

Results of Directional Survey

DD

API number:	30-025-34933		
OGRID:		Operator:	COG OPERATING LLC
		Property:	MC FEDERAL # 4

surface	ULSTR:	L	21	T	17S	R	32E
				2310	FSL	330	FWL

BH Loc	ULSTR:	L	21	T	17S	R	32E
7044	MD	7042.1	TVD	2289	FSL	350	FWL

Top Perf/OH	ULSTR:	L	21	T	17S	R	32E
5357	MD	5355.2	TVD	2300	FSL	364	FWL

Bot Perf/OH	ULSTR:	L	21	T	17S	R	32E
6850	MD	6848.1	TVD	2288	FSL	353	FWL

	MD	N/S	E/W	VD
	5300	-9.70	34.80	5298.2
TOP PERFS/OH	5357	-10.04	34.46	5355.20
	5400	-10.30	34.20	5398.20
	6800	-21.70	23.30	6798.10
BOT PERFS/OH	6850	-21.60	22.75	6848.10
	6900	-21.50	22.20	6898.10

NEXT TO LAST	6900	-21.50	22.20	6898.10
LAST READING	6975	-21.30	21.30	6973.10
TD	7044	-21.12	20.47	7042.10

Surface Location	2310	FS	330	FW
Projected BHL	2289	FS	350	FW
Location of				
Top Perfs/OH	2300	FS	364	FW
Bottom Perfs/OH	2288	FS	353	FW

SUMMARY of Subsurface Locations

Surface Location	L-21-17S-32E	2310	FS	330	FW	Vert. Depth
Top Perfs/OH	L-21-17S-32E	2300	FS	364	FW	5355.20
Bottom Perfs/OH	L-21-17S-32E	2288	FS	353	FW	6848.10
Projected TD	L-21-17S-32E	2289	FS	350	FW	7042.10

APR 19 2012

COG OPERATING

Maljamar
Lea County, NM
MC Federal #4
VH - Job #32K0511460

HOBBS OCD

JUL 05 2011

RECEIVED

Survey: Actual

SUR: L-21-17s-32e, 2310/S & 330/W
BHL: L-21-17s-32e, 2289/S & 350/W
API # 30-025-34933

SDI Standard Survey Report

28 May, 2011

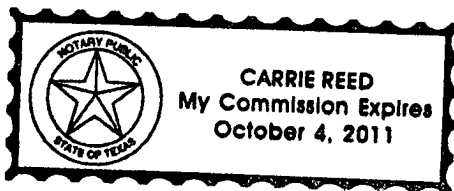
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 17th of June, 2011.



Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well MC Federal #4
Project:	Majamar	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	MC Federal #4	North Reference:	True
Wellbore:	VH - Job #32K0511460	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0511460	Database:	EDM-Regulatory

Project	Maljamar		
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		Lea County, NM			
Site Position:		Northing:	663,893 65 usft	Latitude:	32° 49' 26 346 N
From:	Lat/Long	Easting:	664,520 98 usft	Longitude:	103° 47' 51 972 W
Position Uncertainty:	0 0 usft	Slot Radius:	0"	Grid Convergence:	0 29 °

Well	MC Federal #4, Vertical					
Well Position	+N/-S	0 0 usft	Northing:	662,111 39 usft	Latitude:	32° 49' 8 400 N
	+E/-W	0 0 usft	Easting:	670,603 78 usft	Longitude:	103° 46' 40 800 W
Position Uncertainty		0 0 usft	Wellhead Elevation:	usft	Ground Level:	0 0 usft

Wellbore	VH - Job #32K0511460				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/18/2011	7 74	60 70	48,986

Design	VH - Job #32K0511460			
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	135 08

Survey Program		Date	5/28/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 0	6,975 0	Actual (VH - Job #32K0511460)	Keeper	Keeper Gyro	

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 19	118 29	100 0	-0 1	0 1	118 29	0 2
200 0	0 19	173 11	200 0	-0 3	0 3	135 89	0 4
300 0	0 11	177 15	300 0	-0 6	0 3	149 97	0 7
400 0	0 34	108 00	400 0	-0 8	0 6	140 99	1 0
500 0	0 42	120 09	500 0	-1 0	1 2	130 52	1 6
600 0	0 32	118 34	600 0	-1 4	1 8	127 32	2 2
700 0	0 33	126 17	700 0	-1 7	2 3	126 32	2 8
800 0	0 32	114 37	800 0	-1 9	2 8	125 32	3 4
900 0	0 32	112 43	900 0	-2 2	3 3	123 64	3 9
1,000 0	0 42	133 78	1,000 0	-2 5	3 8	123 76	4 6
1,100 0	0 50	122 34	1,100 0	-3 0	4 4	124 33	5 4

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well MC Federal #4
Project:	Maljamar	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	MC Federal #4	North Reference:	True
Wellbore:	VH - Job #32K0511460	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0511460	Database:	EDM-Regulatory

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
1,200 0	1 26	134 15	1,200 0	-4 0	5 6	125 77	6 9	
1,300 0	1 84	126 44	1,299 9	-5 7	7 7	126 84	9 6	
1,400 0	1 97	117 74	1,399 9	-7 5	10 5	125 58	12 9	
1,500 0	1 94	98 23	1,499 8	-8 5	13 7	121 98	16 1	
1,600 0	2 39	78 59	1,599 8	-8 4	17 4	115 69	19 3	
1,700 0	3 09	67 09	1,699 6	-6 9	21 9	107 48	23 0	
1,800 0	3 38	67 83	1,799 5	-4 7	27 1	99 91	27 5	
1,900 0	3 76	68 37	1,899 3	-2 4	32 9	94 20	33 0	
2,000 0	3 97	68 29	1,999 1	0 1	39 2	89 90	39 2	
2,100 0	3 26	70 61	2,098 9	2 3	45 1	87 08	45 1	
2,200 0	2 81	73 97	2,198 7	3 9	50 1	85 53	50 3	
2,300 0	2 15	74 31	2,298 6	5 1	54 3	84 63	54 5	
2,400 0	1 72	76 40	2,398 6	6 0	57 5	84 08	57 8	
2,500 0	1 11	82 62	2,498 5	6 4	59 9	83 87	60 3	
2,600 0	0 50	111 09	2,598 5	6 4	61 3	84 04	61 7	
2,700 0	0 39	134 76	2,698 5	6 0	62 0	84 46	62 3	
2,800 0	0 50	166 27	2,798 5	5 3	62 3	85 10	62 5	
2,900 0	0 69	186 77	2,898 5	4 3	62 3	86 03	62 5	
3,000 0	0 65	206 60	2,998 5	3 2	62 0	87 03	62 1	
3,100 0	0 53	213 44	3,098 5	2 3	61 5	87 84	61 6	
3,200 0	0 48	212 94	3,198 5	1 6	61 0	88 51	61 0	
3,300 0	0 37	212 95	3,298 5	1 0	60 6	89 09	60 6	
3,400 0	0 40	213 00	3,398 5	0 4	60 3	89 62	60 3	
3,500 0	0 25	256 49	3,498 5	0 1	59 9	89 94	59 9	
3,600 0	0 30	247 14	3,598 5	-0 1	59 4	90 09	59 4	
3,700 0	0 41	290 69	3,698 5	-0 1	58 8	90 07	58 8	
3,800 0	0 59	286 01	3,798 5	0 2	58 0	89 80	58 0	
3,900 0	0 88	274 39	3,898 5	0 4	56 7	89 60	56 7	
4,000 0	0 99	280 98	3,998 5	0 6	55 1	89 35	55 1	
4,100 0	1 01	263 22	4,098 4	0 7	53 4	89 27	53 4	
4,200 0	1 25	248 04	4,198 4	0 2	51 5	89 81	51 5	
4,300 0	1 44	243 89	4,298 4	-0 8	49 4	90 92	49 4	
4,400 0	1 40	242 10	4,398 4	-1 9	47 2	92 32	47 2	
4,500 0	1 38	247 75	4,498 3	-2 9	45 0	93 74	45 1	
4,600 0	1 23	249 79	4,598 3	-3 8	42 8	95 03	43 0	
4,700 0	1 14	248 77	4,698 3	-4 5	40 9	96 28	41 2	
4,800 0	1 16	236 24	4,798 3	-5 4	39 1	97 89	39 5	
4,900 0	0 83	214 21	4,898 3	-6 6	37 9	99 86	38 5	
5,000 0	0 70	216 69	4,998 2	-7 7	37 1	101 68	37 9	
5,100 0	0 57	231 77	5,098 2	-8 5	36 4	103 11	37 3	
5,200 0	0 56	232 36	5,198 2	-9 1	35 6	104 31	36 7	
5,300 0	0 58	226 98	5,298 2	-9 7	34 8	105 59	36 2	
5,400 0	0 44	224 50	5,398 2	-10 3	34 2	106 82	35 7	
5,500 0	0 49	224 01	5,498 2	-10 9	33 6	107 99	35 4	

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Company:	COG OPERATING	Local Co-ordinate Reference:	Well MC Federal #4
Project:	Maljamar	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	MC Federal #4	North Reference:	True
Wellbore:	VH - Job #32K0511460	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0511460	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
5,600 0	0 68	202 44	5,598 2	-11 8	33 1	109 58	35 1
5,700 0	0 95	207 89	5,698 2	-13 1	32 5	111 90	35 0
5,800 0	1 18	209 97	5,798 2	-14 7	31 6	114 93	34 8
5,900 0	1 07	204 76	5,898 2	-16 4	30 7	118 16	34 8
6,000 0	0 86	215 41	5,998 2	-17 9	29 9	120 92	34 8
6,100 0	0 79	225 78	6,098 1	-19 0	28 9	123 26	34 6
6,200 0	0 57	228 14	6,198 1	-19 8	28 1	125 19	34 3
6,300 0	0 51	235 12	6,298 1	-20 4	27 3	126 71	34 1
6,400 0	0 55	234 57	6,398 1	-20 9	26 6	128 20	33 8
6,500 0	0 38	243 50	6,498 1	-21 3	25 9	129 49	33 5
6,600 0	0 48	258 08	6,598 1	-21 6	25 2	130 58	33 2
6,700 0	0 50	265 93	6,698 1	-21 7	24 3	131 71	32 6
6,800 0	0 64	275 87	6,798 1	-21 7	23 3	132 86	31 8
6,900 0	0 66	278 52	6,898 1	-21 5	22 2	134 08	30 9
6,975 0	0 84	284 25	6,973 1	-21 3	21 3	135 08	30 1



Scientific Drilling
Directional Drilling Operations

Project: Maljamar
Lea County, NM
Well: MC Federal #4
Wellbore: VH - Job #32K0511460
Design: VH - Job #32K0511460

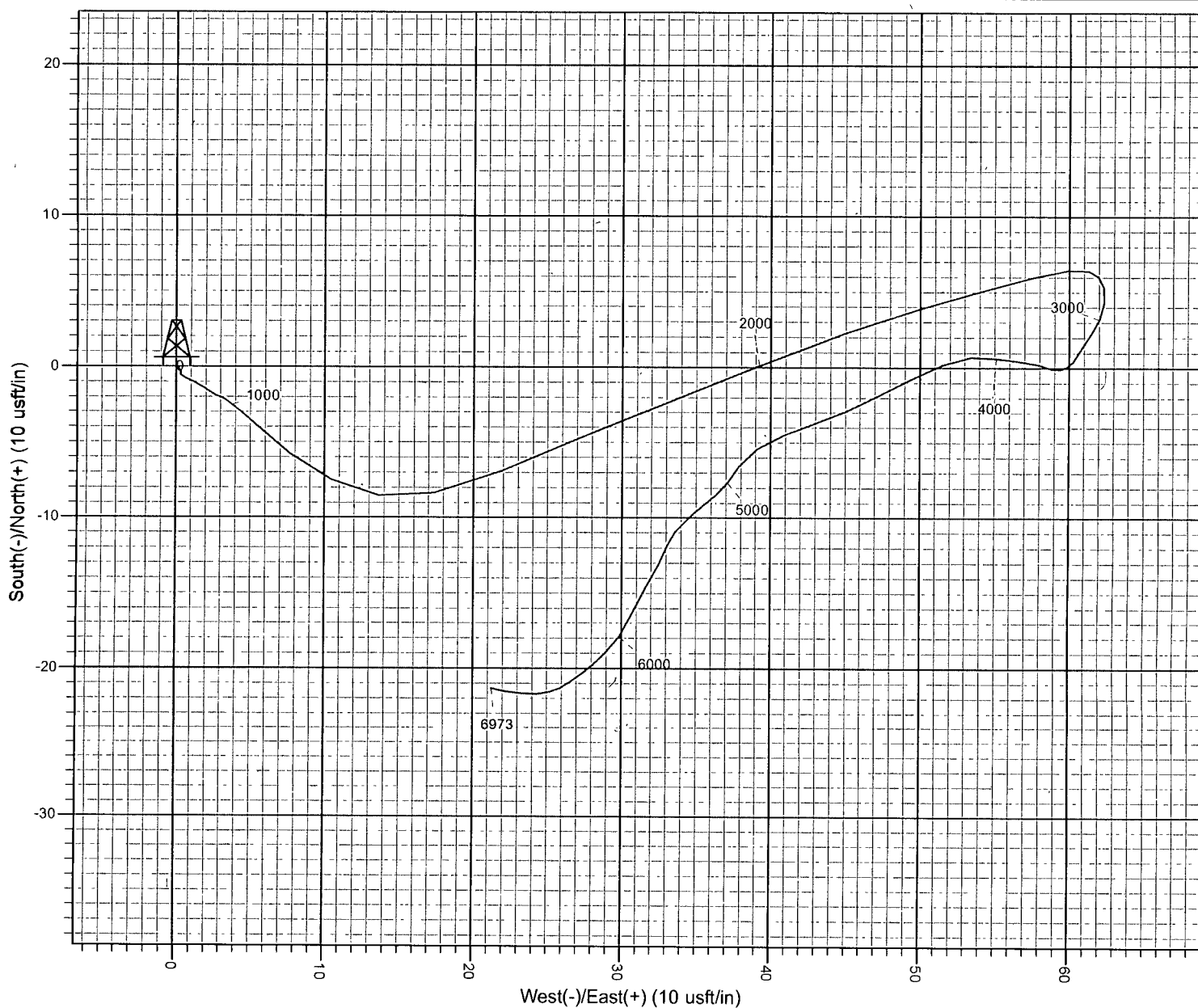


Azimuths to True North
Magnetic North 7.74°

Magnetic Field
Strength 48986.0snT
Dip Angle 60.70°
Date 5/18/2011
Model IGRF2010

WELL DETAILS: MC Federal #4
WELL @ 0.0usft (Original Well Elev)
Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	662111.39	670603.78	32° 49' 8.400 N	103° 46' 40.800 W	



PROJECT DETAILS: Maljamar
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: Lea County, NM
Site Centre Latitude: 32° 49' 26.346 N
Longitude: 103° 47' 51.972 W
Positional Uncertainty: 0.0
Convergence: 0.29
Local North: True