



COG OPERATING LLC

Lea County, NM (NAD27 NME)

JC Federal #53

JC Federal #53

OH

SUR: N-22-17s-32e, 748/S & 1689/W
BHL: N-22-17s-32e, 993/S & 1653/W
API # 30-025-39862

HOBBS OCD

JUN 29 2011

Survey: MWD Survey

RECEIVED

SDI Standard Survey Report

17 May, 2011

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

Richardson

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:	Well JC Federal #53
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (20') @ 4028 0usft (UDI #42)
Site:	JC Federal #53	MD Reference:	KB Elev (20') @ 4028 0usft (UDI #42)
Well:	JC Federal #53	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Project	Lea County, NM (NAD27 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	JC Federal #53		
Site Position:		Northing:	660,648 60 usft
From:	Map	Easting:	677,115 00 usft
Position Uncertainty:	0 0 usft	Slot Radius:	0"
		Latitude:	32° 48' 53 581 N
		Longitude:	103° 45' 24 596 W
		Grid Convergence:	0 31 °

Well	JC Federal #53		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 48' 53 581 N
		Longitude:	103° 45' 24 596 W
		Ground Level:	4,008 0 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	4/21/2011	7 73
			Dip Angle
			(°)
			60 71
			Field Strength
			(nT)
			48,963

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
			(°)
			351 20

Survey Program	Date 5/17/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100 0	2,090 0	Gyro Survey (OH)	UNKNOWN
2,196 0	6,148 0	MWD Survey (OH)	MWD
			Description
			Unknown survey
			MWD - Standard

Survey							
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)
2,090 0	2 50	36 81	2,089 4	12 5	31 8	68 63	34 2
Gyro Tie-in							
2,196 0	1 68	56 75	2,195 4	15 2	34 5	66 29	37 7
2,259 0	2 08	45 93	2,258 3	16 5	36 1	65 49	39 7
2,322 0	2 71	35 25	2,321 3	18 5	37 8	63 95	42 0
2,386 0	3 00	13 16	2,385 2	21 3	39 0	61 34	44 5
2,449 0	3 79	0 48	2,448 1	25 0	39 4	57 60	46 7
2,512 0	4 17	352 72	2,510 9	29 4	39 1	53 12	48 9
2,576 0	4 21	342 11	2,574 8	33 9	38 1	48 34	51 0
2,639 0	4 05	336 15	2,637 6	38 2	36 5	43 75	52 8
2,734 0	3 64	339 11	2,732 4	44 0	34 1	37 74	55 7



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Well:	JC Federal #53	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)
2,829 0	4 33	333 70	2,827 2	50 1	31 4	32 11	59 1
2,924 0	4 02	329 18	2,921 9	56 1	28 1	26 61	62 8
3,019 0	3 43	326 65	3,016 7	61 4	24 9	22 05	66 2
3,114 0	3 94	331 23	3,111 5	66 6	21 7	18 06	70 1
3,209 0	4 73	341 98	3,206 3	73 2	18 9	14 51	75 6
3,304 0	4 70	338 72	3,300 9	80 6	16 3	11 45	82 2
3,399 0	4 40	338 29	3,395 6	87 6	13 6	8 80	88 6
3,494 0	4 10	331 75	3,490 4	93 9	10 6	6 44	94 5
3,596 0	4 08	333 96	3,592 1	100 4	7 3	4 15	100 7
3,691 0	3 99	333 01	3,686 9	106 4	4 3	2 31	106 5
3,786 0	4 23	331 19	3,781 6	112 4	1 1	0 57	112 4
3,881 0	4 24	333 08	3,876 4	118 6	-2 2	358 95	118 6
3,976 0	3 57	342 59	3,971 1	124 6	-4 6	357 87	124 7
4,071 0	3 71	340 27	4,066 0	130 3	-6 6	357 12	130 4
4,166 0	2 97	339 92	4,160 8	135 5	-8 4	356 43	135 7
4,261 0	3 35	333 12	4,255 7	140 3	-10 5	355 70	140 7
4,356 0	3 37	333 57	4,350 5	145 2	-13 0	354 87	145 8
4,451 0	3 14	333 59	4,445 3	150 1	-15 4	354 12	150 9
4,546 0	3 54	335 67	4,540 2	155 1	-17 8	353 45	156 1
4,641 0	3 03	344 09	4,635 0	160 2	-19 7	352 99	161 4
4,736 0	2 76	340 41	4,729 9	164 7	-21 2	352 68	166 1
4,831 0	2 56	341 48	4,824 8	168 9	-22 6	352 38	170 4
4,926 0	2 76	347 06	4,919 7	173 1	-23 8	352 18	174 8
5,021 0	2 74	349 55	5,014 6	177 6	-24 7	352 08	179 3
5,116 0	2 97	347 70	5,109 5	182 2	-25 6	351 99	184 0
5,211 0	2 83	348 25	5,204 3	186 9	-26 7	351 89	188 8
5,275 0	2 26	344 73	5,268 3	189 7	-27 3	351 81	191 7
5,338 0	1 47	335 07	5,331 2	191 6	-28 0	351 70	193 7
5,401 0	1 33	341 18	5,394 2	193 1	-28 5	351 59	195 2
5,465 0	1 42	344 83	5,458 2	194 5	-29 0	351 52	196 7
5,528 0	1 52	343 43	5,521 2	196 1	-29 4	351 46	198 3
5,591 0	1 19	357 44	5,584 2	197 5	-29 7	351 45	199 8
5,623 0	1 31	359 39	5,616 2	198 2	-29 7	351 47	200 5
5,685 0	0 53	0 88	5,678 2	199 2	-29 7	351 51	201 4
5,748 0	0 15	6 12	5,741 2	199 6	-29 7	351 53	201 8
5,843 0	0 24	288 25	5,836 2	199 8	-29 9	351 49	202 0
5,938 0	0 32	315 40	5,931 2	200 0	-30 3	351 40	202 3
6,033 0	0 47	351 49	6,026 1	200 6	-30 5	351 35	202 9
6,096 0	0 62	321 04	6,089 1	201 1	-30 8	351 30	203 5
Last MWD Survey							
6,148 0	0 62	321 04	6,141 1	201 6	-31 1	351 22	204 0
Projection to Bit							



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

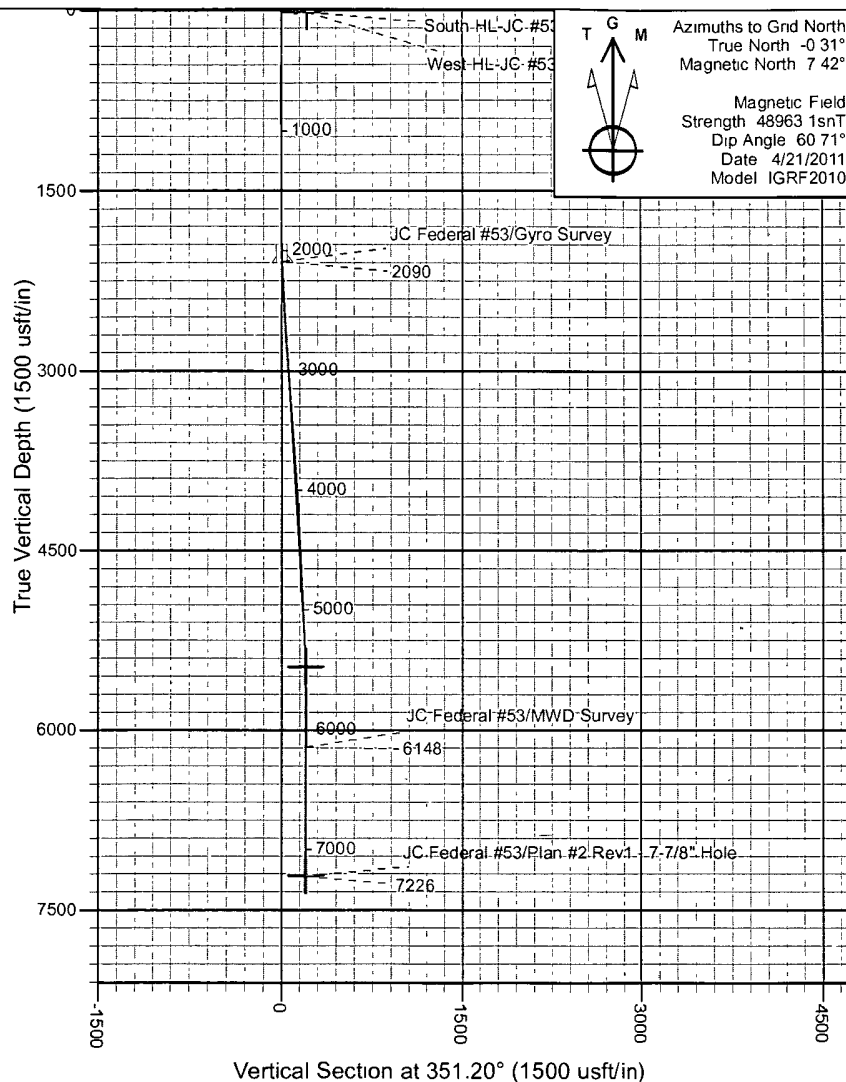
Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,090 0	2,089 4	12 5	31 8	Gyro Tie-in
6,096 0	6,089 1	201 1	-30 8	Last MWD Survey
6,148 0	6,141 1	201 6	-31 1	Projection to Bit



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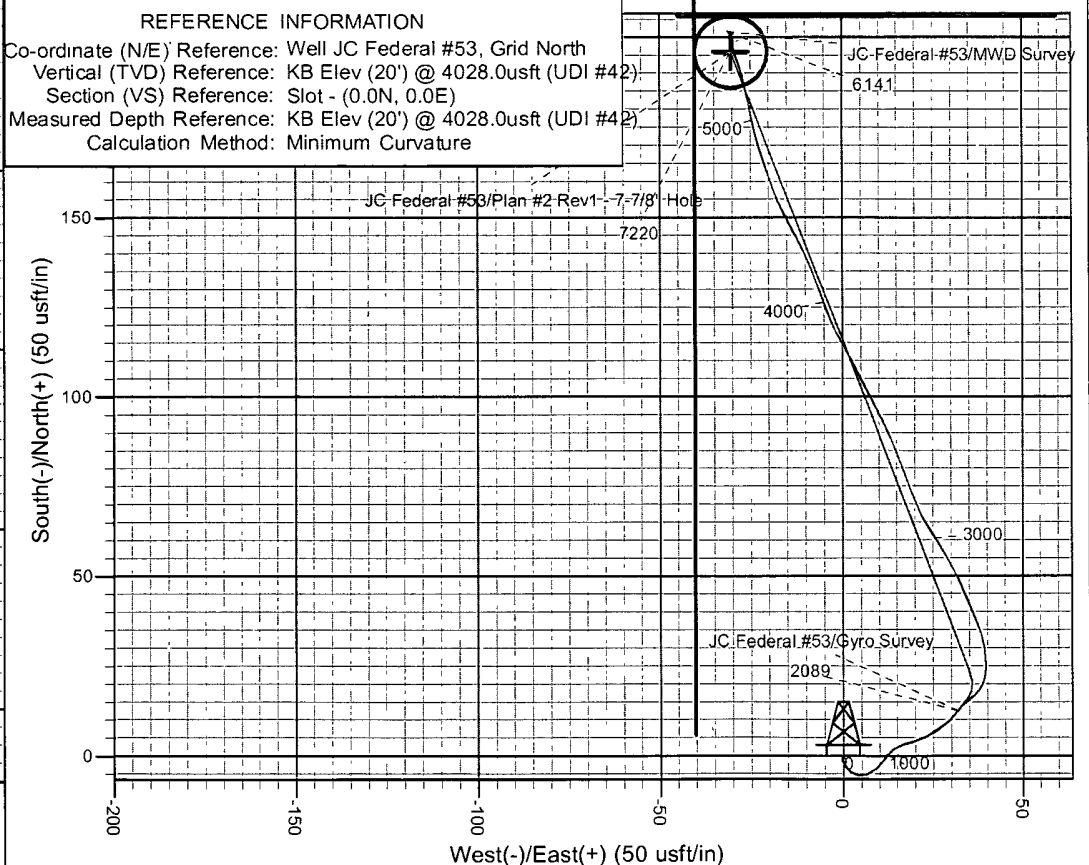
Project: Lea County, NM (NAD27 NME)
Site: JC Federal #53
Well: JC Federal #53
Wellbore: OH
Design: Plan #2 Rev1 - 7-7/8" Hole



Azimuths to Grid North
True North -0 31°
Magnetic North 7 42°

Magnetic Field
Strength 48963 1sT
Dip Angle 60 71°
Date 4/21/2011
Model IGRF2010

WELL DETAILS: JC Federal #53
KB Elev (20') @ 4028.0usft (UDI #42)
Ground Level: 4008 0
Northing 660648.60
Easting 677115.00
Latitude 32° 48' 53.581 N
Longitude 103° 45' 24.596 W
Slo



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: Lea County, NM (NAD27 NME)
Geodetic System: S 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: JC Federal #53
Site Centre Latitude: 32° 48' 53.581 N
Longitude: 103° 45' 24.596 W
Positional Uncertainty: 0.0
Convergence: 0 31
Local North: Grid