

15- 39264



COG Operating LLC

Eddy County, NM (NAD27 NME)

Hearse 36 State

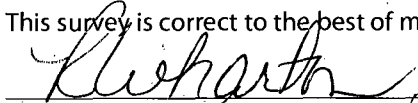
#4H

OH - Job #32H11121358

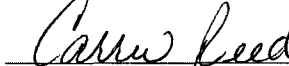
Design: OH

SDI Standard Survey Report

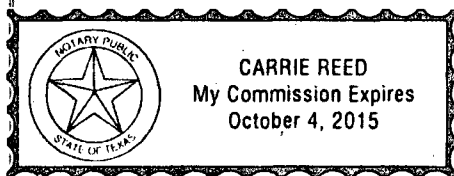
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 5th of December, 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 #4H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3414.00usft (JW #4)
Site:	Hearse 36 State	MD Reference:	RF @ 3414.00usft (JW #4)
Well:	#4H	North Reference:	Grid
Wellbore:	OH - Job #32H11121358	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	Hearse 36 State		
Site Position:	Map	Northing:	585,861.49 usft
From:		Easting:	468,775.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"
		Latitude:	32° 36' 38.148 N
		Longitude:	104° 26' 5.053 W
		Grid Convergence:	-0.05 °

Well	#4H		
Well Position	+N-S	0.00 usft	Northing:
	+E-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 36' 38.148 N
		Longitude:	104° 26' 5.053 W
		Ground Level:	3,401.00 usft

Wellbore	OH - Job #32H11121358				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	BGGM2012	11/03/12	(°)	(°)	(nT)

Design	OH			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	342.82

Survey Program	Date 11/14/12				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.00	2,300.00	Gyro (OH - Job #32H11121358)	Keeper	Standard Wireline Keeper ver 1.0.2	
2,369.00	7,194.00	MWD (OH - Job #32H11121358)	MWD	MWD - Standard	

Survey								
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.73	330.73	100.00	0.56	-0.31	330.73	0.64	
200.00	0.72	329.49	199.99	1.65	-0.94	330.32	1.90	
300.00	0.84	332.70	299.98	2.85	-1.60	330.69	3.26	
400.00	0.88	341.24	399.97	4.22	-2.18	332.70	4.75	
500.00	1.42	335.12	499.95	6.08	-2.95	334.11	6.75	
600.00	1.51	336.88	599.92	8.41	-3.99	334.64	9.31	
700.00	1.17	337.36	699.89	10.56	-4.90	335.13	11.64	
800.00	1.23	334.66	799.87	12.48	-5.75	335.26	13.74	
900.00	1.29	339.51	899.84	14.50	-6.60	335.52	15.93	
1,000.00	1.18	342.95	999.82	16.54	-7.30	336.19	18.08	



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SDI Standard Survey Report



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Site:	Hearse 36 State	MD Reference:	RF @ 3414.00usft (JW #4)
Well:	#4H	North Reference:	Grid
Wellbore:	OH - Job #32H11121358	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)
1,100.00	1.20	349.68	1,099.80	18.56	-7.79	337.23	20.12
1,200.00	1.36	352.50	1,199.77	20.76	-8.13	338.61	22.30
1,300.00	1.42	354.36	1,299.74	23.17	-8.41	340.06	24.65
1,400.00	1.41	354.33	1,399.71	25.63	-8.65	341.35	27.05
1,500.00	1.40	1.89	1,499.68	28.07	-8.73	342.72	29.40
1,600.00	1.22	5.19	1,599.66	30.36	-8.60	344.19	31.55
1,700.00	1.34	5.35	1,699.63	32.58	-8.39	345.56	33.64
1,800.00	1.31	5.14	1,799.60	34.88	-8.18	346.80	35.83
1,900.00	1.29	9.53	1,899.58	37.13	-7.89	348.00	37.96
2,000.00	1.58	359.46	1,999.55	39.62	-7.72	348.98	40.36
2,100.00	2.08	354.87	2,099.50	42.81	-7.89	349.55	43.53
2,200.00	2.12	354.79	2,199.43	46.46	-8.22	349.96	47.18
2,300.00	2.05	349.47	2,299.36	50.06	-8.72	350.12	50.81
Tie-in							
2,369.00	3.34	351.82	2,368.29	53.26	-9.23	350.17	54.05
2,400.00	5.54	358.15	2,399.19	55.65	-9.41	350.41	56.44
2,431.00	8.27	359.12	2,429.96	59.37	-9.49	350.92	60.13
2,462.00	11.70	358.33	2,460.49	64.75	-9.61	351.55	65.46
2,493.00	15.48	358.06	2,490.62	72.03	-9.85	352.22	72.70
2,524.00	18.64	356.04	2,520.25	81.10	-10.33	352.74	81.76
2,556.00	21.45	354.89	2,550.31	92.04	-11.20	353.06	92.72
2,587.00	24.62	355.78	2,578.83	104.13	-12.18	353.33	104.84
2,618.00	27.79	358.33	2,606.64	117.79	-12.87	353.77	118.49
2,649.00	30.35	0.70	2,633.74	132.85	-12.98	354.42	133.48
2,680.00	33.22	3.21	2,660.09	149.16	-12.41	355.24	149.68
2,711.00	36.35	3.78	2,685.54	166.81	-11.33	356.11	167.20
2,743.00	39.13	3.42	2,710.85	186.36	-10.10	356.90	186.63
2,774.00	42.36	2.86	2,734.33	206.56	-9.00	357.51	206.76
2,805.00	45.29	1.84	2,756.69	228.01	-8.12	357.96	228.15
2,836.00	48.19	0.96	2,777.93	250.57	-7.58	358.27	250.69
2,868.00	51.44	0.35	2,798.58	275.01	-7.30	358.48	275.11
2,899.00	54.43	0.92	2,817.26	299.75	-7.02	358.66	299.83
2,930.00	57.14	0.54	2,834.69	325.38	-6.70	358.82	325.45
2,961.00	60.20	1.31	2,850.81	351.85	-6.27	358.98	351.91
2,992.00	63.84	1.93	2,865.35	379.21	-5.49	359.17	379.25
3,024.00	67.45	1.31	2,878.55	408.35	-4.67	359.34	408.37
3,055.00	70.79	1.49	2,889.59	437.30	-3.96	359.48	437.32
3,086.00	74.30	1.49	2,898.89	466.86	-3.19	359.61	466.87
3,117.00	77.82	1.28	2,906.36	496.93	-2.47	359.72	496.93
3,148.00	81.34	0.35	2,911.96	527.41	-2.03	359.78	527.41
3,179.00	84.42	359.29	2,915.80	558.17	-2.13	359.78	558.17
3,211.00	86.09	357.27	2,918.45	590.04	-3.09	359.70	590.05
3,242.00	87.41	355.34	2,920.21	620.92	-5.08	359.53	620.94
3,273.00	89.69	353.58	2,920.99	651.76	-8.08	359.29	651.81
3,304.00	91.98	353.93	2,920.54	682.58	-11.45	359.04	682.67



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Site:	Hearse 36 State	MD Reference:	RF @ 3414.00usft (JW #4)
Well:	#4H	North Reference:	Grid
Wellbore:	OH - Job #32H11121358	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM-Regulatory

Survey

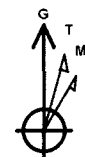
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
3,335.00	92.77	354.28	2,919.26	713.38	-14.63	358.83	713.53
3,367.00	93.12	355.95	2,917.61	745.22	-17.35	358.67	745.43
3,429.00	91.89	356.39	2,914.90	807.03	-21.49	358.47	807.31
3,491.00	91.01	357.58	2,913.33	868.92	-24.75	358.37	869.27
3,554.00	90.13	359.47	2,912.71	931.89	-26.37	358.38	932.26
3,617.00	89.83	1.32	2,912.73	994.89	-25.93	358.51	995.22
3,711.00	90.40	1.49	2,912.54	1,088.86	-23.63	358.76	1,089.11
3,804.00	91.19	1.14	2,911.25	1,181.82	-21.49	358.96	1,182.02
3,898.00	91.71	1.14	2,908.87	1,275.77	-19.63	359.12	1,275.93
3,991.00	89.50	1.91	2,907.89	1,368.73	-17.15	359.28	1,368.84
4,085.00	91.04	1.59	2,907.45	1,462.68	-14.28	359.44	1,462.75
4,179.00	92.77	0.70	2,904.32	1,556.61	-12.40	359.54	1,556.66
4,272.00	92.07	0.26	2,900.40	1,649.52	-11.62	359.60	1,649.56
4,365.00	90.22	0.52	2,898.54	1,742.50	-10.99	359.64	1,742.53
4,459.00	90.87	0.43	2,897.64	1,836.49	-10.21	359.68	1,836.52
4,552.00	91.71	0.35	2,895.55	1,929.46	-9.58	359.72	1,929.48
4,646.00	92.77	359.91	2,891.88	2,023.39	-9.37	359.73	2,023.41
4,739.00	91.88	359.75	2,888.10	2,116.31	-9.64	359.74	2,116.33
4,833.00	90.75	359.91	2,885.95	2,210.28	-9.92	359.74	2,210.30
4,926.00	89.78	359.56	2,885.52	2,303.28	-10.35	359.74	2,303.30
5,020.00	90.84	359.38	2,885.01	2,397.27	-11.22	359.73	2,397.30
5,113.00	91.89	359.47	2,882.79	2,490.24	-12.15	359.72	2,490.27
5,207.00	90.92	0.44	2,880.49	2,584.21	-12.23	359.73	2,584.24
5,301.00	92.07	0.44	2,878.03	2,678.17	-11.51	359.75	2,678.20
5,394.00	91.36	0.61	2,875.25	2,771.13	-10.65	359.78	2,771.15
5,487.00	89.87	0.52	2,874.25	2,864.11	-9.74	359.81	2,864.13
5,581.00	90.71	0.53	2,873.78	2,958.11	-8.87	359.83	2,958.12
5,674.00	89.34	0.35	2,873.74	3,051.10	-8.16	359.85	3,051.11
5,768.00	90.22	0.44	2,874.10	3,145.10	-7.51	359.86	3,145.11
5,862.00	91.45	0.52	2,872.73	3,239.08	-6.73	359.88	3,239.09
5,955.00	91.36	0.61	2,870.45	3,332.05	-5.81	359.90	3,332.06
6,049.00	92.77	0.44	2,867.06	3,425.98	-4.95	359.92	3,425.99
6,143.00	92.95	1.58	2,862.37	3,519.85	-3.29	359.95	3,519.85
6,237.00	91.19	1.49	2,858.97	3,613.75	-0.78	359.99	3,613.75
6,330.00	92.15	2.90	2,856.26	3,706.64	2.78	0.04	3,706.64
6,423.00	90.57	1.93	2,854.06	3,799.53	6.70	0.10	3,799.53
6,518.00	88.59	359.15	2,854.75	3,894.51	7.60	0.11	3,894.52
6,611.00	89.08	358.94	2,856.64	3,987.48	6.05	0.09	3,987.48
6,705.00	89.52	358.59	2,857.79	4,081.45	4.02	0.06	4,081.45
6,798.00	89.60	358.59	2,858.51	4,174.42	1.73	0.02	4,174.42
6,892.00	90.24	358.68	2,858.64	4,268.39	-0.51	359.99	4,268.39
6,986.00	90.48	359.03	2,858.05	4,362.37	-2.39	359.97	4,362.37
7,079.00	91.28	359.29	2,856.62	4,455.35	-3.75	359.95	4,455.35



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3414.00usft (JW #4)
Site:	Hearse 36 State	MD Reference:	RF @ 3414.00usft (JW #4)
Well:	#4H	North Reference:	Grid
Wellbore:	OH - Job #32H11121358	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)
7,142.00	91.71	359.29	2,854.98	4,518.32	-4.53	359.94	4,518.32
Last MWD Survey							
7,194.00	91.71	359.29	2,853.42	4,570.29	-5.17	359.94	4,570.29
Projection to Bit - PBHL-Hearse State #4H							

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,300.00	2,299.36	50.06	-8.72	Tie-in
7,142.00	2,854.98	4,518.32	-4.53	Last MWD Survey
7,194.00	2,853.42	4,570.29	-5.17	Projection to Bit



Azimuths to Grid North
True North: 0.05°
Magnetic North: 8.00°

Magnetic Field
Strength: 48593.2snT
Dip Angle: 60.32°
Date: 11/3/2012
Model: BGGM2012

To convert a Magnetic Direction to a Grid Direction, Add 8.00°
To convert a True Direction to a Grid Direction, Add 0.05°

Hearse 36 State #4H
Eddy County, NM (NAN27 NME)
Northing: (Y) 585861.50
Easting: (X) 468775.50
Plan #5 vs Actual 8-3/4" Hole

WELL DETAILS:						
			Ground Level:	3401.00		
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	585861.50	468775.50	32° 36' 38.148 N	104° 26' 5.053 W	

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSeet	Target
2300.00	2.05	349.47	2299.36	50.06	-8.72	0.00	0.00	50.06	
2418.00	2.05	349.47	2417.29	54.21	-9.49	0.00	0.00	54.21	
3227.03	91.00	0.18	2919.80	583.90	-11.38	11.00	10.89	583.90	
7237.07	91.00	0.16	2849.80	4593.31	0.00	0.00	0.00	4593.31	PBHL

DESIGN TARGET DETAILS					
Name	TVD	+N/-S	+E/-W	Northing	Easting
PBHL	2849.80	4593.31	0.00	590454.40	468775.50

SITE DETAILS: Hearse 36 State
Site Centre Northing: 585861.50
Easting: 468775.50

Positional Uncertainty: 0.00
Convergence: -0.05
Local North: Grid

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1886
Zone Name: New Mexico East 3001
Local Origin: Well #4H, Grid North
Latitude: 32° 36' 38.148 N
Longitude: 104° 26' 5.053 W

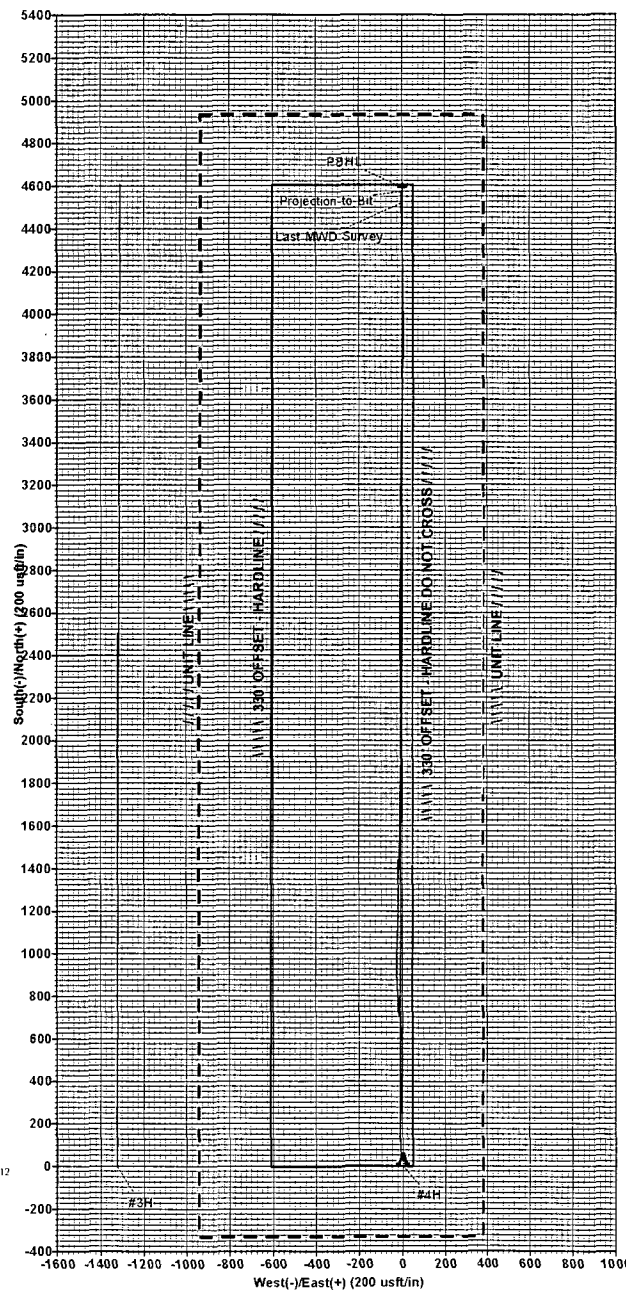
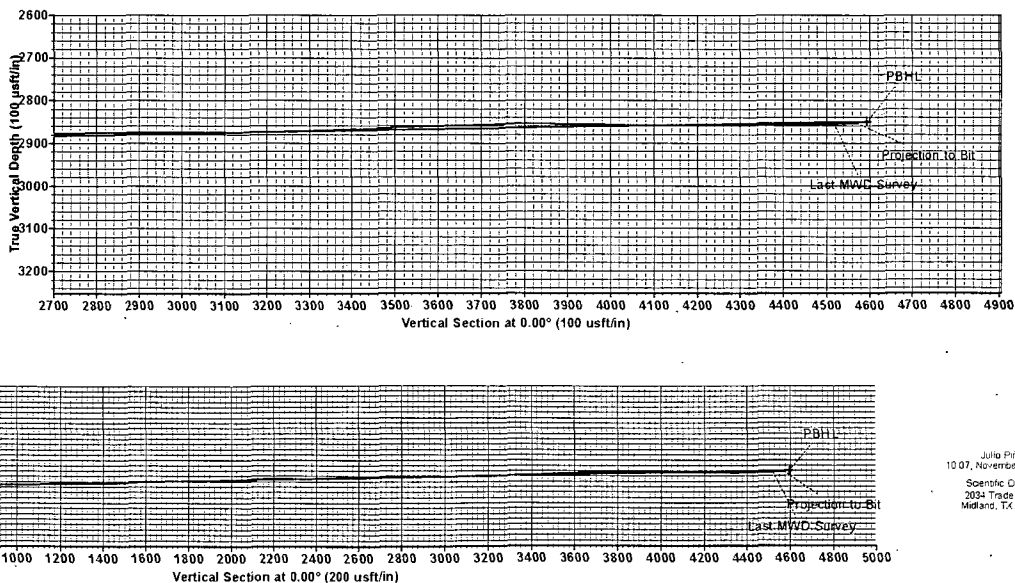
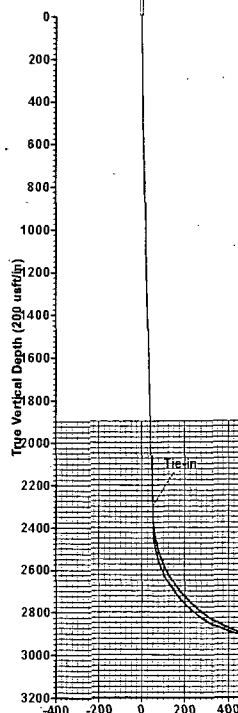
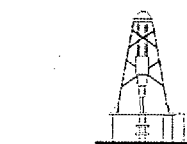
Grid East: 468775.50
Grid North: 585861.50
Scale Factor: 1.000

Geomagnetic Model: BGGM2012
Sample Date: 03-Nov-12
Magnetic Declination: 7.94°
Dip Angle from Horizontal: 60.32°
Magnetic Field Strength: 48593

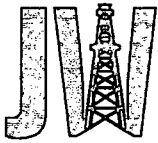
To convert a Magnetic Direction to a Grid Direction, Add 8.00°
To convert a Magnetic Direction to a True Direction, Add 7.94° East
To convert a True Direction to a Grid Direction, Add 0.05°

PROJECT DETAILS: Eddy County, NM (NAN27 NME)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1886
Zone: New Mexico East 3001
System Datum: Mean Sea Level

RF @ 3414.00usft (JW #4)
Ground Level: 3401.00



July 1915
10 07, November 14 2012
Scientific Drilling
2034 Trade Drive
Midland, TX 79703



DRILLING INC. Oil Well Drilling Contractor

Post Office Box 160 Artesia, New Mexico 88211-0160 Office (575) 748-8704 Fax (575) 748-8719

November 12, 2012

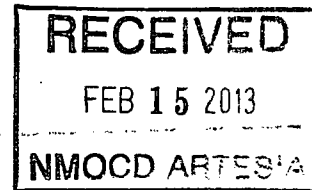
COG Operating, LLC
One Concho Center 600 W Illinois Ave
Midland, Texas 79701

Re: Hearse 36 State # 4 H
Sec. 36, T-19-S, R-25-E
Eddy County, New Mexico

Attn: Jim Evans

The following is a Deviation Survey on the referenced well in Eddy County, New Mexico:

224' - 1°	1870' - 1°
458' - 1.25°	2371' - 1.5°
719' - 1.25°	2808' - 1.75°
1041' - 1.25°	3307' - 1.75°
1405' - 1.5°	4024' - 1.75°



Sincerely,

Gary W. Chappell
Contracts Manager

STATE OF NEW MEXICO)
)
COUNTY OF EDDY)

The foregoing was acknowledged before me this 12th day of November, 2012 by Gary W. Chappell.

NOTARY PUBLIC

