

15-41741



NM OIL CONSERVATION

ARTESIA DISTRICT

JAN 08 2015

RECEIVED

October 9, 2014

COG Operating LLC (Concho)
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701

Attn: Kanicia Castillo

Re: **SRO State Com 60H**

Please find enclosed a copy of the survey from 0' to 7,431' ran on the above referenced well.

If I can be of any further service, please do not hesitate to call me at 800-606-4976.

Sincerely,

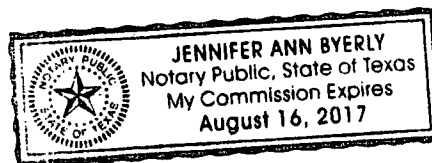
A handwritten signature in black ink, appearing to read "KH", written over a horizontal line.

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 9 day of October, A.D., 2014, by Keith Havelka.

A handwritten signature in black ink, appearing to read "Jennifer Ann Byerly", written over a horizontal line.
Jennifer Byerly
Notary Public, State of Texas





Company: Concho
Lease/Well: SRO State Com/60H

Rig Name: Scan Freedom
State/County: New Mexico/Eddy
Latitude: 32.06, Longitude: -104.07
GRID North is 0.14 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 27 Ft

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: sro state com 60h_gyro survey.ut

Minimum Curvature Method

Report Date/Time: 10/9/2014 / 09:41

VES Survey International

West Texas

(432) 563-5444

Surveyor: Gene Heiss

SRO State Com 60H / API 30-015-41741

NM OIL CONSERVATION
ARTESIA DISTRICT
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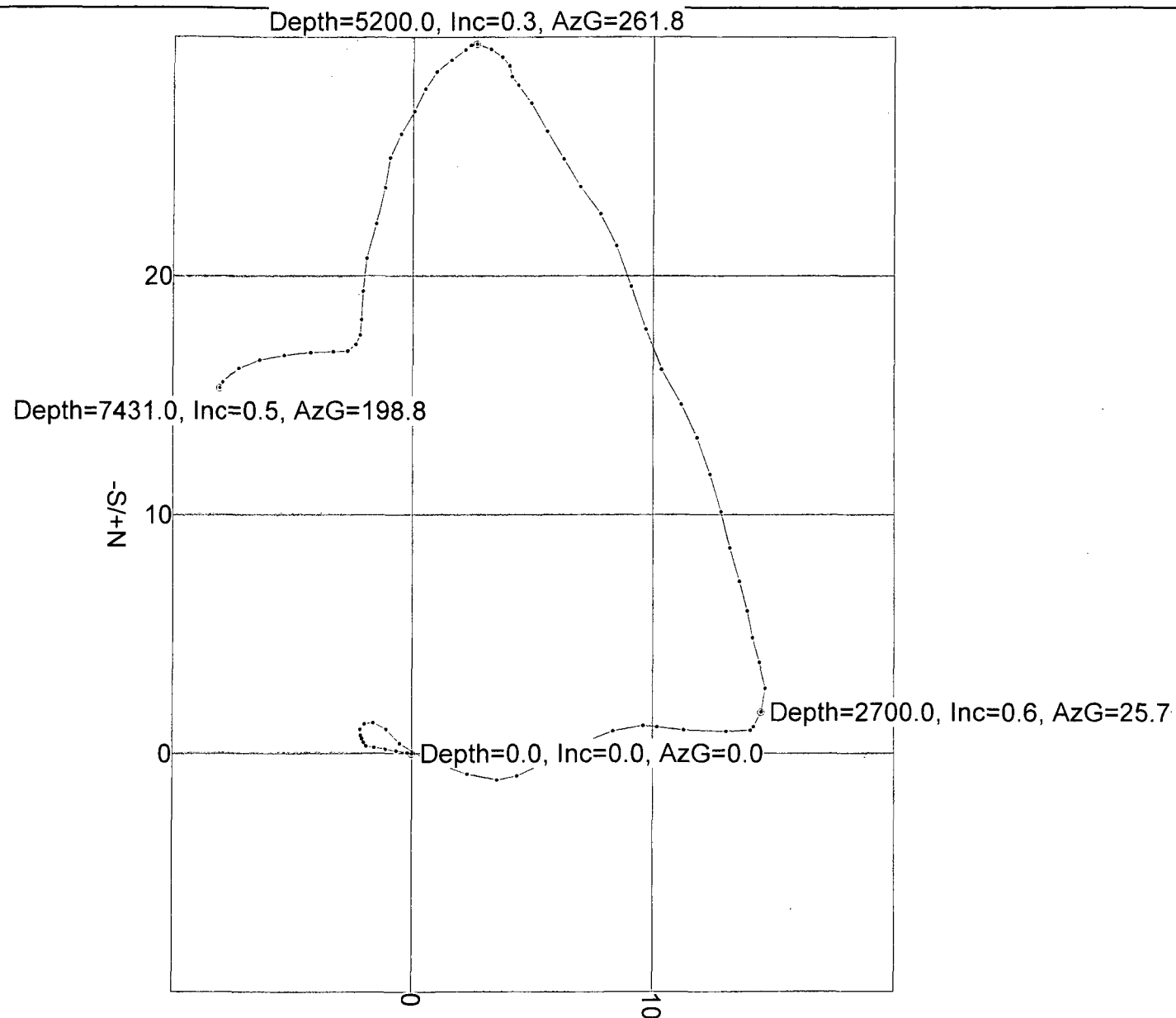
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.21	279.40	100.00	0.03	-0.18	0.03	0.18	279.40	0.21
200.00	0.33	280.30	200.00	0.11	-0.64	0.11	0.65	279.79	0.12
300.00	0.20	274.57	300.00	0.18	-1.10	0.18	1.11	279.11	0.13
400.00	0.34	281.45	400.00	0.25	-1.56	0.25	1.58	279.06	0.15
500.00	0.05	274.59	500.00	0.31	-1.90	0.31	1.93	279.33	0.29
600.00	0.18	336.01	600.00	0.46	-2.01	0.46	2.06	282.90	0.16
700.00	0.02	346.40	700.00	0.62	-2.08	0.62	2.17	286.71	0.16
800.00	0.15	335.79	800.00	0.76	-2.13	0.76	2.27	289.60	0.12
900.00	0.16	16.14	899.99	1.01	-2.15	1.01	2.37	295.12	0.10
1000.00	0.19	56.46	999.99	1.23	-1.97	1.23	2.32	301.96	0.12
1100.00	0.26	100.32	1099.99	1.28	-1.61	1.28	2.06	308.53	0.18
1200.00	0.45	125.68	1199.99	1.01	-1.07	1.01	1.47	313.47	0.24
1300.00	0.52	146.25	1299.99	0.41	-0.50	0.41	0.65	309.35	0.18
1400.00	1.10	109.36	1399.98	-0.28	0.66	-0.28	0.72	113.28	0.76
1500.00	0.89	109.87	1499.96	-0.87	2.30	-0.87	2.46	110.67	0.21
1600.00	0.57	87.45	1599.96	-1.11	3.53	-1.11	3.70	107.48	0.43
1700.00	0.43	67.61	1699.95	-0.95	4.37	-0.95	4.47	102.23	0.22
1800.00	0.67	62.95	1799.95	-0.54	5.23	-0.54	5.26	95.90	0.24

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	1.11	58.82	1899.93	0.23	6.58	0.23	6.58	88.03	0.45
2000.00	1.12	77.77	1999.92	0.94	8.36	0.94	8.41	83.62	0.37
2100.00	0.33	86.90	2099.91	1.16	9.61	1.16	9.68	83.12	0.80
2200.00	0.34	103.57	2199.91	1.10	10.18	1.10	10.24	83.81	0.10
2300.00	0.94	93.90	2299.90	0.98	11.29	0.98	11.33	85.05	0.61
2400.00	1.06	90.05	2399.88	0.92	13.04	0.92	13.07	85.95	0.14
2500.00	0.09	59.33	2499.88	0.96	14.03	0.96	14.06	86.09	0.99
2600.00	0.17	34.85	2599.88	1.12	14.17	1.12	14.22	85.50	0.10
2700.00	0.63	25.70	2699.87	1.73	14.49	1.73	14.60	83.20	0.46
2800.00	0.58	351.76	2799.87	2.72	14.66	2.72	14.91	79.48	0.36
2900.00	0.70	341.52	2899.86	3.80	14.39	3.80	14.89	75.20	0.16
3000.00	0.54	349.41	2999.86	4.84	14.11	4.84	14.92	71.05	0.18
3100.00	0.76	348.64	3099.85	5.96	13.89	5.96	15.12	66.79	0.22
3200.00	0.71	341.76	3199.84	7.20	13.57	7.20	15.36	62.05	0.10
3300.00	0.96	345.99	3299.83	8.60	13.17	8.60	15.73	56.85	0.25
3400.00	0.84	347.02	3399.82	10.12	12.81	10.12	16.32	51.67	0.12
3500.00	1.03	340.89	3499.81	11.68	12.35	11.68	17.00	46.58	0.22
3600.00	0.83	341.29	3599.79	13.22	11.82	13.22	17.73	41.80	0.20
3700.00	0.94	329.50	3699.78	14.62	11.17	14.62	18.40	37.39	0.21
3800.00	0.98	332.41	3799.77	16.08	10.36	16.08	19.13	32.78	0.06
3900.00	1.11	343.53	3899.75	17.77	9.69	17.77	20.24	28.59	0.24
4000.00	1.06	338.98	3999.73	19.56	9.08	19.56	21.57	24.90	0.10
4100.00	1.00	341.29	4099.72	21.25	8.47	21.25	22.88	21.73	0.07
4200.00	0.74	322.89	4199.70	22.59	7.80	22.59	23.90	19.05	0.38
4300.00	0.88	323.61	4299.69	23.72	6.96	23.72	24.72	16.34	0.14
4400.00	0.68	337.52	4399.69	24.89	6.27	24.89	25.67	14.15	0.27
4500.00	0.89	322.43	4499.68	26.05	5.57	26.05	26.64	12.08	0.29
4600.00	0.68	341.50	4599.67	27.23	4.91	27.23	27.67	10.23	0.33
4700.00	0.47	299.17	4699.66	27.99	4.37	27.99	28.33	8.87	0.46
4800.00	0.20	27.67	4799.66	28.34	4.09	28.34	28.63	8.22	0.50
4900.00	0.40	328.66	4899.66	28.79	3.99	28.79	29.07	7.89	0.35
5000.00	0.16	299.64	4999.66	29.16	3.68	29.16	29.40	7.20	0.27
5100.00	0.50	305.11	5099.66	29.49	3.20	29.49	29.66	6.19	0.34
5200.00	0.26	261.75	5199.65	29.71	2.62	29.71	29.82	5.03	0.36
5300.00	0.02	242.82	5299.65	29.67	2.38	29.67	29.76	4.58	0.24
5400.00	0.34	228.62	5399.65	29.47	2.14	29.47	29.54	4.15	0.31
5500.00	0.49	237.12	5499.65	29.04	1.55	29.04	29.08	3.06	0.17
5600.00	0.39	220.03	5599.65	28.54	0.97	28.54	28.56	1.95	0.17
5700.00	0.59	208.88	5699.64	27.83	0.51	27.83	27.84	1.04	0.22

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	0.61	203.37	5799.64	26.89	0.05	26.89	26.89	0.10	0.06
5900.00	0.66	216.01	5899.63	25.93	-0.50	25.93	25.94	358.89	0.15
6000.00	0.63	193.26	5999.63	24.94	-0.96	24.94	24.96	357.79	0.25
6100.00	0.83	186.47	6099.62	23.69	-1.17	23.69	23.72	357.17	0.22
6200.00	0.96	198.97	6199.61	22.17	-1.53	22.17	22.22	356.06	0.23
6300.00	0.75	190.11	6299.60	20.73	-1.91	20.73	20.82	354.72	0.25
6400.00	0.84	183.41	6399.59	19.36	-2.07	19.36	19.47	353.89	0.13
6500.00	0.52	182.55	6499.58	18.18	-2.14	18.18	18.30	353.30	0.32
6600.00	0.22	191.89	6599.58	17.54	-2.20	17.54	17.67	352.86	0.31
6700.00	0.30	211.80	6699.58	17.13	-2.37	17.13	17.29	352.11	0.12
6800.00	0.24	256.32	6799.57	16.86	-2.71	16.86	17.07	350.85	0.21
6900.00	0.44	271.83	6899.57	16.82	-3.31	16.82	17.14	348.88	0.22
7000.00	0.63	265.60	6999.57	16.79	-4.24	16.79	17.32	345.82	0.20
7100.00	0.64	261.77	7099.56	16.67	-5.34	16.67	17.50	342.23	0.04
7200.00	0.56	257.50	7199.56	16.48	-6.37	16.48	17.67	338.88	0.09
7300.00	0.51	237.15	7299.55	16.13	-7.22	16.13	17.68	335.90	0.19
7400.00	0.52	221.96	7399.55	15.55	-7.90	15.55	17.44	333.07	0.14
7431.00	0.53	198.78	7430.55	15.31	-8.04	15.31	17.29	332.29	0.68



VES Survey International
West Texas
(432) 563-5444
Surveyor: Gene Heiss
SRO State Com 60H / API 30-015-41741



-W/+E

VES Survey Date: 09/22/2014



COG Operating, LLC

Eddy County, NM (NAD 27)

Sec 10, T26-S,R28-E

SRO State Com #60H

Wellbore #1

Design: Wellbore #1

DDC Survey Report

02 October, 2014

NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 08 2015

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HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well SRO State Com #60H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3008.0usft (Scandril Freedom)
Site:	Sec 10, T26-S, R28-E	MD Reference:	Well @ 3008.0usft (Scandril Freedom)
Well:	SRO State Com #60H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project	Eddy County, NM (NAD 27)		
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	Sec 10, T26-S, R28-E		
Site Position:		Northing:	384,789.90 usft
From:	Map	Easting:	582,440.20 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 3' 27.444 N
		Longitude:	104° 4' 2.015 W
		Grid Convergence:	0.14 °

Well	SRO State Com #60H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 3' 27.444 N
		Longitude:	104° 4' 2.015 W
		Ground Level:	2,982.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	9/12/2014	(°)
			7.40
			Dip Angle
			(°)
			59.87
			Field Strength
			(nT)
			48,141

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			180.50

Survey Program	Date 10/2/2014		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
100.0	7,431.0	GYRO (Wellbore #1)	Good_gyro
7,481.0	15,725.0	MWD Survey (Wellbore #1)	MWD default
			Good Gyro
			MWD - Standard

Survey			
Measured	Inclination	Azimuth	Vertical
Depth	(°)	(°)	Depth
(usft)			(usft)
			+N/-S
			(usft)
			+E/-W
			(usft)
			Vertical
			Section
			(usft)
			Dogleg
			Rate
			(°/100usft)
			Build
			Rate
			(°/100usft)
			Turn
			Rate
			(°/100usft)
0.0	0.00	0.00	0.0
100.0	0.21	279.40	100.0
200.0	0.33	280.30	200.0
300.0	0.20	274.57	300.0
400.0	0.34	281.45	400.0
			0.0
			0.0
			-0.2
			-0.1
			0.12
			0.12
			-0.13
			-5.73
			6.88
500.0	0.05	274.59	500.0
600.0	0.18	336.01	600.0
700.0	0.02	346.40	700.0
800.0	0.15	335.79	800.0
900.0	0.16	16.14	900.0
			0.3
			-1.9
			-0.3
			0.29
			-0.29
			-6.86
			61.42
			10.39
			-10.61
			40.35



HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well SRO State Com #60H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3008.0usft (Scandrill Freedom)
Site:	Sec 10, T26-S,R28-E	MD Reference:	Well @ 3008.0usft (Scandrill Freedom)
Well:	SRO State Com #60H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
1,000.0	0.19	56.46	1,000.0	1.2	-2.0	-1.2	0.12	0.03	40.32	
1,100.0	0.26	100.32	1,100.0	1.3	-1.6	-1.3	0.18	0.07	43.86	
1,200.0	0.45	125.68	1,200.0	1.0	-1.1	-1.0	0.24	0.19	25.36	
1,300.0	0.52	146.25	1,300.0	0.4	-0.5	-0.4	0.19	0.07	20.57	
1,400.0	1.10	109.36	1,400.0	-0.3	0.7	0.3	0.75	0.58	-36.89	
1,500.0	0.89	109.87	1,500.0	-0.9	2.3	0.8	0.21	-0.21	0.51	
1,600.0	0.57	87.45	1,600.0	-1.1	3.5	1.1	0.42	-0.32	-22.42	
1,700.0	0.43	67.61	1,700.0	-0.9	4.4	0.9	0.22	-0.14	-19.84	
1,800.0	0.67	62.95	1,799.9	-0.5	5.2	0.5	0.24	0.24	-4.66	
1,900.0	1.11	58.82	1,899.9	0.2	6.6	-0.3	0.44	0.44	-4.13	
2,000.0	1.12	77.77	1,999.9	0.9	8.4	-1.0	0.37	0.01	18.95	
2,100.0	0.33	86.90	2,099.9	1.2	9.6	-1.2	0.80	-0.79	9.13	
2,200.0	0.34	103.57	2,199.9	1.1	10.2	-1.2	0.10	0.01	16.67	
2,300.0	0.94	93.90	2,299.9	1.0	11.3	-1.1	0.61	0.60	-9.67	
2,400.0	1.06	90.05	2,399.9	0.9	13.0	-1.0	0.14	0.12	-3.85	
2,500.0	0.09	59.33	2,499.9	1.0	14.0	-1.1	0.98	-0.97	-30.72	
2,600.0	0.17	34.85	2,599.9	1.1	14.2	-1.3	0.10	0.08	-24.48	
2,700.0	0.63	25.70	2,699.9	1.7	14.5	-1.9	0.46	0.46	-9.15	
2,800.0	0.58	351.76	2,799.9	2.7	14.7	-2.9	0.36	-0.05	-33.94	
2,900.0	0.70	341.52	2,899.9	3.8	14.4	-3.9	0.17	0.12	-10.24	
3,000.0	0.54	349.41	2,999.9	4.9	14.1	-5.0	0.18	-0.16	7.89	
3,100.0	0.76	348.64	3,099.9	6.0	13.9	-6.1	0.22	0.22	-0.77	
3,200.0	0.71	341.76	3,199.8	7.2	13.6	-7.3	0.10	-0.05	-6.88	
3,300.0	0.96	345.99	3,299.8	8.6	13.2	-8.7	0.26	0.25	4.23	
3,400.0	0.84	347.02	3,399.8	10.1	12.8	-10.3	0.12	-0.12	1.03	
3,500.0	1.03	340.89	3,499.8	11.7	12.4	-11.8	0.21	0.19	-6.13	
3,600.0	0.83	341.29	3,599.8	13.2	11.8	-13.3	0.20	-0.20	0.40	
3,700.0	0.94	329.50	3,699.8	14.6	11.2	-14.7	0.21	0.11	-11.79	
3,800.0	0.98	332.41	3,799.8	16.1	10.4	-16.2	0.06	0.04	2.91	
3,900.0	1.11	343.53	3,899.8	17.8	9.7	-17.9	0.24	0.13	11.12	
4,000.0	1.06	338.98	3,999.7	19.6	9.1	-19.7	0.10	-0.05	-4.55	
4,100.0	1.00	341.29	4,099.7	21.3	8.5	-21.3	0.07	-0.06	2.31	
4,200.0	0.74	322.89	4,199.7	22.6	7.8	-22.7	0.38	-0.26	-18.40	
4,300.0	0.88	323.61	4,299.7	23.7	7.0	-23.8	0.14	0.14	0.72	
4,400.0	0.68	337.52	4,399.7	24.9	6.3	-25.0	0.27	-0.20	13.91	
4,500.0	0.89	322.43	4,499.7	26.1	5.6	-26.1	0.29	0.21	-15.09	
4,600.0	0.68	341.50	4,599.7	27.3	4.9	-27.3	0.33	-0.21	19.07	
4,700.0	0.47	299.17	4,699.7	28.0	4.4	-28.1	0.46	-0.21	-42.33	
4,800.0	0.20	27.67	4,799.7	28.4	4.1	-28.4	0.51	-0.27	88.50	
4,900.0	0.40	328.66	4,899.7	28.8	4.0	-28.9	0.34	0.20	-59.01	
5,000.0	0.16	299.64	4,999.7	29.2	3.7	-29.2	0.27	-0.24	-29.02	
5,100.0	0.50	305.11	5,099.7	29.5	3.2	-29.5	0.34	0.34	5.47	
5,200.0	0.26	261.75	5,199.7	29.7	2.6	-29.8	0.36	-0.24	-43.36	



HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well SRO State Com #60H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3008.0usft (Scandrill Freedom)
Site:	Sec 10, T26-S,R28-E	MD Reference:	Well @ 3008.0usft (Scandrill Freedom)
Well:	SRO State Com #60H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,300.0	0.02	242.82	5,299.7	29.7	2.4	-29.7	0.24	-0.24	-18.93	
5,400.0	0.34	228.62	5,399.7	29.5	2.2	-29.5	0.32	0.32	-14.20	
5,500.0	0.49	237.12	5,499.7	29.1	1.6	-29.1	0.16	0.15	8.50	
5,600.0	0.39	220.03	5,599.6	28.6	1.0	-28.6	0.16	-0.10	-17.09	
5,700.0	0.59	208.88	5,699.6	27.9	0.5	-27.9	0.22	0.20	-11.15	
5,800.0	0.61	203.37	5,799.6	26.9	0.1	-26.9	0.06	0.02	-5.51	
5,900.0	0.66	216.01	5,899.6	26.0	-0.5	-26.0	0.15	0.05	12.64	
6,000.0	0.63	193.26	5,999.6	25.0	-0.9	-24.9	0.26	-0.03	-22.75	
6,100.0	0.83	186.47	6,099.6	23.7	-1.2	-23.7	0.22	0.20	-6.79	
6,200.0	0.96	198.97	6,199.6	22.2	-1.5	-22.2	0.23	0.13	12.50	
6,300.0	0.75	190.11	6,299.6	20.8	-1.9	-20.7	0.25	-0.21	-8.86	
6,400.0	0.84	183.41	6,399.6	19.4	-2.0	-19.4	0.13	0.09	-6.70	
6,500.0	0.52	182.55	6,499.6	18.2	-2.1	-18.2	0.32	-0.32	-0.86	
6,600.0	0.22	191.89	6,599.6	17.6	-2.2	-17.5	0.31	-0.30	9.34	
6,700.0	0.30	211.80	6,699.6	17.1	-2.4	-17.1	0.12	0.08	19.91	
6,800.0	0.24	256.32	6,799.6	16.9	-2.7	-16.8	0.21	-0.06	44.52	
6,900.0	0.44	271.83	6,899.6	16.8	-3.3	-16.8	0.22	0.20	15.51	
7,000.0	0.63	265.60	6,999.6	16.8	-4.2	-16.8	0.20	0.19	-6.23	
7,100.0	0.64	261.77	7,099.6	16.7	-5.3	-16.6	0.04	0.01	-3.83	
7,200.0	0.56	257.50	7,199.6	16.5	-6.3	-16.4	0.09	-0.08	-4.27	
7,300.0	0.51	237.15	7,299.6	16.1	-7.2	-16.1	0.20	-0.05	-20.35	
7,400.0	0.52	221.96	7,399.5	15.6	-7.9	-15.5	0.14	0.01	-15.19	
Tie-In @ 7431' MD / 7430.5' TVD										
7,431.0	0.53	198.78	7,430.5	15.3	-8.0	-15.3	0.68	0.03	-74.77	
7,481.0	0.40	205.40	7,480.5	15.0	-8.2	-14.9	0.28	-0.26	13.24	
7,512.0	0.50	183.40	7,511.5	14.7	-8.2	-14.6	0.64	0.32	-70.97	
7,543.0	3.30	174.40	7,542.5	13.7	-8.1	-13.6	9.06	9.03	-29.03	
7,575.0	6.10	175.50	7,574.4	11.1	-7.9	-11.0	8.75	8.75	3.44	
7,607.0	9.30	176.70	7,606.1	6.8	-7.6	-6.7	10.01	10.00	3.75	
7,638.0	12.60	178.30	7,636.6	0.9	-7.4	-0.9	10.69	10.65	5.16	
7,670.0	16.00	180.80	7,667.6	-7.0	-7.3	7.0	10.80	10.63	7.81	
7,701.0	19.50	182.00	7,697.1	-16.4	-7.6	16.5	11.35	11.29	3.87	
7,733.0	23.30	182.30	7,726.9	-28.1	-8.0	28.2	11.88	11.88	0.94	
7,764.0	26.30	182.20	7,755.0	-41.1	-8.5	41.2	9.68	9.68	-0.32	
7,795.0	29.50	180.60	7,782.4	-55.6	-8.9	55.7	10.60	10.32	-5.16	
7,827.0	32.60	178.30	7,809.8	-72.1	-8.7	72.2	10.37	9.69	-7.19	
7,858.0	33.90	175.30	7,835.7	-89.0	-7.7	89.1	6.76	4.19	-9.68	
7,890.0	39.40	175.70	7,861.4	-108.1	-6.3	108.1	17.20	17.19	1.25	
7,921.0	43.20	175.80	7,884.7	-128.5	-4.7	128.5	12.26	12.26	-0.32	
7,953.0	46.70	176.40	7,907.3	-151.0	-3.2	151.1	11.02	10.94	1.88	
7,984.0	49.70	177.80	7,928.0	-174.1	-2.0	174.1	10.25	9.68	4.52	
8,016.0	51.80	178.30	7,948.2	-198.9	-1.2	198.9	6.67	6.56	1.56	
CROSSED LEASE LINE @ 8027.4' md / 7955.2' TVD										
8,027.4	52.42	178.64	7,955.2	-207.9	-1.0	207.9	5.95	5.48	2.94	



HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well SRO State Com #60H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3008.0usft (Scandril Freedom)
Site:	Sec 10, T26-S,R28-E	MD Reference:	Well @ 3008.0usft (Scandril Freedom)
Well:	SRO State Com #60H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,047.0	53.50	179.20	7,967.0	-223.5	-0.7	223.5	5.95	5.49	2.88
8,079.0	56.50	179.70	7,985.4	-249.7	-0.4	249.7	9.46	9.38	1.56
8,110.0	58.90	180.80	8,002.0	-275.9	-0.5	275.9	8.30	7.74	3.55
8,141.0	60.60	180.80	8,017.6	-302.7	-0.9	302.7	5.48	5.48	0.00
8,173.0	63.40	180.60	8,032.6	-330.9	-1.3	330.9	8.77	8.75	-0.63
8,204.0	66.70	180.80	8,045.7	-359.0	-1.6	359.0	10.66	10.65	0.65
8,236.0	69.70	180.20	8,057.6	-388.8	-1.9	388.8	9.54	9.38	-1.88
8,267.0	72.10	180.20	8,067.7	-418.0	-2.0	418.0	7.74	7.74	0.00
8,299.0	74.40	180.20	8,076.9	-448.7	-2.1	448.7	7.19	7.19	0.00
8,330.0	76.80	180.40	8,084.6	-478.7	-2.2	478.7	7.77	7.74	0.65
8,362.0	79.60	180.60	8,091.2	-510.0	-2.5	510.0	8.77	8.75	0.63
FTP/CROSSED 330' HARD LINE @ 8390.2' MD / 8095.7' TVD									
8,390.2	81.87	179.78	8,095.7	-537.9	-2.6	537.9	8.56	8.06	-2.90
8,393.0	82.10	179.70	8,096.1	-540.6	-2.6	540.6	8.56	8.07	-2.89
8,424.0	84.30	179.00	8,099.8	-571.4	-2.2	571.4	7.44	7.10	-2.26
8,519.0	88.80	180.60	8,105.5	-666.2	-1.9	666.2	5.03	4.74	1.68
8,606.0	90.00	180.40	8,106.4	-753.2	-2.7	753.2	1.40	1.38	-0.23
8,697.0	88.20	180.60	8,107.8	-844.2	-3.4	844.2	1.99	-1.98	0.22
8,788.0	89.30	180.10	8,109.8	-935.2	-4.0	935.2	1.33	1.21	-0.55
8,879.0	88.00	180.40	8,112.0	-1,026.1	-4.4	1,026.1	1.47	-1.43	0.33
8,971.0	89.00	180.90	8,114.4	-1,118.1	-5.4	1,118.1	1.22	1.09	0.54
9,062.0	87.80	179.40	8,116.9	-1,209.0	-5.7	1,209.0	2.11	-1.32	-1.65
9,153.0	88.60	179.40	8,119.8	-1,300.0	-4.7	1,300.0	0.88	0.88	0.00
9,244.0	89.80	178.80	8,121.0	-1,391.0	-3.3	1,390.9	1.47	1.32	-0.66
9,339.0	89.20	180.80	8,121.9	-1,486.0	-3.0	1,485.9	2.20	-0.63	2.11
9,434.0	87.90	180.90	8,124.3	-1,580.9	-4.4	1,580.9	1.37	-1.37	0.11
9,528.0	88.80	180.40	8,127.0	-1,674.9	-5.4	1,674.9	1.10	0.96	-0.53
9,623.0	89.30	180.60	8,128.5	-1,769.9	-6.3	1,769.8	0.57	0.53	0.21
9,717.0	88.60	181.30	8,130.3	-1,863.8	-7.8	1,863.8	1.05	-0.74	0.74
9,812.0	90.30	182.50	8,131.2	-1,958.8	-11.0	1,958.8	2.19	1.79	1.26
9,905.0	89.00	181.60	8,131.7	-2,051.7	-14.3	2,051.7	1.70	-1.40	-0.97
10,000.0	89.60	180.80	8,132.9	-2,146.7	-16.3	2,146.7	1.05	0.63	-0.84
10,095.0	88.60	181.10	8,134.4	-2,241.6	-17.9	2,241.7	1.10	-1.05	0.32
10,189.0	89.20	181.50	8,136.2	-2,335.6	-20.0	2,335.7	0.77	0.64	0.43
10,284.0	90.00	180.80	8,136.9	-2,430.6	-21.9	2,430.7	1.12	0.84	-0.74
10,379.0	88.50	179.90	8,138.1	-2,525.6	-22.5	2,525.7	1.84	-1.58	-0.95
10,473.0	89.30	180.10	8,139.9	-2,619.5	-22.5	2,619.6	0.88	0.85	0.21
10,568.0	88.90	180.60	8,141.4	-2,714.5	-23.1	2,714.6	0.67	-0.42	0.53
10,663.0	90.50	181.30	8,141.9	-2,809.5	-24.6	2,809.6	1.84	1.68	0.74
10,757.0	89.60	180.80	8,141.8	-2,903.5	-26.4	2,903.6	1.10	-0.96	-0.53
10,851.0	87.60	180.80	8,144.1	-2,997.5	-27.7	2,997.6	2.13	-2.13	0.00
10,946.0	88.60	180.60	8,147.3	-3,092.4	-28.8	3,092.5	1.07	1.05	-0.21
11,040.0	89.30	180.20	8,149.0	-3,186.4	-29.5	3,186.5	0.86	0.74	-0.43



HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well SRO State Com #60H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3008.0usft (Scandril Freedom)
Site:	Sec 10, T26-S,R28-E	MD Reference:	Well @ 3008.0usft (Scandril Freedom)
Well:	SRO State Com #60H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,135.0	87.90	180.10	8,151.3	-3,281.3	-29.7	3,281.5	1.48	-1.47	-0.11
11,229.0	88.30	179.50	8,154.4	-3,375.3	-29.4	3,375.4	0.77	0.43	-0.64
11,323.0	88.90	179.20	8,156.7	-3,469.3	-28.4	3,469.4	0.71	0.64	-0.32
11,417.0	89.00	178.50	8,158.5	-3,563.2	-26.5	3,563.3	0.75	0.11	-0.74
11,511.0	89.30	179.90	8,159.8	-3,657.2	-25.2	3,657.3	1.52	0.32	1.49
11,605.0	90.10	179.40	8,160.3	-3,751.2	-24.6	3,751.3	1.00	0.85	-0.53
11,700.0	91.10	178.80	8,159.3	-3,846.2	-23.1	3,846.2	1.23	1.05	-0.63
11,794.0	89.00	180.60	8,159.3	-3,940.2	-22.6	3,940.2	2.94	-2.23	1.91
11,888.0	89.50	180.20	8,160.5	-4,034.2	-23.3	4,034.2	0.68	0.53	-0.43
11,982.0	90.40	179.20	8,160.6	-4,128.2	-22.8	4,128.2	1.43	0.96	-1.06
12,076.0	89.70	181.10	8,160.5	-4,222.1	-23.0	4,222.2	2.15	-0.74	2.02
12,171.0	88.40	182.90	8,162.1	-4,317.1	-26.3	4,317.1	2.34	-1.37	1.89
12,265.0	88.80	182.50	8,164.4	-4,410.9	-30.7	4,411.0	0.60	0.43	-0.43
12,359.0	89.80	182.30	8,165.5	-4,504.8	-34.7	4,505.0	1.08	1.06	-0.21
12,453.0	88.70	182.50	8,166.7	-4,598.8	-38.6	4,598.9	1.19	-1.17	0.21
12,547.0	89.40	183.60	8,168.3	-4,692.6	-43.6	4,692.8	1.39	0.74	1.17
12,642.0	88.80	181.80	8,169.8	-4,787.5	-48.1	4,787.7	2.00	-0.63	-1.89
12,736.0	88.60	180.10	8,171.9	-4,881.4	-49.7	4,881.7	1.82	-0.21	-1.81
12,830.0	89.40	179.40	8,173.6	-4,975.4	-49.2	4,975.7	1.13	0.85	-0.74
12,924.0	90.50	178.80	8,173.6	-5,069.4	-47.8	5,069.6	1.33	1.17	-0.64
13,018.0	90.80	181.30	8,172.6	-5,163.4	-47.8	5,163.6	2.68	0.32	2.66
13,113.0	89.90	180.60	8,172.0	-5,258.4	-49.4	5,258.6	1.20	-0.95	-0.74
13,207.0	89.40	179.00	8,172.6	-5,352.4	-49.1	5,352.6	1.78	-0.53	-1.70
13,301.0	90.20	179.00	8,172.9	-5,446.4	-47.5	5,446.6	0.85	0.85	0.00
13,395.0	89.20	179.70	8,173.4	-5,540.4	-46.4	5,540.6	1.30	-1.06	0.74
13,490.0	87.10	179.70	8,176.5	-5,635.3	-45.9	5,635.5	2.21	-2.21	0.00
13,583.0	87.80	179.70	8,180.6	-5,728.2	-45.4	5,728.4	0.75	0.75	0.00
13,677.0	88.40	179.20	8,183.7	-5,822.1	-44.5	5,822.3	0.83	0.64	-0.53
13,771.0	89.20	178.60	8,185.7	-5,916.1	-42.7	5,916.3	1.06	0.85	-0.64
13,866.0	89.70	178.60	8,186.6	-6,011.1	-40.4	6,011.2	0.53	0.53	0.00
13,960.0	90.30	178.80	8,186.6	-6,105.1	-38.2	6,105.2	0.67	0.64	0.21
14,054.0	90.40	180.80	8,186.0	-6,199.0	-37.9	6,199.1	2.13	0.11	2.13
14,149.0	89.60	181.50	8,186.0	-6,294.0	-39.8	6,294.1	1.12	-0.84	0.74
14,243.0	88.50	180.20	8,187.6	-6,388.0	-41.2	6,388.1	1.81	-1.17	-1.38
14,337.0	90.00	180.20	8,188.8	-6,482.0	-41.5	6,482.1	1.60	1.60	0.00
14,431.0	90.40	181.30	8,188.5	-6,576.0	-42.8	6,576.1	1.25	0.43	1.17
14,525.0	91.40	181.50	8,187.0	-6,669.9	-45.1	6,670.1	1.08	1.06	0.21
14,619.0	93.30	181.50	8,183.2	-6,763.8	-47.5	6,764.0	2.02	2.02	0.00
14,713.0	92.30	181.50	8,178.6	-6,857.7	-50.0	6,857.8	1.06	-1.06	0.00
14,807.0	91.60	181.60	8,175.4	-6,951.6	-52.5	6,951.8	0.75	-0.74	0.11
14,901.0	89.30	181.60	8,174.6	-7,045.5	-55.2	7,045.8	2.45	-2.45	0.00
14,995.0	87.80	180.20	8,177.0	-7,139.5	-56.6	7,139.7	2.18	-1.60	-1.49
15,088.0	89.00	179.50	8,179.6	-7,232.5	-56.4	7,232.7	1.49	1.29	-0.75



HP
Survey Report



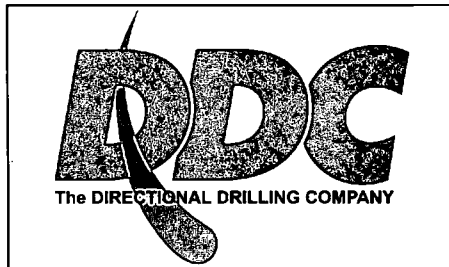
Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well SRO State Com #60H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3008.0usft (Scandriil Freedom)
Site:	Sec 10, T26-S,R28-E	MD Reference:	Well @ 3008.0usft (Scandriil Freedom)
Well:	SRO State Com #60H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,183.0	88.60	180.40	8,181.6	-7,327.4	-56.3	7,327.6	1.04	-0.42	0.95
15,277.0	87.90	181.50	8,184.5	-7,421.4	-57.9	7,421.6	1.39	-0.74	1.17
15,371.0	89.40	181.50	8,186.7	-7,515.3	-60.3	7,515.6	1.60	1.60	0.00
15,466.0	87.40	182.20	8,189.3	-7,610.2	-63.4	7,610.5	2.23	-2.11	0.74
15,560.0	87.10	182.90	8,193.8	-7,704.0	-67.6	7,704.3	0.81	-0.32	0.74
15,654.0	87.80	182.30	8,198.0	-7,797.8	-71.8	7,798.2	0.98	0.74	-0.64
15,679.0	88.00	182.50	8,198.9	-7,822.8	-72.9	7,823.1	1.13	0.80	0.80
TD @ 15725' MD / 8200.5' TVD									
15,725.0	88.00	182.50	8,200.5	-7,868.7	-74.9	7,869.1	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,431.0	7,430.5	15.3	-8.0	Tie-In @ 7431' MD / 7430.5' TVD
8,027.4	7,955.2	-207.9	-1.0	CROSSED LEASE LINE @ 8027.4' md / 7955.2' TVD
8,390.2	8,095.7	-537.9	-2.6	FTP/CROSSED 330' HARD LINE @ 8390.2' MD / 8095.7' TVD
15,725.0	8,200.5	-7,868.7	-74.9	TD @ 15725' MD / 8200.5' TVD

Checked By: _____ Approved By: _____ Date: _____

SRO State Com #60H
Eddy County, NM (NAD 27)
Quote 140992 & WT-140935
Design #2 - Tie into Gyro



Correction: 7.26°

Magnetic Field
Strength: 48141.3nT
Dip Angle: 59.87°
Date: 9/12/2014
Model: IGRF2010

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

		Ground Level:		2982.0	
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	384789.90	582440.20	32° 3' 27.444 N	104° 4' 2.015 W

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL SRO State Com #60H	8205.0	-7892.0	-68.6	376897.90	582371.60	32° 2' 9.342 N	104° 4' 3.038 W
- plan hits target center							

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure	Annotation
7437.0	0.53	198.78	7430.5	16.3	-8.0	-16.3	73.3	Tie-In @ 7431' MD / 7430.5' TVD
8021.4	0.42	176.64	7956.2	-207.9	-1.0	207.9	286.9	CROSSED LEASE LINE @ 8027.4' md / 7956.2' TVD
8390.2	81.87	179.78	8096.7	-537.9	-2.6	537.9	626.9	FTPCROSSED 330' HARD LINE @ 8390.2' MD / 8095.7' TVD
16726.0	88.00	162.60	8205.5	-7868.7	-74.9	7869.1	7959.4	TD @ 15725' MD / 8200.5' TVD

