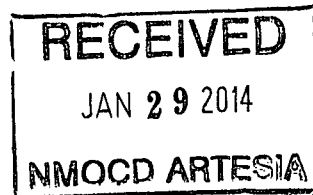


15-25691

COG OPERATING

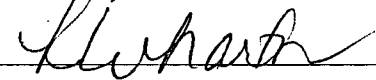
Grayburg Jackson
Eddy County, NM
GJ West Coop #81
VH - Job #320713-KW-709



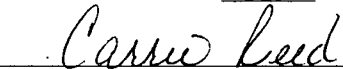
Survey: Gyro

SDI Survey Report

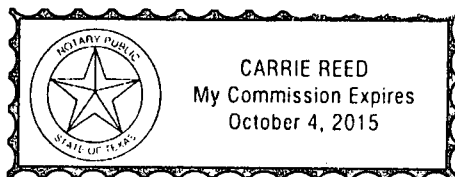
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 1st of August, 2013.



Notary Signature
County of Midland
State of Texas



SDI
SDI Survey Report

Company:	COG OPERATING	Local Co-ordinate Reference:	Well GJ West Coop #81
Project:	Grayburg Jackson	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	GJ West Coop #81	North Reference:	Grid
Wellbore:	VH - Job #320713-KW-709	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320713-KW-709	Database:	EDM-Regulatory

Project:	Grayburg Jackson		
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		Eddy County, NM			
Site Position:		Northing:	665,097.06 usft	Latitude:	32° 49' 40.800 N
From:	Lat/Long	Easting:	601,778.12 usft	Longitude:	104° 0' 7.200 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence:	0.18 °

Well	GJ West Coop #81, Vertical					
Well Position	+N/-S	0.0 usft	Northing:	660,707.55 usft	Latitude:	32° 48' 58.000 N
	+E/-W	0.0 usft	Easting:	578,682.03 usft	Longitude:	104° 4' 37.999 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	0.0 usft

Wellbore	VH - Job #320713-KW-709				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	7/11/2013	7.61	60.60	48,735

Design		VH - Job #320713-KW-709		
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	161.61

Survey Program	Date 8/19/2013				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.0	5,420.0	Gyro (VH - Job #320713-KW-709)	Keeper	Keeper Gyro	

Survey								
MD	Inc	Azi (azimuth)	TVD	N/S	E/W	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(°)	(usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0	
100.0	0.51	275.20	100.0	0.0	-0.4	275.20	0.4	
200.0	0.63	312.59	200.0	0.5	-1.3	289.32	1.4	
300.0	0.49	0.06	300.0	1.3	-1.7	306.45	2.1	
400.0	0.60	23.36	400.0	2.2	-1.5	325.46	2.6	
500.0	1.03	55.76	500.0	3.1	-0.5	350.32	3.2	
600.0	0.97	57.19	600.0	4.1	0.9	12.58	4.2	
700.0	0.96	53.31	699.9	5.1	2.3	24.41	5.6	
800.0	0.72	58.28	799.9	5.9	3.5	30.72	6.9	
900.0	0.43	67.58	899.9	6.4	4.4	34.54	7.7	
1,000.0	0.06	90.05	999.9	6.5	4.8	36.30	8.1	
1,100.0	0.18	183.03	1,099.9	6.4	4.8	37.22	8.0	

SDI
SDI Survey Report

Company:	COG OPERATING	Local Co-ordinate Reference:	Well GJ West Coop #81
Project:	Grayburg Jackson	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	GJ West Coop #81	North Reference:	Grid
Wellbore:	VH - Job #320713-KW-709	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320713-KW-709	Database:	EDM-Regulatory

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth (°)	Closure Distance (usft)	
1,200.0	0.28	210.18	1,199.9	6.0	4.7	38.11	7.6	
1,300.0	0.47	216.07	1,299.9	5.5	4.3	38.51	7.0	
1,400.0	0.60	220.30	1,399.9	4.7	3.8	38.52	6.0	
1,500.0	0.60	212.72	1,499.9	3.9	3.1	38.94	5.0	
1,600.0	0.67	216.26	1,599.9	3.0	2.5	40.17	3.9	
1,700.0	0.70	213.89	1,699.9	2.0	1.8	42.44	2.7	
1,800.0	0.80	213.78	1,799.9	0.9	1.1	50.41	1.4	
1,900.0	0.80	216.34	1,899.9	-0.2	0.3	129.85	0.4	
2,000.0	0.55	209.27	1,999.9	-1.2	-0.4	196.41	1.3	
2,100.0	0.59	200.20	2,099.9	-2.1	-0.8	199.98	2.3	
2,200.0	0.66	207.24	2,199.9	-3.1	-1.2	201.26	3.3	
2,300.0	0.63	210.30	2,299.9	-4.1	-1.8	203.14	4.5	
2,400.0	0.65	209.33	2,399.9	-5.1	-2.3	204.47	5.6	
2,500.0	0.64	218.15	2,499.8	-6.0	-2.9	206.02	6.7	
2,600.0	0.70	207.67	2,599.8	-7.0	-3.6	207.00	7.8	
2,700.0	0.60	197.81	2,699.8	-8.0	-4.0	206.51	9.0	
2,800.0	0.62	192.75	2,799.8	-9.1	-4.3	205.32	10.0	
2,900.0	0.67	183.39	2,899.8	-10.2	-4.4	203.59	11.1	
3,000.0	0.67	167.39	2,999.8	-11.3	-4.3	201.00	12.1	
3,100.0	0.58	163.01	3,099.8	-12.4	-4.1	198.21	13.0	
3,200.0	0.54	154.41	3,199.8	-13.3	-3.7	195.64	13.8	
3,300.0	0.58	157.63	3,299.8	-14.2	-3.3	193.19	14.6	
3,400.0	0.67	155.37	3,399.8	-15.2	-2.9	190.77	15.4	
3,500.0	0.75	167.67	3,499.8	-16.3	-2.5	188.70	16.5	
3,600.0	0.81	168.84	3,599.8	-17.7	-2.2	187.18	17.8	
3,700.0	0.96	164.42	3,699.8	-19.2	-1.9	185.55	19.3	
3,800.0	0.85	148.63	3,799.8	-20.6	-1.3	183.48	20.7	
3,900.0	1.00	153.22	3,899.7	-22.0	-0.5	181.23	22.0	
4,000.0	1.23	165.48	3,999.7	-23.9	0.2	179.55	23.9	
4,100.0	1.20	155.47	4,099.7	-25.8	0.9	178.02	25.9	
4,200.0	1.21	132.69	4,199.7	-27.5	2.1	175.63	27.6	
4,300.0	1.18	129.51	4,299.7	-28.9	3.7	172.75	29.1	
4,400.0	1.09	145.83	4,399.6	-30.3	5.0	170.63	30.7	
4,500.0	0.98	140.19	4,499.6	-31.8	6.1	169.16	32.3	
4,600.0	0.93	124.72	4,599.6	-32.9	7.3	167.49	33.7	
4,700.0	0.70	144.68	4,699.6	-33.8	8.3	166.19	34.9	
4,800.0	0.69	142.02	4,799.6	-34.8	9.0	165.44	36.0	
4,900.0	0.68	135.54	4,899.6	-35.7	9.8	164.62	37.0	
5,000.0	0.64	143.10	4,999.6	-36.6	10.6	163.87	38.1	
5,100.0	0.46	128.19	5,099.6	-37.3	11.2	163.24	38.9	
5,200.0	0.39	131.53	5,199.6	-37.8	11.8	162.64	39.6	
5,300.0	0.37	132.51	5,299.6	-38.2	12.3	162.16	40.1	
5,400.0	0.49	137.82	5,399.6	-38.7	12.8	161.69	40.8	
5,420.0	0.45	142.33	5,419.6	-38.9	12.9	161.61	41.0	



Scientific Drilling

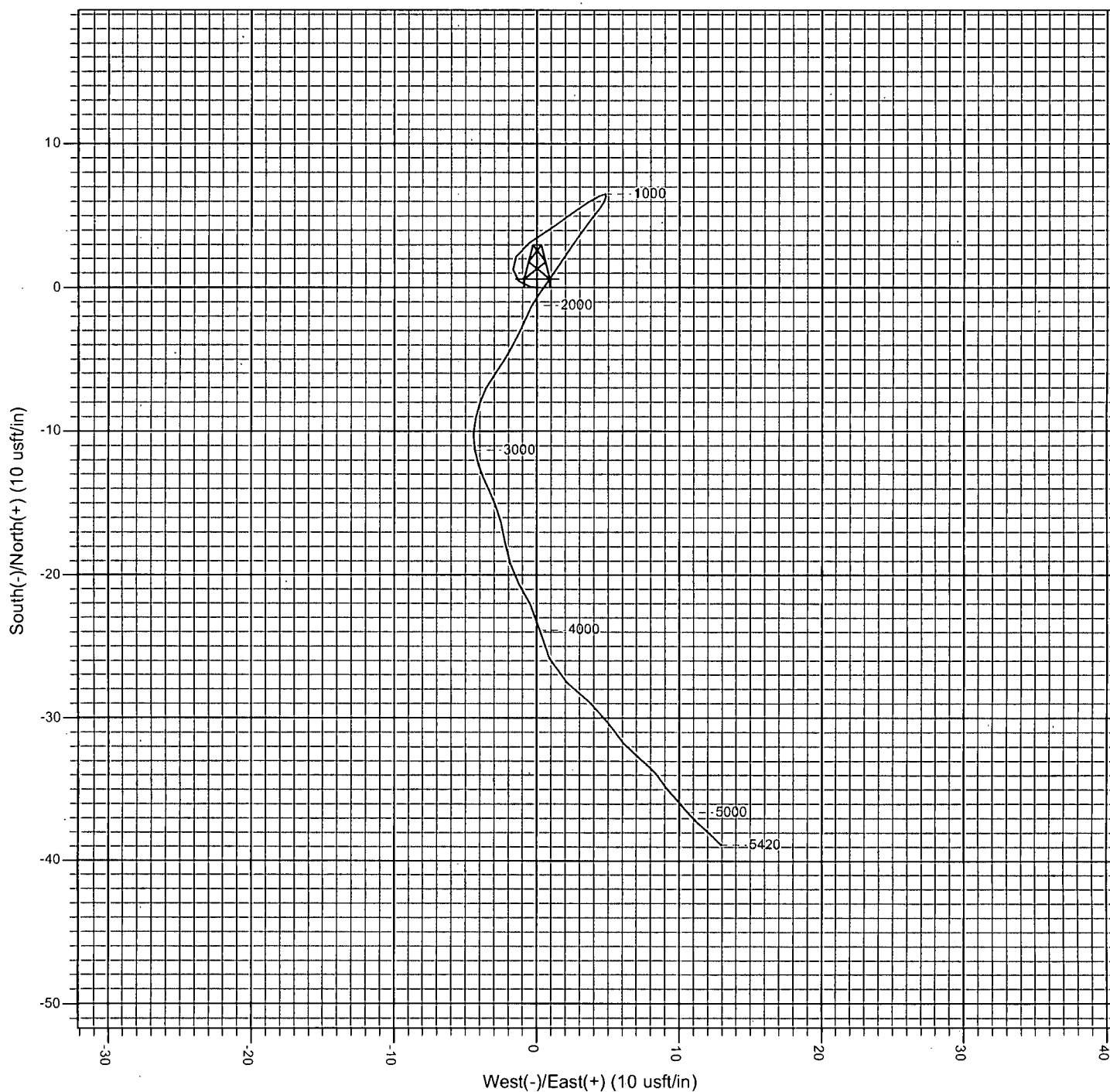
Project: Grayburg Jackson
Eddy County, NM
Well: GJ West Coop #81
Wellbore: VH - Job #320713-KW-709
Design: VH - Job #320713-KW-709

WELL DETAILS: GJ West Coop #81

WELL @ 0.0usft (Original Well Elev)

Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	660707.55	578682.03	32° 48' 58.000 N	104° 4' 37.999 W	



PROJECT DETAILS: Grayburg Jackson	SITE DETAILS: Eddy County, NM
Geodetic System: US State Plane 1927 (Exact solution)	Site Centre Latitude: 32° 49' 40.800 N
Datum: NAD 1927 (NADCON CONUS)	Longitude: 104° 0' 7.200 W
Ellipsoid: Clarke 1866	Positional Uncertainty: 0.0
Zone: New Mexico East 3001	Convergence: 0.18
System Datum: Mean Sea Level	Local North: Grid