

COG Operating LLC

Eddy County, NM (NAD27 NME)

Tumak Federal #2

#2

OH - Job #32D1021322

30 015 40464

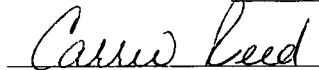
Design: OH

SDI Standard Survey Report

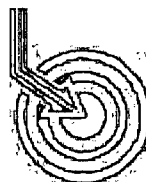
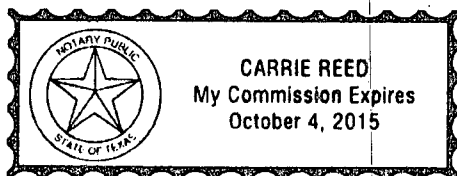
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 5th of November, 2012.



Notary Signature
County of Midland
State of Texas



Scientific Drilling



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3720.00usft (SO #5)
Site:	Tumak Federal #2	MD Reference:	RF @ 3720.00usft (SO #5)
Well:	#2	North Reference:	Grid
Wellbore:	OH - Job #31D1021322	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM-Regulatory

Project	Eddy 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	Tumak Federal #2		
Site Position:		Northing:	665,682.40 usft
From:	Map	Easting:	555,328.10 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"
		Latitude:	32° 49' 47.704 N
		Longitude:	104° 9' 11.561 W
		Grid Convergence:	0.10 °

Well	#2		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 49' 47.704 N
		Longitude:	104° 9' 11.561 W
		Ground Level:	3,708.00 usft

Wellbore	OH - Job #31D1021322		
Magnetics	Model Name	Sample Date	Declination
			(°)
	BGGM2012	10/24/12	
			Dip Angle
			(°)
			Field Strength
			(nT)

Design	OH		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			89.54

Survey Program	Date 11/08/12		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	890.00	Gyro (OH - Job #31D1021322)	Keeper
947.00	5,448.00	MWD (OH - Job #31D1021322)	MWD
			Description
			Standard Wireline Keeper ver 1.0.2
			MWD - Standard

Survey			
Measured Depth	Inclination	Azimuth	True Vertical
(usft)	(°)	(°)	Depth
0.00	0.00	0.00	0.00
8.50	0.08	232.31	8.50
West HL-Tumak Fed #2 - North HL-Tumak Fed #2			
100.00	0.91	232.31	100.00
200.00	0.38	220.21	199.99
300.00	0.46	222.43	299.99
400.00	0.31	218.91	399.98
500.00	0.51	210.44	499.98
600.00	0.48	212.41	599.98
700.00	0.47	216.16	699.97
800.00	0.36	223.44	799.97
			North/South
			(usft)
			East/West
			(usft)
			Closure Azimuth
			(°)
			Closure Distance
			(usft)
			0.00
			0.00
			232.31
			0.01
			0.79
			1.91
			2.64
			3.31
			4.01
			4.85
			5.68
			6.40

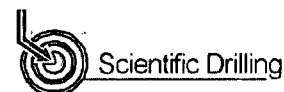


Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3720.00usft (SO #5)
Site:	Tumak Federal #2	MD Reference:	RF @ 3720.00usft (SO #5)
Well:	#2	North Reference:	Grid
Wellbore:	OH - Job #31D1021322	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
890.00	0.17	225.77	889.97	-5.15	-4.46	220.85	6.81
Gyro Tie-in							
947.00	0.44	223.07	946.97	-5.37	-4.67	220.97	7.12
1,011.00	0.35	131.05	1,010.97	-5.68	-4.69	219.52	7.37
1,074.00	1.06	101.17	1,073.96	-5.92	-3.97	213.84	7.13
1,137.00	1.76	94.93	1,136.94	-6.12	-2.43	201.70	6.58
1,202.00	2.64	91.06	1,201.90	-6.23	0.06	179.48	6.23
1,265.00	3.69	91.50	1,264.80	-6.31	3.53	150.75	7.23
1,329.00	4.13	97.83	1,328.65	-6.68	7.88	130.29	10.33
1,393.00	4.66	101.25	1,392.46	-7.50	12.71	120.54	14.76
1,457.00	5.19	90.88	1,456.23	-8.05	18.15	113.92	19.86
1,520.00	5.98	87.19	1,518.93	-7.93	24.28	108.09	25.54
1,616.00	5.63	84.20	1,614.43	-7.21	33.96	101.99	34.72
1,711.00	6.33	81.57	1,708.92	-5.97	43.78	97.77	44.18
1,807.00	5.99	88.91	1,804.36	-5.10	54.02	95.40	54.26
1,902.00	6.16	91.94	1,898.83	-5.18	64.07	94.62	64.28
1,998.00	5.80	93.52	1,994.31	-5.65	74.06	94.37	74.27
2,094.00	6.86	91.41	2,089.72	-6.09	84.63	94.12	84.85
2,189.00	6.95	88.60	2,184.03	-6.09	96.05	93.63	96.24
2,285.00	6.86	86.75	2,279.34	-5.62	107.58	92.99	107.73
2,381.00	6.86	85.00	2,374.65	-4.80	119.02	92.31	119.11
2,476.00	7.03	85.61	2,468.95	-3.86	130.47	91.69	130.52
2,572.00	7.03	86.05	2,564.23	-3.01	142.18	91.21	142.22
2,667.00	7.56	85.08	2,658.46	-2.07	154.21	90.77	154.22
2,763.00	6.86	89.30	2,753.70	-1.46	166.23	90.50	166.24
2,858.00	5.98	89.30	2,848.11	-1.33	176.86	90.43	176.86
2,954.00	6.10	90.86	2,943.57	-1.34	186.96	90.41	186.96
3,049.00	6.33	90.86	3,038.02	-1.50	197.24	90.44	197.25
3,145.00	6.33	90.00	3,133.43	-1.58	207.82	90.43	207.83
3,241.00	6.51	88.81	3,228.83	-1.46	218.56	90.38	218.56
3,337.00	6.51	91.32	3,324.21	-1.48	229.44	90.37	229.44
3,432.00	6.42	93.61	3,418.61	-1.93	240.12	90.46	240.13
3,528.00	5.45	91.41	3,514.09	-2.39	250.04	90.55	250.05
3,623.00	5.89	90.27	3,608.62	-2.52	259.42	90.56	259.43
3,719.00	5.62	92.28	3,704.14	-2.73	269.04	90.58	269.06
3,814.00	5.80	92.73	3,798.67	-3.14	278.49	90.65	278.50
3,910.00	5.75	90.59	3,894.18	-3.42	288.14	90.68	288.16
4,006.00	5.72	92.29	3,989.70	-3.66	297.73	90.71	297.75
4,103.00	5.89	89.83	4,086.20	-3.84	307.54	90.72	307.56
4,198.00	5.63	90.97	4,180.72	-3.91	317.07	90.71	317.09
4,294.00	5.33	87.19	4,276.29	-3.77	326.23	90.66	326.25
4,389.00	5.19	87.72	4,370.89	-3.38	334.93	90.58	334.95
4,485.00	5.98	89.30	4,466.43	-3.15	344.27	90.52	344.29
4,580.00	5.98	87.10	4,560.91	-2.84	354.16	90.46	354.17
4,676.00	6.24	87.98	4,656.37	-2.40	364.37	90.38	364.38



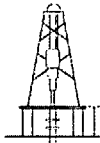
Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3720.00usft (SO #5)
Site:	Tumak Federal #2	MD Reference:	RF @ 3720.00usft (SO #5)
Well:	#2	North Reference:	Grid
Wellbore:	OH - Job #31D1021322	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
4,771.00	6.24	87.54	4,750.80	-2.00	374.69	90.31	374.69
4,867.00	6.22	87.54	4,846.24	-1.55	385.10	90.23	385.10
4,962.00	6.07	86.05	4,940.69	-0.98	395.25	90.14	395.25
5,058.00	5.98	85.43	5,036.16	-0.23	405.30	90.03	405.30
5,152.00	5.80	83.85	5,129.67	0.67	414.90	89.91	414.90
5,248.00	5.63	83.33	5,225.19	1.73	424.40	89.77	424.40
5,343.00	5.01	83.33	5,319.78	2.76	433.15	89.64	433.16
5,390.00	4.84	81.66	5,366.60	3.28	437.15	89.57	437.16
Last MWD Survey							
5,423.82	4.84	81.66	5,400.31	3.69	439.97	89.52	439.99
PBHL-Tumak Fed #2							
5,448.00	4.84	81.66	5,424.40	3.99	441.99	89.48	442.01
Projection to Bit							

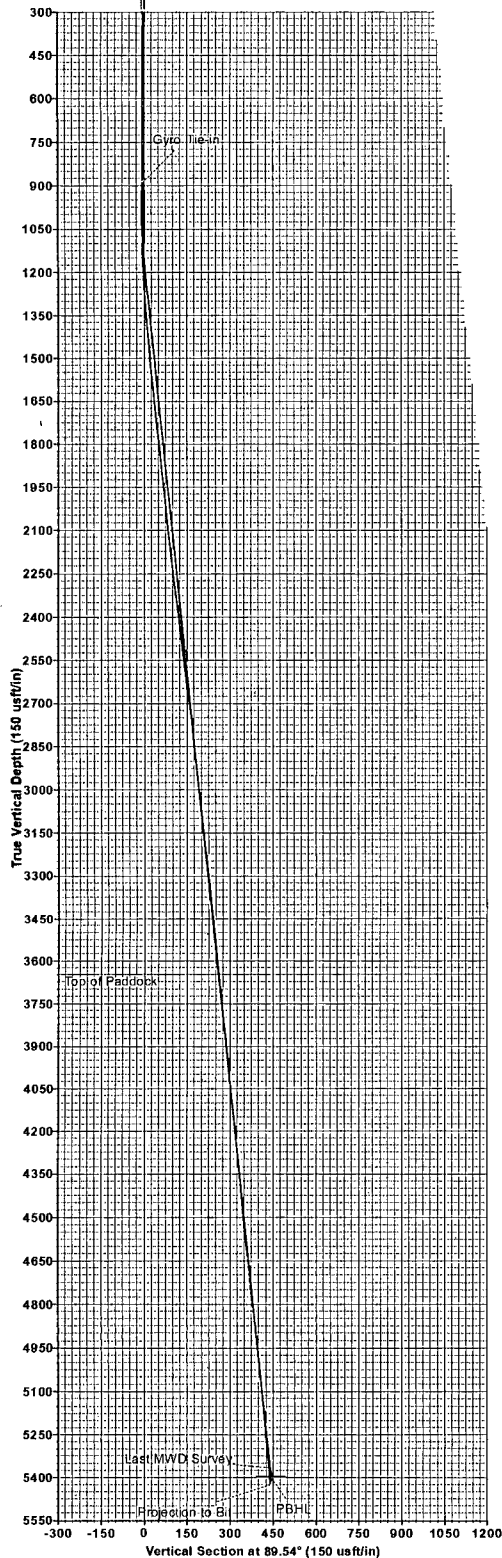
Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
890.00	889.97	-5.15	-4.46	Gyro Tie-in
5,390.00	5,366.60	3.28	437.15	Last MWD Survey
5,448.00	5,424.40	3.99	441.99	Projection to Bit



Tumak Federal #2
Eddy County, NM (NAN27 NME)
Northing: 665682.40
Easting: 555328.10
Plan #3 vs Actual 7-7/8" Hole



RF @ 3720.00usft (SO #5)
Ground Level: 3708.00



To convert a Magnetic Direction to a Grid Direction, Add 7.74°
To convert a True Direction to a Grid Direction, Subtract 0.10°

Azimuths to Grid North
True North: -0.10°
Magnetic North: 7.74°

Magnetic Field
Strength: 48762.25nT
Dip Angle: 60.58°
Date: 10/24/2012
Model: BGGM2012

WELL DETAILS:

+N/-S	+E/-W	Northing	Easting	Ground Level	Latitude	Longitude
0.00	0.00	665682.40	555328.10	3708.00	32° 49' 47.704 N	104° 9' 11.561 W

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
890.00	0.17	225.77	889.97	-5.15	-4.46	0.00	0.00	-4.50	
950.00	0.17	225.77	949.97	-5.28	-4.58	0.00	0.00	-4.63	
1254.27	5.96	88.83	1253.70	-5.27	10.90	2.00	-138.02	10.86	
5423.10	5.96	88.83	5400.00	3.53	443.68	0.00	0.00	443.69	PBHL

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting
PBHL	5400.00	3.53	443.68	665685.93	555771.74

SITE DETAILS: Tumak Federal

Site Centre Northing: 665682.40
Easting: 555328.10
Positional Uncertainty: 0.00
Convergence: 0.10
Local North: Grid

PROJECT DETAILS: Eddy County, NM (NAN27 NME)

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

CASING DETAILS

TVD	MD	Name	Size
850.00	8-5/8"	Casing	8-5/8"

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
3650.00	3663.59	Top of Paddock

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

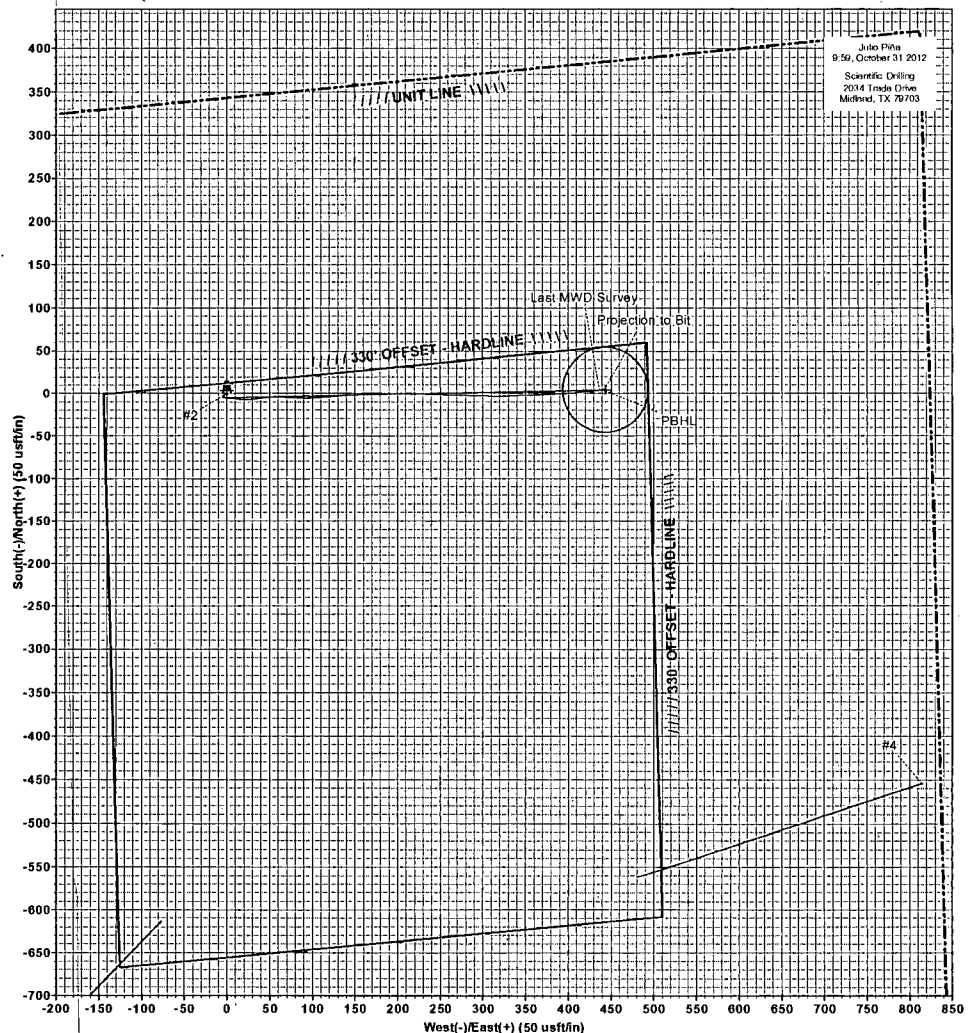
Local Origin: Well #2, Grid North

Latitude: 32° 49' 47.704 N
Longitude: 104° 9' 11.561 W

Grid East: 555328.10
Grid North: 665682.40
Scale Factor: 1.000

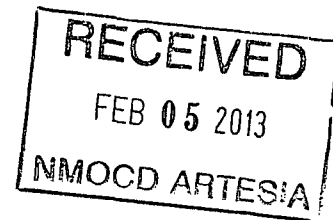
Geomagnetic Model: BGGM2012
Sample Date: 24-Oct-12
Magnetic Declination: 7.84°
Dip Angle from Horizontal: 60.58°
Magnetic Field Strength: 48762

To convert a Magnetic Direction to a Grid Direction, Add 7.74°
To convert a Magnetic Direction to a True Direction, Add 7.84° East
To convert a True Direction to a Grid Direction, Subtract 0.10°





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



October 31, 2012

COG, LLC
One Concho Center
600 W. Illinois Ave.
Midland, TX 79701

RE: Tumak Federal #2
984' FSL & 474' FWL
Sec. 14, T17S, R28E
Eddy County, New Mexico

Dear Sir,

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

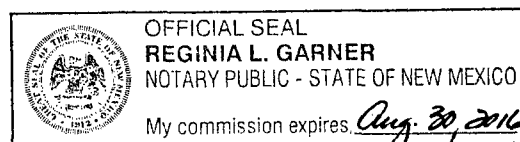
Very truly yours,

A handwritten signature in cursive script, appearing to read "Chris Graham".

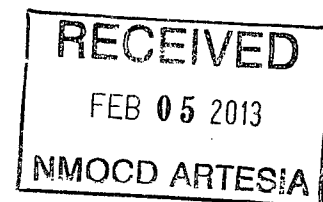
Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 31st day of October, 2012.

A handwritten signature in cursive script, appearing to read "Regina L. Garner".
Notary Public

Tumak Federal #2



Date	Depth	Dev/Inc	Dir/AZ	TVD
10/23/2012	322	0.60		
10/24/2012	716	0.50		
10/25/2012	947	0.44	223.07	
10/25/2012	1011	0.35	131.00	
10/25/2012	1074	1.06	101.10	
10/25/2012	1138	1.76		
10/25/2012	1202	2.64	91.06	
10/26/2012	1711	6.33	81.57	
10/26/2012	1807	5.99	88.96	
10/26/2012	1902	6.16	91.94	
10/26/2012	1998	5.80	93.52	
10/26/2012	2094	6.86	91.41	
10/26/2012	2190	6.95	88.60	
10/26/2012	2381	6.86	85.00	
10/26/2012	2476	7.03	65.61	
10/26/2012	2572	7.03	86.05	
10/27/2012	3050	6.33	90.18	
10/27/2012	3145	6.33	90.00	
10/27/2012	3241	6.51	88.81	
10/27/2012	3337	6.51	91.32	
10/27/2012	3432	6.42	93.61	
10/27/2012	3528	5.45	91.41	
10/27/2012	3719	5.62	92.28	
10/27/2012	3814	5.80	92.73	
10/27/2012	3910	5.75	90.59	
10/28/2012	4006	5.72	92.28	
10/28/2012	4102	5.89	89.83	
10/28/2012	4197	5.63	90.97	
10/28/2012	4293	5.36	87.19	
10/28/2012	4579	5.98	87.10	
10/28/2012	4765	6.24	87.98	
10/28/2012	4770	6.24	87.54	
10/29/2012	5453	5.80	83.85	
10/29/2012	5249	5.63	83.33	
10/29/2012	5344	5.01	81.22	