



COG Operating LLC

Eddy County, NM (NAD27 NME)

GJ West Coop Unit #281

GJ West #281

OH - Job #32D0512616

30-015-37583

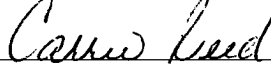
Design: Actual

SDI Standard Survey Report

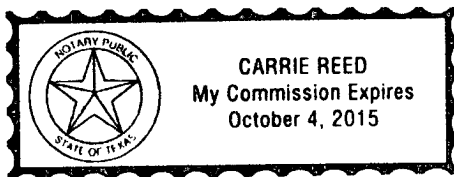
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date Bill of June, 2012.



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:	Site GJ West Coop Unit #281
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RF @ 3590 00usft (SO #5)
Site:	GJ West Coop Unit #281	MD Reference:	RF @ 3590 00usft (SO #5)
Well:	GJ West #281	North Reference:	Grid
Wellbore:	OH - Job #32D0512616	Survey Calculation Method:	Minimum Curvature
Design:	Actual	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	GJ West Coop Unit #281		
Site Position:	Map	Northing:	657,411 10 usft
From:		Easting:	577,728 20 usft
Position Uncertainty:	0 00 usft	Slot Radius:	0"
		Latitude:	32° 48' 25 403 N
		Longitude:	104° 4' 49 269 W
		Grid Convergence:	0 14 °

Well	GJ West #281		
Well Position	+N/-S	0 00 usft	Northing:
	+E/-W	0 00 usft	Easting:
Position Uncertainty	0 00 usft	Wellhead Elevation:	usft
		Latitude:	32° 48' 25 403 N
		Longitude:	104° 4' 49 269 W
		Ground Level:	3,578 00 usft

Wellbore	OH - Job #32D0512616				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2012/05/28	7 74	60 64	48,854

Design	Actual			
Audit Notes:				
Version:	1 0	Phase:	ACTUAL	Tie On Depth: 0 00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0 00	0 00	0 00	182 22

Survey Program	Date	2012/06/01			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 00	812 00	Gyro (OH - Job #32D0512616)	Keeper	Standard Wireline Keeper ver 1 0 2	
868 00	4,397 00	MWD (OH - Job #32D0512616)	MWD	MWD - Standard	

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
12 10	0 06	141 28	12 10	0 00	0 00	141 28	0 01	
North HL-GJ West #281								
12 82	0 06	141 28	12 82	-0 01	0 00	141 28	0 01	
West HL-GJ West #281								
100 00	0 48	141 28	100 00	-0 33	0 26	141 28	0 42	
200 00	0 51	169 33	200 00	-1 09	0 61	150 93	1 25	
300 00	0 46	147 60	299 99	-1 87	0 90	154 17	2 07	
400 00	0 51	128 62	399 99	-2 48	1 47	149 44	2 88	
500 00	0 53	72 18	499 98	-2 62	2 25	139 29	3 46	
600 00	0 84	89 99	599 98	-2 48	3 43	125 87	4 23	



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Site:	GJ West Coop Unit #281	MD Reference:	RF @ 3590 00usft (SO #5)
Well:	GJ West #281	North Reference:	Grid
Wellbore:	OH - Job #32D0512616	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)
700 00	0 73	70 61	699 97	-2 27	4 76	115 46	5 27
800 00	0 62	71 60	799 96	-1 88	5 88	107 78	6 17
812 00	0 60	76 49	811 96	-1 85	6 00	107 13	6 28
Gryo Tie-in							
868 00	0 75	55 22	867 96	-1 57	6 59	103 43	6 77
932 00	1 06	114 66	931 95	-1 58	7 47	101 95	7 63
996 00	1 41	149 64	995 94	-2 51	8 40	106 61	8 77
1,059 00	1 85	143 14	1,058 91	-3 99	9 40	112 98	10 22
1,123 00	2 64	167 39	1,122 86	-6 25	10 35	121 15	12 09
1,187 00	3 43	174 42	1,186 77	-9 60	10 85	131 48	14 49
1,251 00	3 92	175 16	1,250 64	-13 68	11 23	140 64	17 70
1,314 00	4 28	178 86	1,313 48	-18 18	11 45	147 79	21 49
1,378 00	4 40	194 20	1,377 30	-22 95	10 90	154 59	25 40
1,473 00	4 84	195 25	1,471 99	-30 35	8 95	163 57	31 64
1,569 00	4 13	200 18	1,567 69	-37 50	6 69	169 88	38 09
1,665 00	3 87	193 06	1,663 46	-43 90	4 77	173 80	44 16
1,760 00	4 31	178 91	1,758 22	-50 59	4 11	175 35	50 76
1,856 00	4 48	184 36	1,853 94	-57 94	3 90	176 15	58 07
1,952 00	5 19	183 30	1,949 60	-66 01	3 36	177 09	66 10
2,047 00	5 36	182 33	2,044 20	-74 73	2 93	177 75	74 79
2,143 00	5 98	184 71	2,139 73	-84 20	2 34	178 41	84 23
2,238 00	5 80	184 88	2,234 22	-93 91	1 52	179 07	93 92
2,334 00	5 72	184 88	2,329 74	-103 51	0 71	179 61	103 51
2,430 00	5 45	186 64	2,425 28	-112 81	-0 23	180 12	112 81
2,525 00	5 36	185 50	2,519 86	-121 70	-1 18	180 55	121 71
2,621 00	5 36	182 86	2,615 44	-130 65	-1 83	180 80	130 66
2,717 00	5 36	181 37	2,711 02	-139 61	-2 16	180 89	139 62
2,813 00	5 19	182 60	2,806 61	-148 43	-2 46	180 95	148 45
2,908 00	5 01	180 40	2,901 24	-156 87	-2 69	180 98	156 89
3,004 00	4 92	180 14	2,996 88	-165 18	-2 73	180 95	165 20
3,099 00	4 92	180 31	3,091 53	-173 32	-2 76	180 91	173 35
3,195 00	5 10	189 89	3,187 16	-181 64	-3 51	181 11	181 68
3,290 00	5 36	188 66	3,281 77	-190 19	-4 91	181 48	190 25
3,386 00	5 28	190 51	3,377 35	-198 97	-6 39	181 84	199 07
3,482 00	5 10	187 26	3,472 96	-207 54	-7 73	182 13	207 69
3,577 00	5 01	190 42	3,567 59	-215 81	-9 02	182 39	216 00
3,641 00	4 92	189 81	3,631 35	-221 26	-9 99	182 59	221 49
3,704 00	4 84	187 43	3,694 12	-226 56	-10 79	182 73	226 82
3,768 00	3 61	182 51	3,757 95	-231 25	-11 23	182 78	231 52
3,832 00	2 81	177 85	3,821 85	-234 83	-11 26	182 75	235 10
3,896 00	1 76	173 81	3,885 80	-237 38	-11 10	182 68	237 64
3,959 00	0 97	173 90	3,948 78	-238 87	-10 94	182 62	239 12
3,997 24	0 76	172 92	3,987 01	-239 44	-10 87	182 60	239 69
PP-GJ West #281							



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Site:	GJ West Coop Unit #281	MD Reference:	RF @ 3590 00usft (SO #5)
Well:	GJ West #281	North Reference:	Grid
Wellbore:	OH - Job #32D0512616	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)
4,023 00	0 62	171 88	4,012 77	-239 75	-10 83	182 59	239 99
4,119 00	0 53	150 34	4,108 77	-240 65	-10 54	182 51	240 88
4,214 00	0 44	132 68	4,203 76	-241 28	-10 05	182 39	241 49
4,310 00	0 70	148 06	4,299 76	-242 03	-9 47	182 24	242 21
4,342 00	0 60	140 47	4,331 76	-242 32	-9 26	182 19	242 50
Last MWD Survey							
4,397 00	0 60	140 47	4,386 75	-242 77	-8 89	182 10	242 93
Projection to Bit - PBHL-GJ West #281							

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
812 00	811 96	-1 85	6 00	Gryo Tie-in
4,342 00	4,331 76	-242 32	-9 26	Last MWD Survey
4,397 00	4,386 75	-242 77	-8 89	Projection to Bit



Assumes to Grid North
True North -0.14°
Magnetic North -7.60°
Magnetic Field
Strength: 48554.2nT
Dip Angle: 60.64°
Date: 05/26/2012
Model: IGRF200510

GJ West #281
Eddy County, NM (NAN27 NME)
Northing (Y) 657411.10
Easting (X) 577728.20
Plan #2 vs Actual - 7-7/8" Hole

WELL DETAILS

GJ West Coop Unit #281
Ground Level 3578.00
Northing 657411.10
Easting 577728.20
Latitude 32° 48' 25.403" N
Longitude 104° 4' 49.269" W
Spot

SITE DETAILS

GJ West Coop Unit #281
Site Centre Northing 657411.10
Easting 577728.20
Positional Uncertainty 0.00
Convergence 0.14
Local North Grid

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Dleg	TFace	VSect	Target
1	812.00	0.00	78.49	811.96	-1.85	5.00	0.00	0.00	1.62	
2	1000.00	0.00	76.49	999.95	-1.39	7.91	0.00	0.00	1.08	
3	1262.67	5.04	184.44	1262.29	-12.57	6.36	2.00	114.17	12.24	
4	3733.37	5.04	184.44	3723.45	-228.87	8.44	0.00	0.00	229.02	
5	3985.25	0.00	0.00	3975.00	-239.90	-9.30	2.00	180.00	240.08	PBH-GJ West #281
6	5610.25	0.00	0.00	5600.00	-239.90	-9.30	0.00	0.00	240.08	PBH-GJ West #281

DESIGN TARGET DETAILS

Name	TVD	+N/S	+E/W	Northing	Easting	Latitude	Longitude	Shape
North HL-GJ West #281	-1.00	-249.90	0.70	657181.20	577728.90	32° 48' 22.930" N	104° 4' 49.267" W	Rectangle (Sides: L:0.00 W:100.00)
- plan masses target center by 849.08uoft at 812.00uoft MD (811.96 TVD -1.85 N 6.00 E)								
West HL-GJ West #281	-1.00	-249.90	0.70	657181.20	577728.90	32° 48' 22.930" N	104° 4' 49.267" W	Rectangle (Sides: L:100.00 W:100.00)
- plan masses target center by 649.08uoft at 812.00uoft MD (811.96 TVD -1.85 N 6.00 E)								
PP-GJ West #281	3975.00	-239.90	-9.30	657171.20	577718.90	32° 48' 23.029" N	104° 4' 49.384" W	Point
- plan hole target center								
PBH-GJ West #281	5600.00	-239.90	-9.30	657171.20	577718.90	32° 48' 23.029" N	104° 4' 49.384" W	Circle (Radius: 10.00)
- plan hole target center								

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

Local Origin: See GJ West Coop Unit #281 Grid North

Latitude: 32° 48' 25.403" N
Longitude: 104° 4' 49.269" W

Grid East: 577728.20
Grid North: 657411.10
Scale Factor: 1.000

Geometric Model: IGRF200510

Sample Date: 26-May-12
Magnetic Declination: 7.74°
Dip Angle from Horizontal: 60.64°
Magnetic Field Strength: 48554

To convert Magnetic North to Grid: Add 7.60°
To convert Magnetic North to True North: Add 7.74° East
To convert True North to Grid: Subtract 0.14°

FORMATION TOP DETAILS

No formation data is available

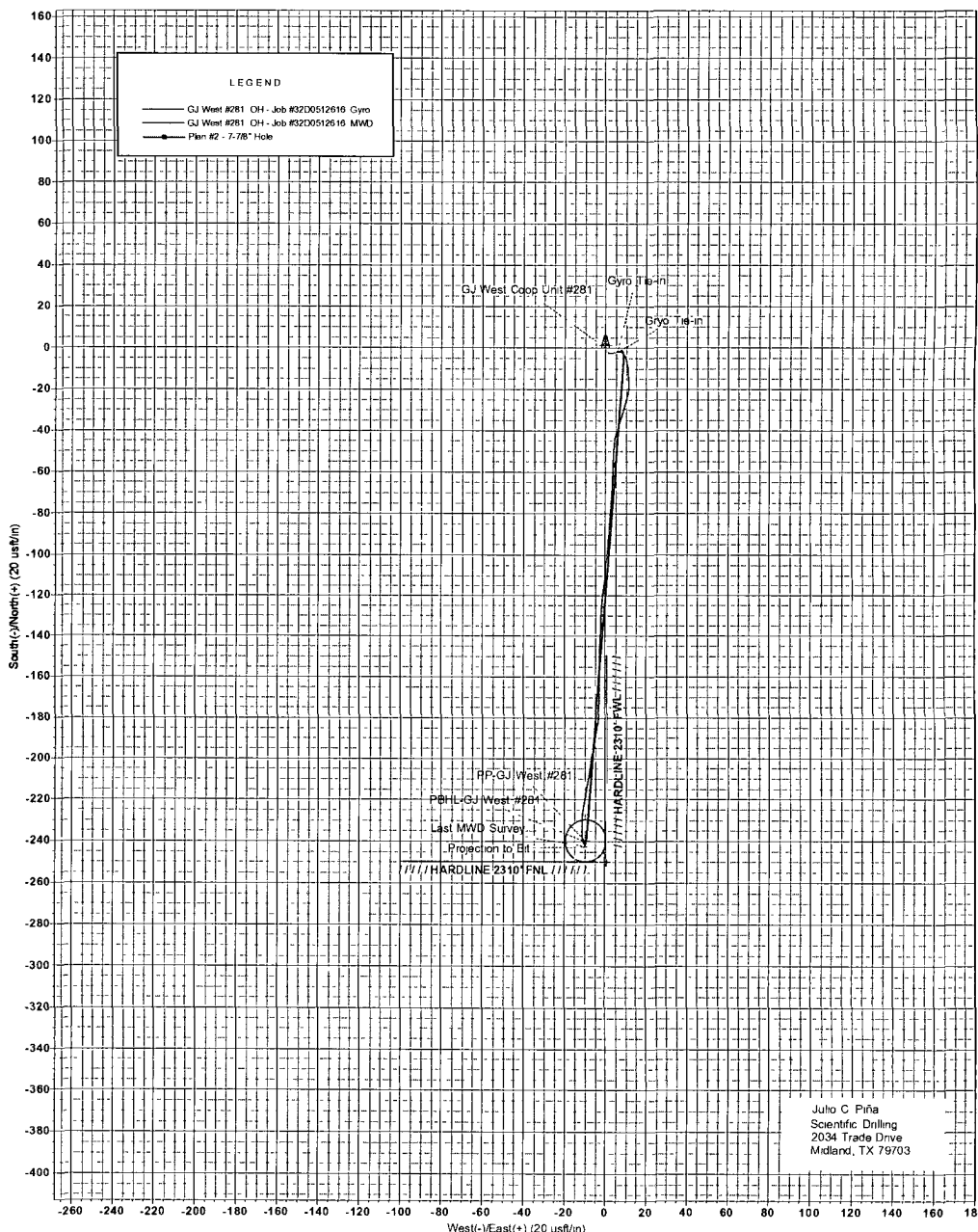
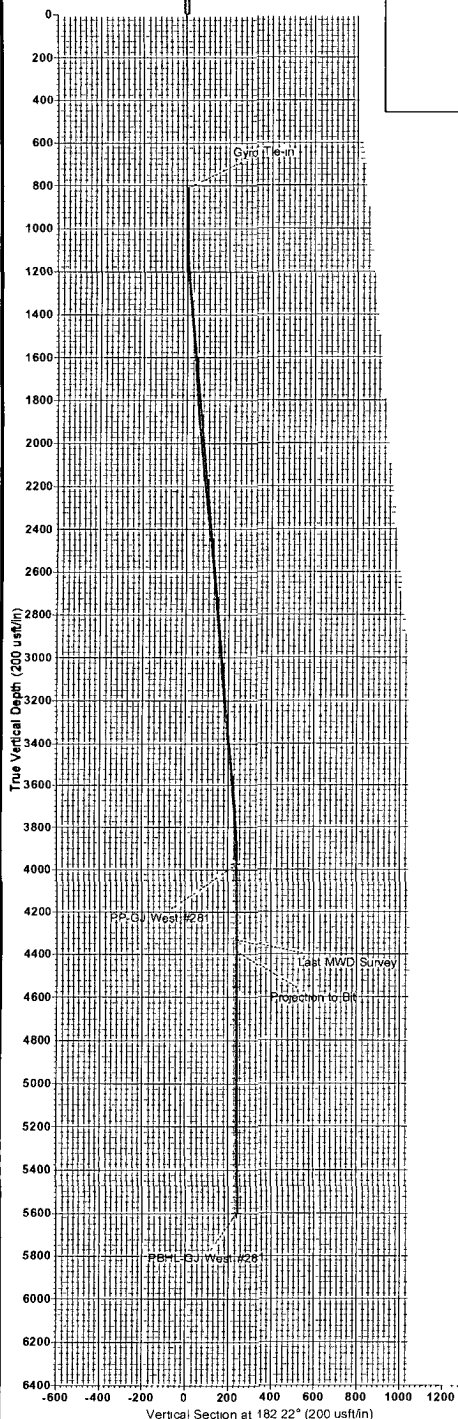
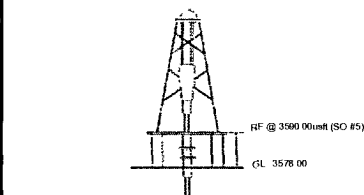
CASING DETAILS

TVD	MD	Name	Size
900.00	900.05	8-5/8" Casing	8-5/8"

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



Juho C. Piña
Scientific Drilling
2034 Trade Drive
Midland, TX 79703



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

June 5, 2012

COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

RE: GJ West Coop Unit #281
2060' FNL & 2310' FWL
Sec. 28, T17S, R29E
Eddy County, New Mexico

Dear Sir,

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

Very truly yours,

A handwritten signature in black ink, appearing to read "Chris Graham".

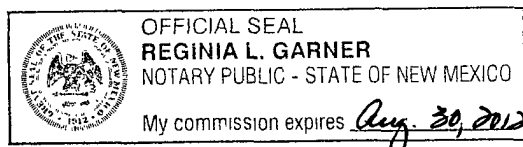
Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 5th day of June, 2012.

A handwritten signature in black ink, appearing to read "Regina L. Garner".

Notary Public



GJ West Coop Unit #281

Date	Depth	Dev/Inc	Dir/AZ
5/27/2012	324	0.50	0
5/28/2012	873	0.75	55.22
5/28/2012	932	1.06	114.6
5/28/2012	996	1.41	149.6
5/28/2012	1059	1.85	143.10
5/29/2012	1123	2.64	167.30
5/29/2012	1187	3.43	174.40
5/29/2012	1251	3.92	175.10
5/29/2012	1314	4.28	178.80
5/29/2012	1378	4.40	194.20
5/29/2012	1473	4.84	195.20
5/30/2012	2525	5.36	185.5
5/30/2012	2621	5.36	182.80
5/30/2012	2717	5.36	181.30
5/30/2012	2813	5.19	182.60
5/30/2012	2908	5.01	180.40
5/30/2012	3004	4.92	180.10
5/30/2012	3099	4.92	180.30
5/30/2012	3195	5.10	189.80
5/30/2012	3290	5.36	188.60
5/30/2012	3386	5.28	190.50
5/30/2012	3482	5.10	187.20
5/30/2012	3577	5.01	190.40
5/31/2012	3641	4.92	189.80
5/31/2012	3704	4.84	187.40
5/31/2012	3800	3.61	182.50
5/31/2012	3832	2.81	177.80
5/31/2012	3959	0.97	173.90
5/31/2012	4023	0.62	171.80
5/31/2012	4119	0.50	150.30
5/31/2012	4214	0.44	132.60
5/31/2012	4310	0.70	148.00
5/31/2012	4388	0.60	140.40
6/2/2012	4571	0.60	0.00
6/2/2012	5017	0.70	0.00
6/2/2012	5478	0.40	0.00