



NM OIL CONSERVATION

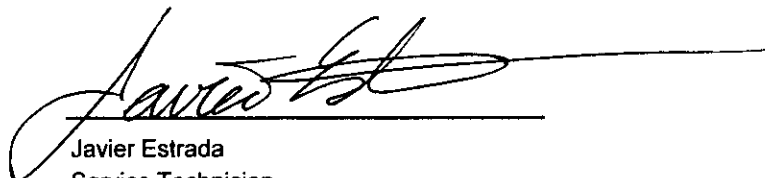
ARTESIA DISTRICT

MAR 14 2016

RECEIVED

30-015-41617

I Javier Estrada certify that I am employed by VES Survey International. That I did on the day(s) of 12/23/15 through 12/23/15 conduct or supervise the taking of a Rate Gyro survey from a depth of 0 feet to a depth of 1,029.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of Cog Operating LLC for the Sam Adams 12 Fed Com No Well # O 13 H API # 30-015-41617 in Eddy County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services


Javier Estrada
Service Technician
Vaughn Energy Services



January 4, 2016

NM OIL CONSERVATION
ARTESIA DISTRICT
MAR 14 2016

RECEIVED

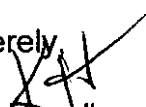
Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: **Sam Adams 12 Federal Com No 013H**

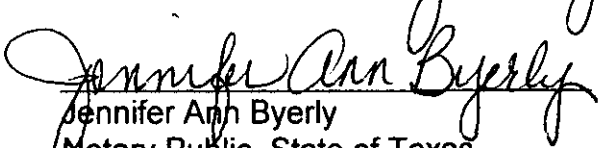
Please find enclosed a copy of the survey from 0' to 1029' ran on the above referenced well.

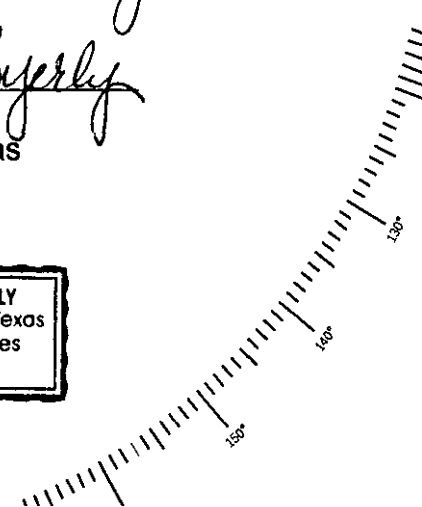
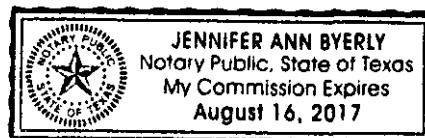
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

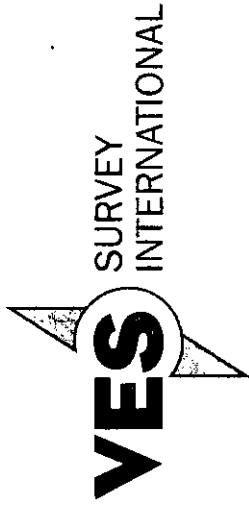
This instrument was acknowledged before me on the 4 day of January,
A.D., 2015, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: Cog Operating LLC
Lease/Well: Sam Adams 12 Federal Com No/013H



Rig Name: Silver Oak 3
State/County: New Mexico /Eddy
VS-Azi: 0.00 Degrees
Latitude: 32.85166, Longitude: -104.03559
Grid North = True North -0.16 degs (NAD 27)
Grid Correction Applied = -0.16 degs

Depth Reference : R.K.B=18 FT

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: sam adams 12 fed com 13h.ut
Minimum Curvature Method
Report Date/Time: 1/4/2016 / 08:17

VES Survey International
Midland, Texas
432-563-5444

Surveyor: Javier Estrada

Sam Adams 12 Federal Com No 013H / API 30-015-41617

NM OIL CONSERVATION

ARTESIA DISTRICT

MAR 14 2016

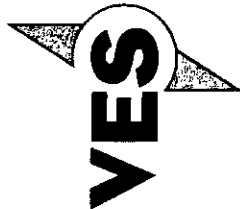
RECEIVED

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	0.32	34.29	100.00	0.23	0.16	0.23	0.28	34.29	0.32
200.00	0.46	38.88	200.00	0.77	0.56	0.77	0.95	36.23	0.15
300.00	0.12	40.21	300.00	1.17	0.89	1.17	1.47	37.26	0.34
400.00	0.56	41.16	399.99	1.62	1.28	1.62	2.06	38.34	0.44
500.00	0.83	56.70	499.99	2.38	2.21	2.38	3.25	42.80	0.33
600.00	0.63	63.85	599.98	3.02	3.31	3.02	4.48	47.55	0.22
700.00	1.25	79.59	699.96	3.46	4.87	3.46	5.97	54.58	0.67
800.00	1.53	71.86	799.93	4.08	7.21	4.08	8.28	60.52	0.34
900.00	1.78	77.54	899.89	4.83	9.99	4.83	11.10	64.22	0.30
1000.00	1.51	77.91	999.85	5.44	12.80	5.44	13.90	66.98	0.27
1029.00	1.71	78.84	1028.84	5.60	13.59	5.60	14.70	67.61	0.69

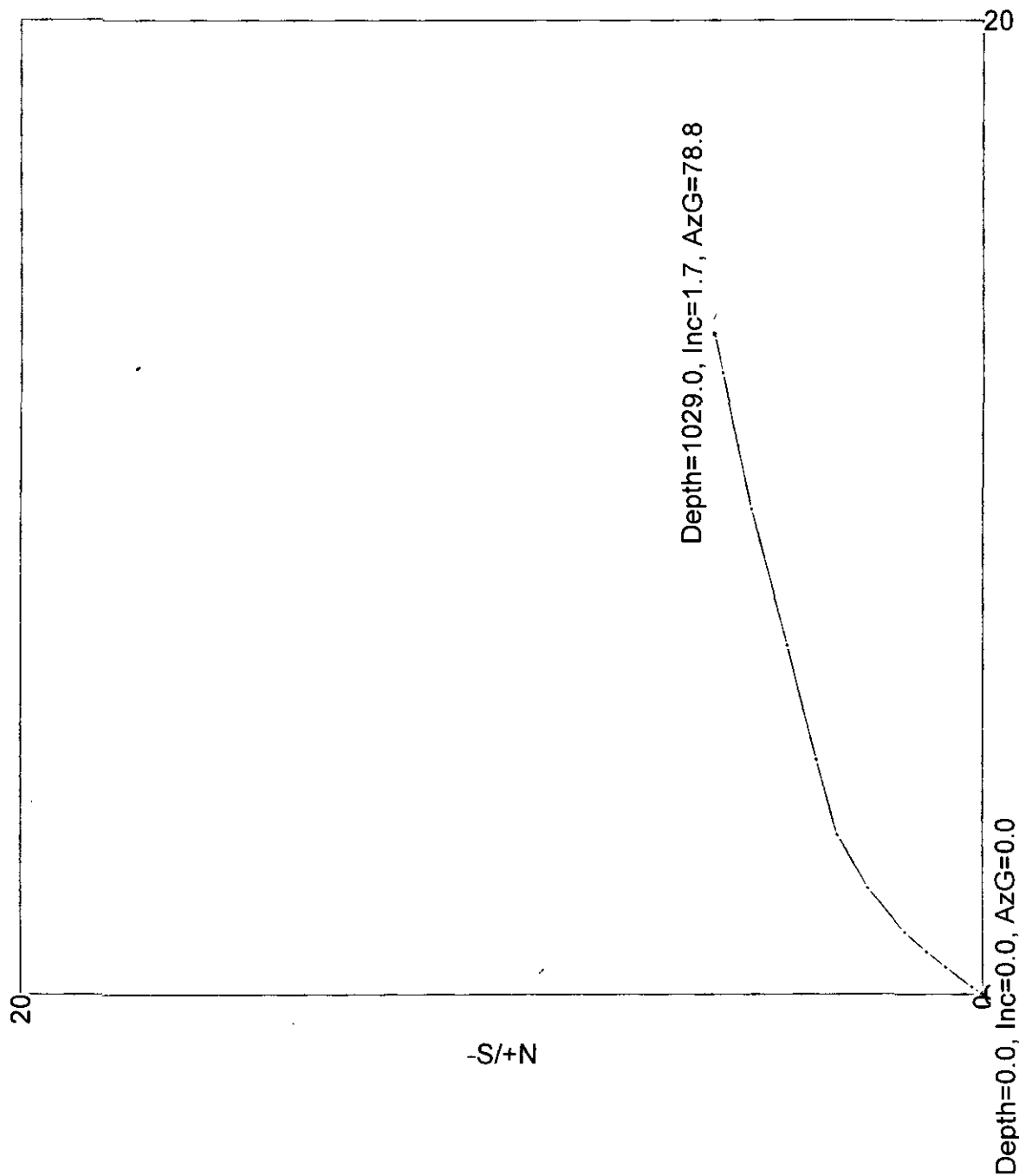


VES Survey International
Midland, Texas
432-563-5444

Surveyor: Javier Estrada
Sam Adams 12 Federal Com No 013H / API 30-015-41617



SURVEY
INTERNATIONAL



-W/+E

V.E.S. Survey Date: 12/22/2015



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

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 14 2016

RECEIVED

January 8, 2016

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

RE: Sam Adams 12 Federal Com 13H
1650' FNL & 230' FWL
Sec. 12, T17S, R29E
Eddy County, New Mexico

Dear Sir,

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

Very truly yours,

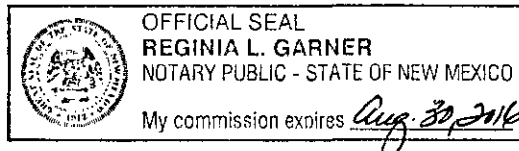
A handwritten signature in cursive script, appearing to read "Chris Graham".

Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 8th day of January, 2016.

A handwritten signature in cursive script, appearing to read "Regina L. Garner".

Notary Public

Sam Adams 12 Fed Com 13H

Date	Depth	Deviation	Direction
12/21/2015	239	0.50	
12/22/2015	473	0.30	
12/22/2015	713	1.30	
12/22/2015	839	1.80	
12/23/2015	1033	1.80	
12/24/2015	1122	1.20	95.50
12/24/2015	1217	0.90	229.30
12/24/2015	1311	2.70	267.30
12/26/2015	1405	4.60	266.10
12/26/2015	1500	6.40	266.10
12/26/2015	1594	6.30	269.20
12/26/2015	1689	5.80	271.50
12/26/2015	1783	5.30	272.20
12/26/2015	1877	4.90	272.50
12/26/2015	1972	5.60	261.90
12/26/2015	2066	5.70	261.70
12/26/2015	2160	5.30	263.00
12/26/2015	2254	5.70	263.40
12/26/2015	2349	5.50	264.70
12/26/2015	2443	5.20	264.80
12/26/2015	2538	6.50	261.80
12/27/2015	2632	7.00	261.60
12/27/2015	2726	6.50	261.70
12/27/2015	2921	5.90	260.80
12/27/2015	3010	5.50	264.00
12/27/2015	3119	5.20	267.40
12/27/2015	3293	5.40	268.30
12/30/2015	3388	5.40	256.20
12/30/2015	3482	5.40	254.50
12/30/2015	3577	3.90	248.80
12/30/2015	3671	2.10	222.90
12/30/2015	3703	1.80	214.90
12/30/2015	3734	1.10	187.70
12/31/2015	3829	7.30	86.50
12/31/2015	3860	10.30	82.90
12/31/2015	3892	13.50	81.00
12/31/2015	3923	17.00	81.20
12/31/2015	3955	20.40	81.90
12/31/2015	3955	2.00	106.60
12/31/2015	3986	23.60	82.00
12/31/2015	3997	4.40	106.60
12/31/2015	4018	27.30	83.90

12/31/2015	4050	31.00	86.70
12/31/2015	4081	34.70	88.50
12/31/2015	4113	37.20	90.40
12/31/2015	4144	39.70	90.50
12/31/2015	4176	42.20	89.00
12/31/2015	4207	45.80	88.00
12/31/2015	4239	49.10	87.90
12/31/2015	4270	53.00	88.90
12/31/2015	4302	54.20	91.00
12/31/2015	4365	57.30	93.30
12/31/2015	4396	59.10	93.40
12/31/2015	4428	61.40	93.40
12/31/2015	4459	66.10	93.60
12/31/2015	4491	69.90	93.10
12/31/2015	4522	73.60	92.50
12/31/2015	4554	76.30	92.30
12/31/2015	4585	79.30	91.10
12/31/2015	4617	82.20	89.30
1/1/2016	4648	84.00	88.80
1/1/2016	4679	85.50	88.40
1/1/2016	4711	88.50	89.10
1/1/2016	4806	1.30	89.80
1/1/2016	4900	90.10	91.20
1/1/2016	4995	90.10	90.10
1/1/2016	5090	89.90	89.90
1/1/2016	5184	91.30	89.70
1/1/2016	5279	90.60	89.00
1/1/2016	5373	92.00	88.60
1/1/2016	5468	91.10	89.90
1/1/2016	5562	91.00	91.70
1/1/2016	5657	90.30	91.60
1/1/2016	5751	89.90	90.90
1/2/2016	5845	91.00	89.70
1/2/2016	5972	91.20	89.40
1/2/2016	6035	90.50	89.20
1/2/2016	6129	90.70	89.70
1/2/2016	6223	90.30	89.90
1/2/2016	6318	90.80	89.70
1/2/2016	6449	92.60	88.80
1/3/2016	6544	91.30	89.10
1/3/2016	6638	90.90	90.00
1/3/2016	6827	90.40	90.30
1/3/2016	6921	90.30	90.90
1/3/2016	7016	90.20	91.30
1/3/2016	7110	90.40	91.20
1/3/2016	7205	90.40	91.50
1/3/2016	7299	91.40	91.40

1/3/2016	7393	92.00	90.80
1/3/2016	7488	91.80	90.20
1/4/2016	7577	90.90	89.30
1/4/2016	7671	91.90	88.80
1/4/2016	7766	91.70	88.80
1/4/2016	7860	91.20	89.10
1/4/2016	7954	90.70	89.30
1/4/2016	8049	90.40	89.70
1/4/2016	8143	91.60	89.70
1/4/2016	8237	90.90	89.20
1/4/2016	8332	90.00	88.90
1/5/2016	8426	89.20	89.60
1/5/2016	8521	90.10	89.00
1/5/2016	8615	90.20	89.20
1/5/2016	8709	91.30	89.50
1/5/2016	8804	92.90	90.00
1/5/2016	8898	92.30	90.40

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 14 2016

RECEIVED



2/2/16

State of New Mexico
County of Eddy

I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 12/24/2015 through 01/05/2016 conduct or supervise the taking of a MWD survey from a depth of 1122 feet to a depth of 8967 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Terra Directional Services LLC; that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating LLC for the Sam Adams 12 Federal Com #13H Well API 30-015-41617 in Eddy County, New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Terra Directional Services LLC.

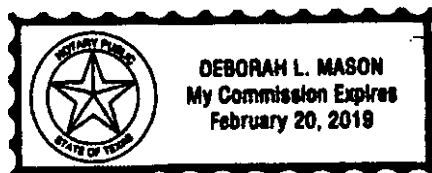
A handwritten signature of Donald D. Mason in black ink, written over a horizontal line.

Donald D. Mason
President

State of Texas

County of Burnet

Before me, a notary public, on this day personally appeared Donald D. Mason, known to me to be the person whose name is subscribed to the foregoing document and, being by me first duly sworn, declared that the statements therein contained are true and correct.



A handwritten signature of Deborah L. Mason in black ink, written over a horizontal line.

Notary Public's Signature



NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 14 2016

RECEIVED

COG Operating LLC

Eddy County, NM (NAD-27 2015)

Sam Adams 12 Federal Com #13H

SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E

PP: 1670.4' FNL, 330' FWL, Sec 12, T17S, R29E, Unit E

30-015-41617

BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H

Design: BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H

Standard Survey Report

02 February, 2016





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3670.00usft (Silver Oak 3)
Site:	Sam Adams 12 Federal Com #13H	MD Reference:	KB @ 3670.00usft (Silver Oak 3)
Well:	SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E	North Reference:	Grid
Wellbore:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Database:	EDM 5000.1 Single User Db

Project	Eddy County, NM (NAD-27 2015)		
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	Sam Adams 12 Federal Com #13H		
Site Position:		Northing:	673,673.20 usft
From:	Map	Easting:	591,436.30 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 51' 5.968 N
		Longitude:	104° 2' 8.117 W
		Grid Convergence:	0.16 °

Well	SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 51' 5.968 N
		Longitude:	104° 2' 8.117 W
		Ground Level:	3,652.00 usft

Wellbore	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2015	12/10/2015	7.38
			Dip Angle
			(°)
			Field Strength
			(nT)
			48,416

Design	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H		
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
			(°)
			90.22

Survey Program	Date 1/6/2016		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	1,029.00	VES Gyro #1 (BHL: 1670' FNL, 350' FEL,	VES-ISCWSA-GYRO-3
1,122.00	8,967.00	TDS MWD #2 (BHL: 1670' FNL, 350' FEL,	MWD
			Description
			Biaxial Semi-Cont. Gyro
			MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.32	34.29	100.00	0.23	0.16	0.16	0.32	0.32	0.00	
200.00	0.46	38.88	200.00	0.77	0.57	0.56	0.14	0.14	4.59	
300.00	0.12	40.21	300.00	1.17	0.89	0.88	0.34	-0.34	1.33	
400.00	0.56	41.16	399.99	1.61	1.28	1.27	0.44	0.44	0.95	
500.00	0.83	56.70	499.99	2.38	2.20	2.19	0.33	0.27	15.54	
600.00	0.63	63.85	599.98	3.02	3.30	3.29	0.22	-0.20	7.15	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3670.00usft (Silver Oak 3)
Site:	Sam Adams 12 Federal Com #13H	MD Reference:	KB @ 3670.00usft (Silver Oak 3)
Well:	SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E	North Reference:	Grid
Wellbore:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Database:	EDM 5000.1 Single User Db

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)
700.00	1.25	79.59	699.96	3.46	4.87	4.85	0.67	0.62	15.74
800.00	1.53	71.86	799.93	4.07	7.21	7.19	0.34	0.28	-7.73
900.00	1.78	77.54	899.89	4.82	9.99	9.98	0.30	0.25	5.68
1,000.00	1.51	77.91	999.85	5.43	12.80	12.78	0.27	-0.27	0.37
1,029.00	1.71	78.84	1,028.84	5.60	13.60	13.58	0.70	0.69	3.21
Tie-In to VES Gyro									
1,122.00	1.20	95.50	1,121.81	5.77	15.93	15.91	0.71	-0.55	17.91
First TDS MWD Survey									
1,217.00	0.90	229.30	1,216.80	5.19	16.35	16.33	2.04	-0.32	140.84
1,311.00	2.70	267.30	1,310.76	4.61	13.58	13.56	2.20	1.91	40.43
1,405.00	4.60	266.10	1,404.56	4.24	7.61	7.59	2.02	2.02	-1.28
1,500.00	6.40	266.10	1,499.12	3.63	-1.48	-1.49	1.89	1.89	0.00
1,594.00	6.30	269.20	1,592.54	3.20	-11.86	-11.87	0.38	-0.11	3.30
1,689.00	5.80	271.50	1,687.01	3.25	-21.87	-21.88	0.58	-0.53	2.42
1,783.00	5.30	272.20	1,780.57	3.54	-30.96	-30.97	0.54	-0.53	0.74
1,877.00	4.90	272.50	1,874.20	3.88	-39.31	-39.32	0.43	-0.43	0.32
1,972.00	5.60	261.90	1,968.80	3.41	-47.95	-47.96	1.26	0.74	-11.16
2,066.00	5.70	261.70	2,062.35	2.09	-57.11	-57.12	0.11	0.11	-0.21
2,160.00	5.30	263.00	2,155.91	0.88	-66.04	-66.04	0.45	-0.43	1.38
2,254.00	5.70	263.40	2,249.48	-0.18	-74.98	-74.98	0.43	0.43	0.43
2,349.00	5.50	264.70	2,344.03	-1.15	-84.20	-84.20	0.25	-0.21	1.37
2,443.00	5.20	264.80	2,437.62	-1.95	-92.93	-92.92	0.32	-0.32	0.11
2,538.00	6.50	261.80	2,532.12	-3.10	-102.54	-102.53	1.41	1.37	-3.16
2,632.00	7.00	261.60	2,625.47	-4.70	-113.47	-113.45	0.53	0.53	-0.21
2,726.00	6.50	261.70	2,718.82	-6.30	-124.40	-124.38	0.53	-0.53	0.11
2,821.00	5.90	260.80	2,813.26	-7.86	-134.54	-134.51	0.64	-0.63	-0.95
2,915.00	6.10	262.40	2,906.75	-9.29	-144.26	-144.23	0.28	0.21	1.70
3,010.00	5.50	264.00	3,001.26	-10.44	-153.79	-153.75	0.65	-0.63	1.68
3,104.00	5.20	265.40	3,094.85	-11.25	-162.52	-162.48	0.35	-0.32	1.49
3,199.00	5.20	267.40	3,189.46	-11.79	-171.11	-171.07	0.19	0.00	2.11
3,293.00	5.40	268.50	3,283.06	-12.10	-179.79	-179.74	0.24	0.21	1.17
3,388.00	5.40	256.20	3,377.64	-13.28	-188.60	-188.55	1.22	0.00	-12.95
3,482.00	5.40	254.50	3,471.22	-15.52	-197.16	-197.10	0.17	0.00	-1.81
3,577.00	3.90	248.80	3,565.91	-17.88	-204.48	-204.41	1.65	-1.58	-6.00
3,671.00	2.10	222.90	3,659.78	-20.30	-208.63	-208.55	2.35	-1.91	-27.55
3,703.00	1.80	214.90	3,691.76	-21.14	-209.32	-209.23	1.26	-0.94	-25.00
3,734.00	1.10	187.70	3,722.75	-21.84	-209.64	-209.55	3.11	-2.26	-87.74
3,766.00	2.00	106.60	3,754.74	-22.30	-209.14	-209.05	6.65	2.81	-253.44
3,797.00	4.40	92.90	3,785.69	-22.52	-207.44	-207.35	8.07	7.74	-44.19
3,829.00	7.30	86.50	3,817.52	-22.45	-204.18	-204.09	9.28	9.06	-20.00
3,860.00	10.30	82.90	3,848.15	-21.99	-199.46	-199.38	9.83	9.68	-11.61



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3670.00usft (Silver Oak 3)
Site:	Sam Adams 12 Federal Com #13H	MD Reference:	KB @ 3670.00usft (Silver Oak 3)
Well:	SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E	North Reference:	Grid
Wellbore:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Database:	EDM 5000.1 Single User Db

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)
3,892.00	13.50	81.00	3,879.46	-21.05	-192.93	-192.85	10.07	10.00	-5.94
3,923.00	17.00	81.20	3,909.37	-19.79	-184.88	-184.80	11.29	11.29	0.65
3,955.00	20.40	81.90	3,939.67	-18.29	-174.73	-174.66	10.65	10.63	2.19
3,986.00	23.60	82.00	3,968.41	-16.67	-163.23	-163.17	10.32	10.32	0.32
4,018.00	27.30	83.90	3,997.30	-14.99	-149.59	-149.53	11.84	11.56	5.94
4,049.00	31.00	86.70	4,024.37	-13.78	-134.54	-134.49	12.72	11.94	9.03
4,081.00	34.70	88.50	4,051.25	-13.07	-117.21	-117.15	11.96	11.56	5.63
4,113.00	37.20	90.40	4,077.15	-12.89	-98.42	-98.37	8.55	7.81	5.94
4,144.00	39.70	90.50	4,101.43	-13.05	-79.15	-79.10	8.07	8.06	0.32
4,176.00	42.20	89.00	4,125.60	-12.95	-58.18	-58.13	8.39	7.81	-4.69
4,207.00	45.80	88.00	4,147.89	-12.38	-36.66	-36.61	11.83	11.61	-3.23
4,239.00	49.10	87.90	4,169.53	-11.53	-13.10	-13.06	10.32	10.31	-0.31
4,270.00	52.00	88.90	4,189.23	-10.87	10.82	10.87	9.68	9.35	3.23
4,302.00	54.20	91.00	4,208.44	-10.86	36.41	36.45	8.65	6.88	6.56
4,333.00	55.80	92.40	4,226.22	-11.61	61.79	61.84	6.35	5.16	4.52
4,365.00	57.30	93.30	4,243.86	-12.94	88.46	88.51	5.24	4.69	2.81
4,396.00	59.10	93.40	4,260.19	-14.48	114.76	114.81	5.81	5.81	0.32
4,428.00	61.40	93.40	4,276.07	-16.13	142.49	142.55	7.19	7.19	0.00
4,459.00	66.10	93.60	4,289.78	-17.83	170.23	170.30	15.17	15.16	0.65
4,491.00	69.90	93.10	4,301.76	-19.56	199.85	199.92	11.96	11.88	-1.56
4,522.00	73.60	92.50	4,311.47	-20.99	229.25	229.33	12.08	11.94	-1.94
4,554.00	76.30	92.30	4,319.78	-22.29	260.12	260.20	8.46	8.44	-0.63
4,585.00	79.30	91.10	4,326.33	-23.18	290.40	290.49	10.39	9.68	-3.87
4,617.00	82.20	89.30	4,331.47	-23.29	321.98	322.07	10.63	9.06	-5.63
4,648.00	84.00	88.80	4,335.20	-22.78	352.75	352.84	6.02	5.81	-1.61
4,679.00	85.50	88.40	4,338.03	-22.03	383.61	383.69	5.01	4.84	-1.29
4,711.00	88.50	89.10	4,339.71	-21.33	415.55	415.63	9.63	9.38	2.19
4,742.00	90.40	89.00	4,340.01	-20.82	446.55	446.62	6.14	6.13	-0.32
4,806.00	91.30	89.80	4,339.06	-20.15	510.54	510.61	1.88	1.41	1.25
4,900.00	90.10	91.20	4,337.91	-20.97	604.52	604.60	1.96	-1.28	1.49
4,995.00	90.10	90.10	4,337.74	-22.05	699.51	699.59	1.16	0.00	-1.16
5,090.00	89.90	89.90	4,337.74	-22.05	794.51	794.59	0.30	-0.21	-0.21
5,184.00	91.30	89.70	4,336.76	-21.72	888.51	888.58	1.50	1.49	-0.21
5,279.00	90.60	89.00	4,335.18	-20.64	983.48	983.56	1.04	-0.74	-0.74
5,373.00	92.00	88.60	4,333.05	-18.67	1,077.44	1,077.50	1.55	1.49	-0.43
5,468.00	91.10	89.90	4,330.48	-17.43	1,172.39	1,172.45	1.66	-0.95	1.37
5,562.00	91.00	91.70	4,328.76	-18.74	1,266.36	1,266.43	1.92	-0.11	1.91
5,657.00	90.30	91.60	4,327.68	-21.48	1,361.32	1,361.39	0.74	-0.74	-0.11
5,751.00	89.90	90.90	4,327.52	-23.53	1,455.29	1,455.37	0.86	-0.43	-0.74
5,845.00	91.00	89.70	4,326.78	-24.02	1,549.29	1,549.37	1.73	1.17	-1.28
5,940.00	91.20	89.40	4,324.95	-23.27	1,644.27	1,644.34	0.38	0.21	-0.32



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3670.00usft (Silver Oak 3)
Site:	Sam Adams 12 Federal Com #13H	MD Reference:	KB @ 3670.00usft (Silver Oak 3)
Well:	SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E	North Reference:	Grid
Wellbore:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Database:	EDM 5000.1 Single User Db

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)
6,035.00	90.50	89.20	4,323.54	-22.11	1,739.25	1,739.32	0.77	-0.74	-0.21
6,129.00	90.70	89.70	4,322.56	-21.21	1,833.24	1,833.31	0.57	0.21	0.53
6,223.00	90.30	89.90	4,321.74	-20.88	1,927.23	1,927.30	0.48	-0.43	0.21
6,318.00	90.80	89.70	4,320.83	-20.55	2,022.23	2,022.29	0.57	0.53	-0.21
6,381.00	91.90	89.30	4,319.34	-20.00	2,085.21	2,085.27	1.86	1.75	-0.63
6,449.00	92.60	88.80	4,316.67	-18.87	2,153.14	2,153.20	1.26	1.03	-0.74
6,544.00	91.30	89.10	4,313.44	-17.13	2,248.07	2,248.12	1.40	-1.37	0.32
6,638.00	90.90	89.60	4,311.64	-16.07	2,342.05	2,342.09	0.68	-0.43	0.53
6,733.00	90.80	90.00	4,310.23	-15.74	2,437.04	2,437.08	0.43	-0.11	0.42
6,827.00	90.40	90.30	4,309.24	-15.98	2,531.03	2,531.07	0.53	-0.43	0.32
6,921.00	90.30	90.90	4,308.67	-16.97	2,625.02	2,625.07	0.65	-0.11	0.64
7,016.00	90.20	91.30	4,308.25	-18.79	2,720.00	2,720.06	0.43	-0.11	0.42
7,110.00	90.40	91.20	4,307.76	-20.84	2,813.98	2,814.04	0.24	0.21	-0.11
7,205.00	90.40	91.50	4,307.10	-23.08	2,908.95	2,909.02	0.32	0.00	0.32
7,299.00	91.40	91.40	4,305.62	-25.46	3,002.91	3,002.98	1.07	1.06	-0.11
7,393.00	92.00	90.80	4,302.83	-27.26	3,096.85	3,096.93	0.90	0.64	-0.64
7,488.00	91.80	90.20	4,299.68	-28.09	3,191.79	3,191.88	0.67	-0.21	-0.63
7,577.00	90.90	89.30	4,297.59	-27.70	3,280.77	3,280.85	1.43	-1.01	-1.01
7,671.00	91.90	88.80	4,295.29	-26.14	3,374.72	3,374.80	1.19	1.06	-0.53
7,766.00	91.70	88.80	4,292.31	-24.16	3,469.66	3,469.72	0.21	-0.21	0.00
7,860.00	91.20	89.10	4,289.93	-22.43	3,563.61	3,563.67	0.62	-0.53	0.32
7,954.00	90.70	89.30	4,288.37	-21.12	3,657.59	3,657.64	0.57	-0.53	0.21
8,049.00	90.40	89.70	4,287.46	-20.29	3,752.58	3,752.63	0.53	-0.32	0.42
8,143.00	91.60	89.70	4,285.82	-19.80	3,846.56	3,846.61	1.28	1.28	0.00
8,237.00	90.90	89.20	4,283.77	-18.90	3,940.53	3,940.58	0.92	-0.74	-0.53
8,332.00	90.00	88.90	4,283.02	-17.32	4,035.52	4,035.55	1.00	-0.95	-0.32
8,426.00	89.20	89.60	4,283.68	-16.09	4,129.50	4,129.54	1.13	-0.85	0.74
8,521.00	90.10	89.00	4,284.26	-14.93	4,224.49	4,224.52	1.14	0.95	-0.63
8,615.00	90.20	89.20	4,284.01	-13.46	4,318.48	4,318.50	0.24	0.11	0.21
8,709.00	91.30	89.50	4,282.78	-12.39	4,412.47	4,412.48	1.21	1.17	0.32
8,804.00	92.90	90.00	4,279.30	-11.98	4,507.40	4,507.41	1.76	1.68	0.53
8,898.00	92.30	90.40	4,275.04	-12.30	4,601.30	4,601.31	0.77	-0.64	0.43
Final MWD Survey									
8,967.00	92.30	90.40	4,272.27	-12.78	4,670.24	4,670.26	0.00	0.00	0.00
Projection to Bit/TD									



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well: SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3670.00usft (Silver Oak 3)
Site:	Sam Adams 12 Federal Com #13H	MD Reference:	KB @ 3670.00usft (Silver Oak 3)
Well:	SHL: 1650' FNL, 230' FWL, Sec 12, T17S, R29E, Unit E	North Reference:	Grid
Wellbore:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 1670' FNL, 350' FEL, Sec 12, T17S, R29E, Unit H	Database:	EDM 5000.1 Single User Db

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,028.00	1,028.84	5.80	13.60	Tie-In to VES Gyro
1,122.00	1,121.81	5.77	15.93	First TDS MWD Survey
8,898.00	4,275.04	-12.30	4,601.30	Final MWD Survey
8,967.00	4,272.27	-12.78	4,670.24	Projection to Bit/TD

Checked By: Deborah L. Mason Approved By: [Signature] Date: 2/2/16

