

DRILLING INC. Oil Well Drilling Contractor

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

December 10, 2012

38-015-40412

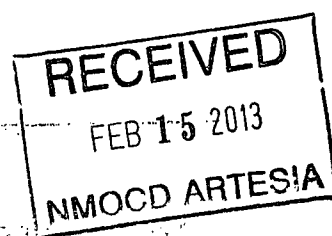
COG Operating, LLC
One Concho Center 600 W. Illinois Ave
Midland, Texas 79701

Re: Grave Digger St. Com # 5H
Sec. 2, T-20-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:

373' - 1°	1812' - 0.5°	3434' - 0.75°
628' - 1.5°	2310' - 0.75°	3933' - 1°
1043' - 1°	2747' - 0.75°	
1343' - 0.5°	3185' - 1.25°	



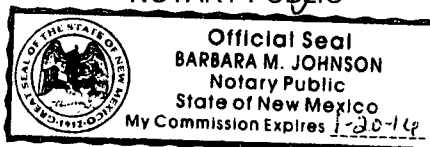
Sincerely,

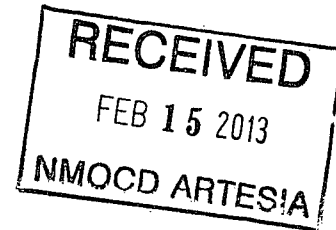
Gary W. Chappell
Contracts Manager

STATE OF NEW MEXICO)
COUNTY OF EDDY)

The foregoing was acknowledged before me this 10th day of December, 2012 by Gary W. Chappell.

NOTARY PUBLIC





COG Operating LLC

Eddy County, NM (NAD27 NME)

Grave Digger State Com

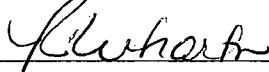
#5H

OH - Job #32H11121444

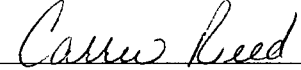
Design: OH

SDI Standard Survey Report

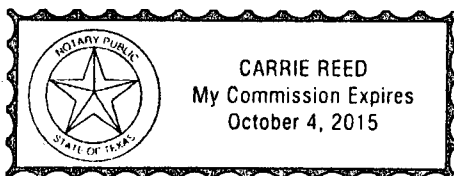
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 17th 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 #5H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3486.00usft (JW #4)
Site:	Grave Digger State Com	MD Reference:	RF @ 3486.00usft (JW #4)
Well:	#5H	North Reference:	Grid
Wellbore:	OH - Job #32H11121444	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	Grave Digger State Com		
Site Position:		Northing:	585,274.50 usft
From:	Map	Easting:	463,340.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"
		Latitude:	32° 36' 32.284 N
		Longitude:	104° 27' 8.584 W
		Grid Convergence:	-0.06 °

Well	#5H		
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' 32.528 N
		Longitude:	104° 27' 37.179 W
		Ground Level:	3,473.00 usft

Wellbore	OH - Job #32H11121444		
Magnetics	Model Name	Sample Date	Declination
	BGGM2012	12/06/12	(°)
			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
			(°)
			180.33

Survey Program	Date	12/14/12		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100.00	2,300.00	Gyro (OH - Job #32H11121444)	Keeper	Standard Wireline Keeper ver 1.0.2
2,339.00	7,316.00	MWD (OH - Job #32H11121444)	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	284.57	100.00	0.16	-0.62	284.57	0.64	
200.00	1.07	286.25	199.98	0.58	-2.13	285.28	2.21	
300.00	1.05	291.37	299.97	1.18	-3.88	286.88	4.05	
400.00	1.23	273.07	399.95	1.57	-5.80	285.12	6.01	
500.00	1.11	265.71	499.93	1.55	-7.84	281.20	7.99	
600.00	1.15	261.14	599.91	1.33	-9.80	277.71	9.89	
700.00	1.09	257.49	699.89	0.97	-11.72	274.71	11.76	
800.00	1.08	253.13	799.87	0.49	-13.55	272.05	13.56	
900.00	1.08	255.14	899.85	-0.03	-15.36	269.89	15.36	
1,000.00	0.88	261.67	999.84	-0.38	-17.03	268.72	17.04	



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3486.00usft (JW #4)
Site:	Grave Digger State Com	MD Reference:	RF @ 3486.00usft (JW #4)
Well:	#5H	North Reference:	Grid
Wellbore:	OH - Job #32H11121444	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	0.76	263.17	1,099.83	-0.57	-18.45	268.22	18.46	
1,200.00	0.67	254.47	1,199.82	-0.81	-19.67	267.65	19.69	
1,300.00	0.56	277.85	1,299.81	-0.90	-20.72	267.52	20.74	
1,400.00	0.44	271.05	1,399.81	-0.82	-21.59	267.82	21.60	
1,500.00	0.40	287.27	1,499.81	-0.71	-22.31	268.17	22.32	
1,600.00	0.45	267.00	1,599.81	-0.63	-23.03	268.43	23.04	
1,700.00	0.41	284.89	1,699.80	-0.56	-23.77	268.65	23.78	
1,800.00	0.52	296.05	1,799.80	-0.27	-24.52	269.38	24.52	
1,900.00	0.52	296.84	1,899.80	0.14	-25.34	270.31	25.34	
2,000.00	0.56	292.45	1,999.79	0.53	-26.19	271.16	26.20	
2,100.00	0.59	255.05	2,099.79	0.58	-27.14	271.23	27.15	
2,200.00	0.55	247.00	2,199.78	0.26	-28.08	270.53	28.08	
2,300.00	0.64	249.10	2,299.78	-0.12	-29.04	269.75	29.04	
Tie-in								
2,339.00	3.43	191.61	2,338.75	-1.35	-29.48	267.39	29.51	
2,370.00	7.12	188.09	2,369.61	-4.16	-29.94	262.10	30.23	
2,402.00	10.29	187.04	2,401.24	-8.96	-30.57	253.67	31.85	
2,433.00	12.84	183.44	2,431.61	-15.15	-31.12	244.05	34.61	
2,464.00	15.48	175.52	2,461.67	-22.71	-31.00	233.77	38.43	
2,495.00	18.73	172.80	2,491.29	-31.78	-30.05	223.40	43.73	
2,526.00	21.81	172.36	2,520.37	-42.42	-28.66	214.04	51.20	
2,558.00	24.01	174.82	2,549.84	-54.80	-27.28	206.47	61.22	
2,589.00	26.56	178.43	2,577.87	-68.01	-26.52	201.30	73.00	
2,620.00	29.65	181.27	2,605.22	-82.61	-26.50	197.79	86.76	
2,651.00	32.71	182.64	2,631.73	-98.65	-27.06	195.34	102.29	
2,683.00	35.88	182.29	2,658.17	-116.66	-27.83	193.42	119.93	
2,714.00	38.78	181.59	2,682.82	-135.45	-28.47	191.87	138.40	
2,729.80	40.13	181.17	2,695.02	-145.48	-28.71	191.16	148.29	
PP=330' FNL GDSC #5H								
2,745.00	41.42	180.79	2,706.53	-155.41	-28.88	190.53	158.07	
2,776.00	44.39	180.36	2,729.23	-176.51	-29.09	189.36	178.89	
2,807.00	47.64	180.54	2,750.76	-198.81	-29.26	188.37	200.95	
2,839.00	50.91	180.71	2,771.63	-223.06	-29.53	187.54	225.00	
2,870.00	54.08	181.50	2,790.50	-247.64	-30.01	186.91	249.45	
2,901.00	57.33	181.50	2,807.97	-273.24	-30.68	186.41	274.95	
2,932.00	60.41	180.62	2,823.99	-299.77	-31.16	185.94	301.38	
2,963.00	63.75	179.83	2,838.51	-327.15	-31.27	185.46	328.64	
2,995.00	67.09	179.57	2,851.81	-356.25	-31.11	184.99	357.60	
3,026.00	70.61	179.57	2,863.00	-385.16	-30.90	184.59	386.39	
3,057.00	73.69	180.62	2,872.50	-414.66	-30.95	184.27	415.81	
3,088.00	76.68	180.27	2,880.43	-444.62	-31.18	184.01	445.72	
3,119.00	80.28	180.62	2,886.62	-474.99	-31.42	183.78	476.03	
3,151.00	83.62	181.68	2,891.10	-506.67	-32.05	183.62	507.68	
3,182.00	86.61	182.56	2,893.74	-537.53	-33.20	183.53	538.55	
3,213.00	88.96	181.99	2,894.93	-568.48	-34.43	183.47	569.52	



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3486.00usft (JW #4)
Site:	Grave Digger State Com	MD Reference:	RF @ 3486.00usft (JW #4)
Well:	#5H	North Reference:	Grid
Wellbore:	OH - Job #32H11121444	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)	
3,307.00	91.54	181.41	2,894.52	-662.43	-37.22	183.22	663.47	
3,401.00	90.75	181.06	2,892.65	-756.39	-39.24	182.97	757.40	
3,494.00	90.66	180.89	2,891.50	-849.37	-40.82	182.75	850.35	
3,588.00	91.01	180.84	2,890.13	-943.35	-42.24	182.56	944.29	
3,682.00	90.37	179.79	2,889.00	-1,037.34	-42.76	182.36	1,038.22	
3,775.00	91.01	179.39	2,887.88	-1,130.33	-42.09	182.13	1,131.11	
3,869.00	89.78	179.92	2,887.23	-1,224.32	-41.53	181.94	1,225.02	
3,962.00	90.74	180.11	2,886.81	-1,317.32	-41.55	181.81	1,317.97	
4,056.00	89.87	178.78	2,886.31	-1,411.31	-40.64	181.65	1,411.89	
4,150.00	90.66	178.86	2,885.87	-1,505.29	-38.71	181.47	1,505.78	
4,243.00	91.80	178.16	2,883.88	-1,598.23	-36.29	181.30	1,598.64	
4,337.00	90.57	178.60	2,881.93	-1,692.17	-33.63	181.14	1,692.51	
4,430.00	89.90	179.68	2,881.55	-1,785.16	-32.24	181.03	1,785.45	
4,524.00	90.66	179.22	2,881.09	-1,879.15	-31.33	180.96	1,879.41	
4,617.00	89.52	179.83	2,880.95	-1,972.15	-30.56	180.89	1,972.38	
4,711.00	89.87	179.92	2,881.45	-2,066.15	-30.36	180.84	2,066.37	
4,804.00	90.40	179.66	2,881.23	-2,159.14	-30.02	180.80	2,159.35	
4,898.00	90.84	179.48	2,880.21	-2,253.14	-29.31	180.75	2,253.33	
4,992.00	89.87	180.18	2,879.63	-2,347.13	-29.03	180.71	2,347.31	
5,085.00	90.17	180.28	2,879.60	-2,440.13	-29.41	180.69	2,440.31	
5,179.00	90.64	180.21	2,878.93	-2,534.13	-29.81	180.67	2,534.30	
5,272.00	90.92	179.82	2,877.67	-2,627.12	-29.83	180.65	2,627.29	
5,366.00	91.36	179.30	2,875.80	-2,721.10	-29.11	180.61	2,721.25	
5,459.00	90.40	179.92	2,874.37	-2,814.08	-28.48	180.58	2,814.23	
5,553.00	90.71	180.01	2,873.46	-2,908.08	-28.42	180.56	2,908.22	
5,646.00	90.94	179.27	2,872.12	-3,001.07	-27.84	180.53	3,001.19	
5,740.00	90.00	180.17	2,871.35	-3,095.06	-27.38	180.51	3,095.18	
5,833.00	90.75	179.92	2,870.74	-3,188.06	-27.45	180.49	3,188.17	
5,927.00	89.16	180.45	2,870.81	-3,282.05	-27.75	180.48	3,282.17	
6,020.00	89.43	179.83	2,871.96	-3,375.05	-27.98	180.47	3,375.16	
6,114.00	89.69	179.22	2,872.68	-3,469.04	-27.20	180.45	3,469.15	
6,207.00	89.96	180.27	2,872.96	-3,562.04	-26.79	180.43	3,562.14	
6,301.00	90.92	181.15	2,872.24	-3,656.02	-27.95	180.44	3,656.13	
6,395.00	89.63	180.12	2,871.79	-3,750.01	-28.99	180.44	3,750.13	
6,488.00	90.22	180.18	2,871.91	-3,843.01	-29.24	180.44	3,843.12	
6,583.00	90.54	179.68	2,871.28	-3,938.01	-29.12	180.42	3,938.12	
6,676.00	91.04	179.24	2,870.00	-4,031.00	-28.24	180.40	4,031.10	
6,769.00	91.58	180.65	2,867.87	-4,123.97	-28.15	180.39	4,124.07	
6,863.00	92.07	180.36	2,864.88	-4,217.92	-28.98	180.39	4,218.02	
6,957.00	91.14	181.41	2,862.25	-4,311.87	-30.43	180.40	4,311.97	
7,050.00	89.73	181.22	2,861.54	-4,404.84	-32.57	180.42	4,404.96	
7,143.00	90.31	181.24	2,861.51	-4,497.82	-34.56	180.44	4,497.95	
7,206.00	90.66	180.27	2,860.97	-4,560.81	-35.39	180.44	4,560.94	



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3486.00usft (JW #4)
Site:	Grave Digger State Corn	MD Reference:	RF @ 3486.00usft (JW #4)
Well:	#5H	North Reference:	Grid
Wellbore:	OH - Job #32H11121444	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)
7,268.00	91.04	180.26	2,860.05	-4,622.80	-35.68	180.44	4,622.94
Last MWD Survey							
7,316.00	91.04	180.26	2,859.18	-4,670.79	-35.90	180.44	4,670.93
Projection to Bit - PBHL-GDSC #5H							

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,268.00	2,860.05	-4,622.80	-35.68	Last MWD Survey
7,316.00	2,859.18	-4,670.79	-35.90	Projection to Bit



Grave Digger State Com#5H
Eddy County, NM (NAN27 NME)
Northing: (Y) 585302.00
Easting: (X) 460894.90
Plan #3 vs Actual 8-3/4" Hole



Azimuths to Grid North
True North: 0.07°
Magnetic North: 8.01°

Magnetic Field
Strength: 48577.2nT
Dip Angle: 60.31°
Date: 12/6/2012
Model: BSGM2012

To convert a Magnetic Direction to a Grid Direction, Add 8.01°
To convert a True Direction to a Grid Direction, Add 0.07°

WELL DETAILS:						
			Ground Level: 3473.00			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	585302.00	460894.90	32° 36' 32.528 N	104° 27' 37.179 W	

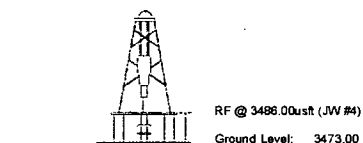
SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
2300.00	0.64	249.10	2299.78	-0.12	-29.04	0.00	0.00	0.29	
2378.50	0.64	249.10	2378.27	-0.43	-29.84	0.00	0.00	0.80	
3197.12	90.50	179.90	2895.03	-525.81	-34.35	11.00	-69.20	525.99	
7385.99	90.50	179.90	2859.00	-4694.52	-26.80	0.00	0.00	4694.60	PBHL

DESIGN TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	
PP=330° FNL GDSC #5H	2712.20	-125.00	-33.14	585177.01	460861.77	
PBHL	2859.00	-4694.52	-26.80	580607.90	460868.10	

SITE DETAILS: Grave Digger State Com				Map System: US State Plane 1927 (Exact solution)		
Site Centre Northing: 585274.50				Datum: NAD 1927 (NADCON CONUS)		
Easting: 463340.80				Ellipsoid: Clarke 1866		
				Zone Name: New Mexico East 3001		
Positional Uncertainty: 0.00				Local Origin: Well #5H, Grid North		
Convergence: -0.06				Latitude: 32° 36' 32.528 N		
Local North: Grid				Longitude: 104° 27' 37.179 W		

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				Geomagnetic Model: BSGM2012		
				Sample Date: 05-Dec-12		
				Magnetic Declination: 7.95°		
				Dip Angle from Horizontal: 60.31°		
				Magnetic Field Strength: 48577		

To convert a Magnetic Direction to a Grid Direction, Add 8.01°
To convert a Magnetic Direction to a True Direction, Add 7.95° East
To convert a True Direction to a Grid Direction, Add 0.07°



Julio Pifa
9/31/December 14 2012
Scientific Drilling
2034 Trade Drive
Midland, TX 79703

