Reference:	Grid
Wellbore:	OH - Job #32D0911921	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)
1,772.0	3.93	260.97	1,770.5	16.7	-28.0	300.73	32.6
1,867.0	3.64	263.63	1,865.3	15.8	-34.2	294.80	37.7
1,963.0	3.54	262.69	1,961.1	15.1	-40.2	290.59	43.0
2,058.0	3.27	265.46	2,055.9	14.5	-45.8	287.58	48.1
2,153.0	4.26	261.85	2,150.7	13.8	-52.0	284.86	53.8
2,249.0	4.18	261.96	2,246.4	12.8	-59.0	282.25	60.4
2,344.0	4.03	260.83	2,341.2	11.8	-65.7	280.17	66.8
2,440.0	3.90	261.65	2,437.0	10.8	-72.3	278.48	73.1
2,535.0	3.70	260.61	2,531.8	9.8	-78.5	277.12	79.1
2,631.0	3.60	261.53	2,627.6	8.9	-84.6	275.98	85.0
2,727.0	3.62	260.62	2,723.4	7.9	-90.5	275.00	90.9
2,822.0	3.57	261.20	2,818.2	7.0	-96.4	274.14	96.7
2,918.0	3.64	259.78	2,914.0	6.0	-102.4	273.35	102.5
3,014.0	3.40	258.29	3,009.8	4.9	-108.1	272.58	108.3
3,109.0	3.11	257.86	3,104.7	3.8	-113.4	271.89	113.5
3,205.0	3.36	257.03	3,200.5	2.6	-118.7	271.24	118.7
3,300.0	3.20	253.64	3,295.4	1.2	-124.0	270.56	124.0
3,396.0	3.96	265.59	3,391.2	0.2	-129.8	270.08	129.8
3,492.0	3.78	266.90	3,487.0	-0.2	-136.3	269.90	136.3
3,587.0	3.77	265.91	3,581.7	-0.6	-142.5	269.75	142.5
3,683.0	3.88	267.06	3,677.5	-1.0	-148.9	269.61	148.9
3,777.0	2.54	264.31	3,771.4	-1.4	-154.2	269.48	154.2
3,873.0	1.38	257.24	3,867.3	-1.9	-157.4	269.33	157.4
3,969.0	0.45	201.17	3,963.3	-2.5	-158.7	269.11	158.7
4,065.0	0.64	228.78	4,059.3	-3.2	-159.2	268.86	159.3
4,160.0	0.65	225.86	4,154.3	-3.9	-160.0	268.61	160.1
4,256.0	0.78	220.86	4,250.3	-4.8	-160.8	268.30	160.9
4,302.0	0.48	231.65	4,296.3	-5.1	-161.2	268.18	161.3
Last MWD Survey 4,349.0	0.48	231.65	4,343.3	-5.4	-161.5	268.10	161.6
Projection to Bit							

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
810.0	809.7	19.4	7.2	Gyro Tie-in
4,302.0	4,296.3	-5.1	-161.2	Last MWD Survey
4,349.0	4,343.3	-5.4	-161.5	Projection to Bit



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

October 4, 2011

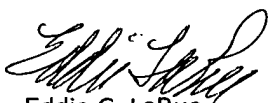
COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

RE: McCoy State #20
970' FNL & 2415' FWL
Sec. 8, T17S, R29E
Eddy County, New Mexico

Dear Sir,

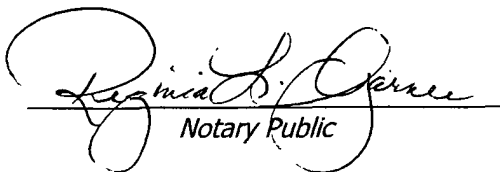
The attached is the Deviation Survey for the above captioned well.

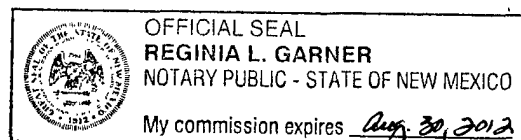
Very truly yours,


Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 4th day of October, 2011.


Notary Public



McCoy State #20

Date	Depth	Dev/Inc	Dir/AZ
9/26/2011	220	1.40	
9/27/2011	372	1.90	
9/27/2011	587	1.90	
9/27/2011	711	1.90	
9/27/2011	839	1.60	
9/28/2011	1007	0.74	341.90
9/28/2011	1198	1.99	264.70
9/28/2011	1485	3.97	257.80
9/28/2011	1580	3.58	258.70
9/28/2011	1676	3.52	261.20
9/28/2011	1772	3.93	260.90
9/29/2011	2153	4.26	261.80
9/29/2011	2440	3.90	261.60
9/29/2011	2631	3.60	261.50
9/29/2011	2918	3.64	259.70
9/29/2011	3014	3.40	258.20
9/29/2011	3205	3.36	257.00
9/29/2011	3205	3.36	257.00
9/30/2011	3873	1.38	257.20
9/30/2011	4160	0.65	225.80
9/30/2011	4256	0.78	220.86
9/30/2011	4302	0.48	231.65
10/1/2011	4352	0.50	
10/1/2011	4926	0.30	
10/2/2011	5372	0.20	