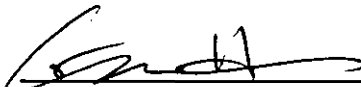




30-015-42895

I Gene Heiss certify that I am employed by VES Survey International. That I did on the day(s) of 12/11/15 through 12/11/15 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 877.00 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 Concho for the Bose Ikard 4 State Com No Well # 015H API # 30-015-43033 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


Gene Heiss
Service Technician
Vaughn Energy Services

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 09 2016

RECEIVED



December 21, 2015

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 09 2016

RECEIVED

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

Attn: Kanicia Castillo

RE: **Bose Ikard 4 State Com No 015H**

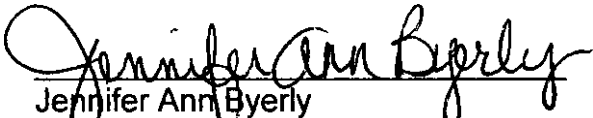
Please find enclosed a copy of the survey from 0' to 877' ran on the above referenced well.

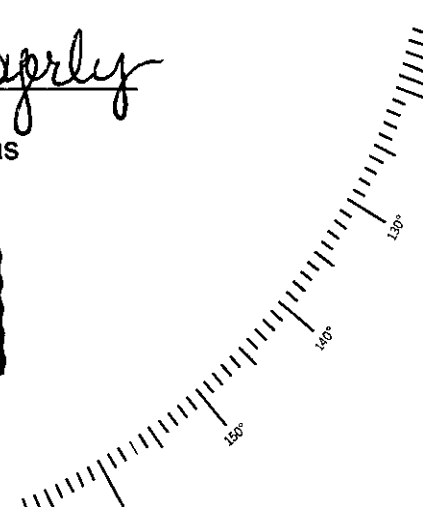
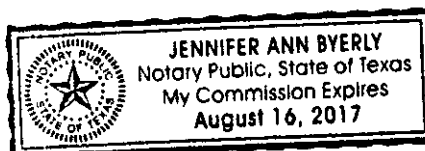
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 21 day of December A.D., 2015, by Keith Havelka.

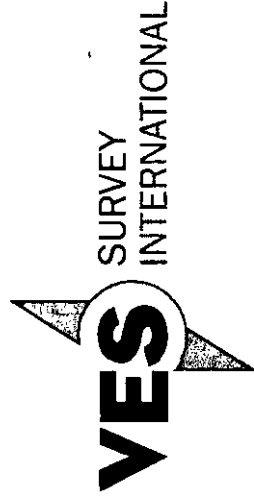

Jennifer Ann Byerly
Notary Public, State of Texas





Company: Concho

Lease/Well: Bose Ikard 4 State Com No/015H



Rig Name: Silveroak 3

State/County: New Mexico/Eddy

VS-Azi: 0.00 Degrees

Latitude: 32.86210, Longitude: -104.08738

Grid North = True North -0.13 degs (NAD 27)

Grid Correction Applied = -0.13 degs

Depth Reference : RKB = 17 Foot

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...state com 015h_gyro survey.ut

Minimum Curvature Method

Report Date/Time: 12/21/2015 / 09:31

VES Survey International

West Texas

(432) 563-5444

Surveyor: Gene Heiss

Bose Ikard 4 State Com No 015H / API 30-015-43033

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 09 2016

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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	0.56	96.91	100.00	-0.06	0.48	-0.06	0.49	96.91	0.56
200.00	0.79	21.96	199.99	0.52	1.22	0.52	1.33	66.80	0.84
300.00	0.75	24.34	299.98	1.76	1.75	1.76	2.48	44.83	0.05
400.00	1.04	47.14	399.97	2.97	2.69	2.97	4.01	42.09	0.46
500.00	1.04	66.85	499.96	3.95	4.19	3.95	5.76	46.67	0.36
600.00	1.52	63.39	599.93	4.90	6.20	4.90	7.91	51.70	0.48
700.00	1.22	72.33	699.90	5.81	8.40	5.81	10.21	55.31	0.37
800.00	1.23	72.54	799.88	6.46	10.43	6.46	12.27	58.24	0.01
877.00	1.37	63.47	876.86	7.12	12.04	7.12	13.98	59.42	0.32



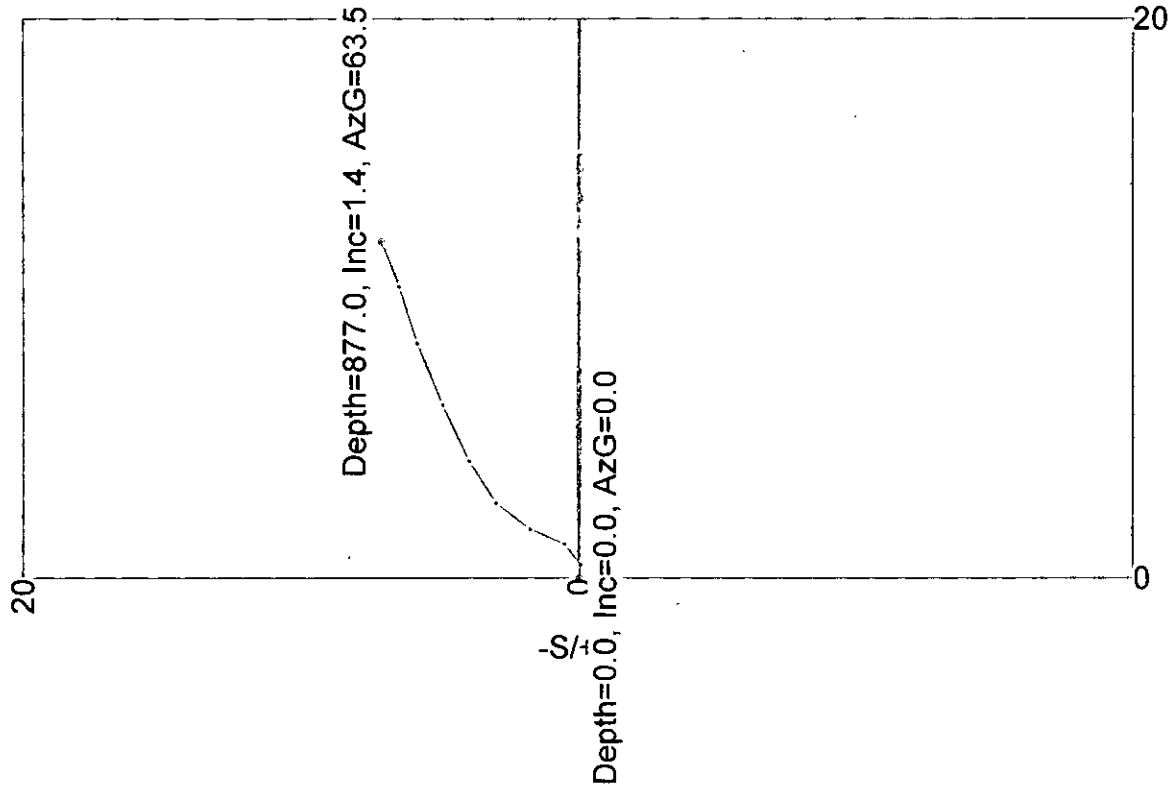
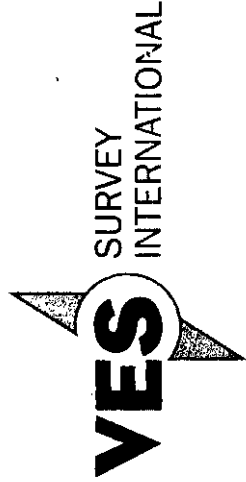
VES Survey International

West Texas

(432) 563-5444

Surveyor: Gene Heiss

Bose Ikard 4 State Com No 015H / API 30-015-43033



-W/+E

VES Survey Date: 12/10/2015



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

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 09 2016

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December 21, 2015

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

RE: Bose Ikard 4 State Com #15H
2140' FSL & 150' FWL
Sec. 4, T17S, R29E
Eddy County, New Mexico

Dear Sir,

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

Very truly yours,

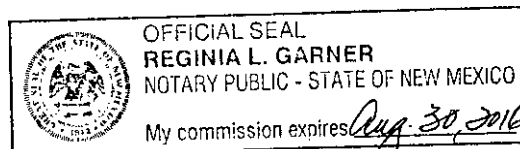
A handwritten signature in cursive script, appearing to read "Chris Graham".

Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 21st day of December, 2015.

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

Notary Public

Bose Ikard 4 State Com #15H

Date	Depth	Deviation	Direction
12/8/2015	202	0.90	
12/9/2015	354	1.00	
12/10/2015	631	1.20	
12/10/2015	722	1.70	
12/10/2015	911	1.40	
12/11/2015	1040	1.10	336.30
12/11/2015	1134	2.90	320.90
12/11/2015	1229	4.60	321.00
12/11/2015	1323	5.70	318.10
12/12/2015	1512	5.20	309.70
12/12/2015	1606	4.90	309.70
12/12/2015	1701	4.40	312.30
12/12/2015	1795	4.80	311.30
12/12/2015	1890	5.50	314.00
12/12/2015	1984	5.40	313.40
12/12/2015	2078	5.10	312.60
12/12/2015	2173	4.70	311.50
12/12/2015	2267	5.30	314.60
12/12/2015	2362	5.50	314.40
12/12/2015	2456	5.40	314.60
12/12/2015	2550	5.30	313.80
12/12/2015	2645	0.30	315.00
12/12/2015	2739	5.30	313.40
12/12/2015	2834	5.30	313.90
12/13/2015	3023	5.10	313.90
12/13/2015	3117	5.10	313.00
12/13/2015	3212	5.00	313.90
12/13/2015	3306	3.90	316.50
12/13/2015	3400	2.00	315.30
12/13/2015	3463	1.60	305.70
12/13/2015	3495	1.20	316.30
12/13/2015	3526	0.90	27.00
12/13/2015	3558	2.50	67.10
12/13/2015	3589	4.70	74.70
12/13/2015	3621	6.70	80.90
12/13/2015	3646	8.40	83.80
12/13/2015	3677	10.50	87.50
12/13/2015	3709	13.40	89.00
12/13/2015	3740	16.80	84.70
12/13/2015	3772	20.60	84.70
12/13/2015	3803	24.30	88.20
12/13/2015	3866	4.70	93.00

Date	Depth	Deviation	Direction
12/13/2015	3897	35.60	92.30
12/13/2015	3929	39.70	91.80
12/14/2015	3961	43.60	91.10
12/14/2015	3992	48.00	91.30
12/14/2015	4024	51.10	90.00
12/14/2015	4055	53.80	90.20
12/14/2015	4086	56.50	90.20
12/14/2015	4118	60.60	89.80
12/14/2015	4149	64.10	89.20
12/14/2015	4181	67.20	88.90
12/14/2015	4212	69.80	89.20
12/14/2015	4244	72.60	90.00
12/14/2015	4275	75.60	90.20
12/14/2015	4306	78.50	90.70
12/14/2015	4338	81.50	90.90
12/14/2015	4369	84.40	90.40
12/14/2015	4401	86.50	90.30
12/14/2015	4468	87.60	89.20
12/14/2015	4562	88.80	88.60
12/14/2015	4657	90.00	89.60
12/15/2015	4751	91.80	89.90
12/15/2015	4846	91.10	90.50
12/15/2015	4941	92.10	90.60
12/15/2015	5035	90.30	90.00
12/15/2015	5130	91.40	89.80
12/15/2015	5224	90.70	90.10
12/15/2015	5319	91.00	90.20
12/15/2015	5413	90.80	90.90
12/15/2015	5508	89.50	89.30
12/15/2015	5602	90.80	88.80
12/15/2015	5696	92.10	88.70
12/15/2015	5791	91.30	89.80
12/15/2015	5885	92.40	90.20
12/15/2015	5980	90.70	90.10
12/16/2015	6074	91.60	89.90
12/16/2015	6169	90.20	90.10
12/16/2015	6263	90.80	89.70
12/16/2015	6358	92.00	89.60
12/16/2015	6453	90.60	88.90
12/16/2015	6547	91.40	89.10
12/16/2015	6642	89.70	89.20
12/16/2015	6736	91.70	89.80
12/16/2015	6831	90.40	89.50
12/16/2015	6926	90.20	88.90
12/16/2015	7020	91.50	89.50

Date	Depth	Deviation	Direction
12/17/2015	7115	90.20	89.70
12/17/2015	7210	91.50	89.50
12/17/2015	7305	92.60	89.90
12/17/2015	7400	91.40	90.20
12/17/2015	7495	90.10	90.20
12/17/2015	7590	90.70	90.90
12/17/2015	7684	88.10	88.90
12/17/2015	7779	88.60	88.80
12/17/2015	7874	89.90	88.90
12/17/2015	7968	91.00	89.30
12/17/2015	8063	91.70	89.40
12/18/2015	8157	90.70	89.30
12/18/2015	8252	91.20	89.30
12/18/2015	8346	92.20	89.50
12/18/2015	8441	90.50	89.60
12/18/2015	8535	91.10	89.80
12/18/2015	8630	92.00	89.70



NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 09 2016

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2/2/16

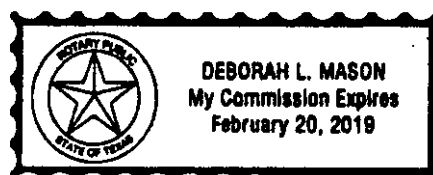
State of New Mexico
County of Eddy

I, Donald D. Mason, certify that: I am employed by Terra Directional Services LLC; that I did on the day(s) of 12/11/2015 through 12/18/2015 conduct or supervise the taking of a MWD survey from a depth of 945 feet to a depth of 8727 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 Bose Ikard 4 State Com #15H Well API 30-015-43033 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.

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.



Notary Public's Signature



NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 09 2016

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COG Operating LLC

Eddy County, NM (NAD-27 2015)

Bose Ikard 4 State Com #15H

SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L

PP: 2291' FSL, 330' FWL, Sec 4, T17S, R29E, Unit L

BHL: 2289' FSL, 382' FEL, Sec 4, T17S, R29E, Unit I

Design: BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I

Standard Survey Report

18 December, 2015





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3616.00usft (Silver Oak 3)
Site:	Bose Ikard 4 State Com #15H	MD Reference:	KB @ 3616.00usft (Silver Oak 3)
Well:	SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L	North Reference:	Grid
Wellbore:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	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	Bose Ikard 4 State Com #15H		
Site Position:	From: Map	Northing: 677,429.70 usft	Latitude: 32° 51' 43.545 N
		Easting: 575,521.80 usft	Longitude: 104° 5' 14.574 W
Position Uncertainty:	0.00 usft	Slot Radius: 13.20 in	Grid Convergence: 0.13 °

Well	SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L		
Well Position	+N/-S 0.00 usft	Northing: 677,429.70 usft	Latitude: 32° 51' 43.545 N
	+E/-W 0.00 usft	Easting: 575,521.80 usft	Longitude: 104° 5' 14.574 W
Position Uncertainty	0.00 usft	Wellhead Elevation: 0.00 usft	Ground Level: 3,598.00 usft

Wellbore	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/30/2015	7.41	60.58	48,420

Design		BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I		
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	87.85

Survey Program		Date 12/18/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	877.00	VES Gyro #1 (BHL: 2289' FSL, 350' FEL,	MWD	MWD - Standard
945.00	8,727.00	TDS MWD #2 (BHL: 2289' FSL, 350' FEL,	MWD	MWD - Standard

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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.56	96.91	100.00	-0.06	0.49	0.48	0.56	0.56	0.00	
200.00	0.79	21.96	199.99	0.52	1.23	1.25	0.84	0.23	-74.95	
300.00	0.75	24.34	299.98	1.76	1.76	1.82	0.05	-0.04	2.38	
400.00	1.04	47.14	399.97	2.97	2.69	2.80	0.45	0.29	22.80	
500.00	1.04	66.85	499.96	3.95	4.19	4.34	0.36	0.00	19.71	
600.00	1.52	63.39	599.93	4.90	6.21	6.39	0.49	0.48	-3.46	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3616.00usft (Silver Oak 3)
Site:	Bose Ikard 4 State Com #15H	MD Reference:	KB @ 3616.00usft (Silver Oak 3)
Well:	SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L	North Reference:	Grid
Wellbore:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	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	1.22	72.33	699.90	5.81	8.41	8.62	0.37	-0.30	8.94
800.00	1.23	72.54	799.88	6.46	10.45	10.68	0.01	0.01	0.21
877.00	1.37	63.47	876.86	7.12	12.06	12.32	0.32	0.18	-11.78
Final VES Gyro Survey									
945.00	0.80	80.70	944.85	7.56	13.26	13.53	0.96	-0.84	25.34
First TDS MWD Survey									
1,040.00	1.10	336.30	1,039.84	8.50	13.54	13.85	1.59	0.32	-109.89
1,134.00	2.90	320.90	1,133.78	11.17	11.68	12.09	1.98	1.91	-16.38
1,229.00	4.60	321.00	1,228.57	16.00	7.77	8.36	1.79	1.79	0.11
1,323.00	5.70	318.10	1,322.19	22.40	2.28	3.12	1.20	1.17	-3.09
1,417.00	5.50	308.90	1,415.74	28.70	-4.34	-3.26	0.98	-0.21	-9.79
1,512.00	5.20	309.70	1,510.33	34.31	-11.20	-9.90	0.33	-0.32	0.64
1,606.00	4.90	309.70	1,603.97	39.60	-17.57	-16.07	0.32	-0.32	0.00
1,701.00	4.40	312.30	1,698.65	44.64	-23.38	-21.69	0.57	-0.53	2.74
1,795.00	4.80	311.30	1,792.35	49.67	-29.00	-27.12	0.43	0.43	-1.06
1,890.00	5.50	314.00	1,886.97	55.45	-35.27	-33.16	0.78	0.74	2.84
1,984.00	5.40	313.40	1,980.54	61.62	-41.72	-39.38	0.12	-0.11	-0.64
2,078.00	5.10	312.60	2,074.15	67.49	-48.01	-45.44	0.33	-0.32	-0.85
2,173.00	4.70	311.50	2,168.80	72.92	-54.03	-51.26	0.43	-0.42	-1.16
2,267.00	5.30	314.60	2,262.44	78.52	-60.01	-57.02	0.70	0.64	3.30
2,362.00	5.50	314.40	2,357.02	84.79	-66.38	-63.16	0.21	0.21	-0.21
2,456.00	5.40	314.60	2,450.59	91.05	-72.75	-69.29	0.11	-0.11	0.21
2,550.00	5.30	313.80	2,544.18	97.16	-79.04	-75.33	0.13	-0.11	-0.85
2,645.00	5.30	315.00	2,638.78	103.30	-85.30	-81.37	0.12	0.00	1.26
2,739.00	5.30	313.40	2,732.38	109.35	-91.53	-87.36	0.16	0.00	-1.70
2,834.00	5.30	313.90	2,826.97	115.41	-97.88	-93.48	0.05	0.00	0.53
2,928.00	5.20	314.40	2,920.58	121.40	-104.05	-99.42	0.12	-0.11	0.53
3,023.00	5.10	313.90	3,015.19	127.34	-110.17	-105.31	0.12	-0.11	-0.53
3,117.00	5.10	313.00	3,108.82	133.08	-116.23	-111.16	0.09	0.00	-0.96
3,212.00	5.00	313.90	3,203.45	138.83	-122.31	-117.01	0.13	-0.11	0.95
3,306.00	3.90	316.50	3,297.17	143.99	-127.46	-121.97	1.19	-1.17	2.77
3,400.00	2.00	315.30	3,391.04	147.48	-130.81	-125.19	2.02	-2.02	-1.28
3,432.00	1.70	313.80	3,423.02	148.20	-131.55	-125.90	0.95	-0.94	-4.69
3,463.00	1.60	305.70	3,454.01	148.78	-132.23	-126.56	0.82	-0.32	-26.13
3,495.00	1.20	316.30	3,486.00	149.28	-132.83	-127.13	1.48	-1.25	33.13
3,526.00	0.90	27.00	3,517.00	149.73	-132.94	-127.23	4.00	-0.97	228.06
3,558.00	2.50	67.10	3,548.98	150.23	-132.18	-126.45	5.94	5.00	125.31
3,589.00	4.70	74.70	3,579.92	150.82	-130.33	-124.58	7.25	7.10	24.52
3,621.00	6.70	80.90	3,611.76	151.47	-127.23	-121.45	6.53	6.25	19.38
3,646.00	8.40	83.80	3,636.54	151.89	-123.97	-118.18	6.97	6.80	11.60
3,677.00	10.50	87.50	3,667.12	152.26	-118.90	-113.10	7.05	6.77	11.94

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3616.00usft (Silver Oak 3)
Site:	Bose Ikard 4 State Com #15H	MD Reference:	KB @ 3616.00usft (Silver Oak 3)
Well:	SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L	North Reference:	Grid
Wellbore:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	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)
3,709.00	13.40	89.00	3,698.42	152.45	-112.27	-106.48	9.11	9.06	4.69
3,740.00	16.80	84.70	3,728.35	152.93	-104.22	-98.41	11.54	10.97	-13.87
3,772.00	20.60	84.70	3,758.65	153.88	-94.01	-88.17	11.88	11.88	0.00
3,803.00	24.30	88.20	3,787.30	154.58	-82.20	-76.34	12.69	11.94	11.29
3,834.00	27.90	91.60	3,815.14	154.58	-68.56	-62.72	12.57	11.61	10.97
3,866.00	31.70	93.00	3,842.90	153.93	-52.68	-46.87	12.07	11.88	4.38
3,897.00	35.60	92.30	3,868.70	153.14	-35.52	-29.75	12.64	12.58	-2.26
3,929.00	39.70	91.80	3,894.03	152.45	-15.99	-10.26	12.85	12.81	-1.56
3,961.00	43.60	91.10	3,917.94	151.91	5.26	10.96	12.27	12.19	-2.19
3,992.00	48.00	91.30	3,939.54	151.45	27.48	33.14	14.20	14.19	0.65
4,024.00	51.10	90.00	3,960.30	151.18	51.82	57.46	10.17	9.69	-4.06
4,055.00	53.80	90.20	3,979.20	151.13	76.40	82.01	8.72	8.71	0.65
4,086.00	56.50	90.20	3,996.91	151.04	101.83	107.43	8.71	8.71	0.00
4,118.00	60.60	89.80	4,013.60	151.05	129.13	134.70	12.86	12.81	-1.25
4,149.00	64.10	89.20	4,027.98	151.29	156.58	162.15	11.42	11.29	-1.94
4,181.00	67.20	88.90	4,041.18	151.77	185.73	191.29	9.73	9.69	-0.94
4,212.00	69.80	89.20	4,052.54	152.25	214.56	220.13	8.44	8.39	0.97
4,244.00	72.60	90.00	4,062.85	152.46	244.85	250.40	9.06	8.75	2.50
4,275.00	75.60	90.20	4,071.34	152.41	274.66	280.19	9.70	9.68	0.65
4,306.00	78.50	90.70	4,078.29	152.17	304.87	310.37	9.49	9.35	1.61
4,338.00	81.50	90.90	4,083.84	151.73	336.38	341.83	9.40	9.38	0.63
4,369.00	84.40	90.40	4,087.65	151.38	367.14	372.56	9.49	9.35	-1.61
4,401.00	86.50	90.30	4,090.19	151.19	399.04	404.43	6.57	6.56	-0.31
4,468.00	87.60	89.20	4,093.63	151.48	465.94	471.30	2.32	1.64	-1.64
4,562.00	88.80	88.60	4,096.59	153.28	559.88	565.23	1.43	1.28	-0.64
4,657.00	90.00	89.60	4,097.58	154.77	654.86	660.20	1.64	1.26	1.05
4,751.00	91.80	89.90	4,096.11	155.18	748.84	754.14	1.94	1.91	0.32
4,846.00	91.10	90.50	4,093.70	154.85	843.81	849.02	0.97	-0.74	0.63
4,941.00	92.10	90.60	4,091.05	153.94	938.77	943.88	1.06	1.05	0.11
5,035.00	90.30	90.00	4,089.08	153.45	1,032.74	1,037.77	2.02	-1.91	-0.64
5,130.00	91.40	89.80	4,087.67	153.61	1,127.73	1,132.70	1.18	1.16	-0.21
5,224.00	90.70	90.10	4,085.95	153.70	1,221.71	1,226.62	0.81	-0.74	0.32
5,319.00	91.00	90.20	4,084.54	153.45	1,316.70	1,321.53	0.33	0.32	0.11
5,413.00	90.80	90.90	4,083.06	152.55	1,410.68	1,415.41	0.77	-0.21	0.74
5,508.00	89.50	89.30	4,082.81	152.38	1,505.68	1,510.34	2.17	-1.37	-1.68
5,602.00	90.80	88.80	4,082.57	153.94	1,599.66	1,604.31	1.48	1.38	-0.53
5,696.00	92.10	88.70	4,080.19	155.99	1,693.61	1,698.27	1.39	1.38	-0.11
5,791.00	91.30	89.80	4,077.37	157.23	1,788.56	1,793.20	1.43	-0.84	1.16
5,885.00	92.40	90.20	4,074.34	157.23	1,882.51	1,887.08	1.25	1.17	0.43
5,980.00	90.70	90.10	4,071.77	156.98	1,977.47	1,981.96	1.79	-1.79	-0.11
6,074.00	91.60	89.90	4,069.88	156.98	2,071.45	2,075.88	0.98	0.96	-0.21

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3616.00usft (Silver Oak 3)
Site:	Bose Ikard 4 State Com #15H	MD Reference:	KB @ 3616.00usft (Silver Oak 3)
Well:	SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L	North Reference:	Grid
Wellbore:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	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)
6,169.00	90.20	90.10	4,068.39	156.98	2,168.43	2,170.80	1.49	-1.47	0.21
6,263.00	90.80	89.70	4,067.57	157.15	2,260.43	2,264.73	0.77	0.64	-0.43
6,358.00	92.00	89.60	4,065.25	157.73	2,355.40	2,359.66	1.27	1.26	-0.11
6,453.00	90.60	88.90	4,063.09	158.97	2,450.36	2,454.60	1.65	-1.47	-0.74
6,547.00	91.40	89.10	4,061.45	160.61	2,544.33	2,548.57	0.88	0.85	0.21
6,642.00	89.70	89.20	4,060.54	162.02	2,639.31	2,643.53	1.79	-1.79	0.11
6,736.00	91.70	89.80	4,059.39	162.84	2,733.30	2,737.48	2.22	2.13	0.64
6,831.00	90.40	89.50	4,057.65	163.42	2,828.28	2,832.42	1.40	-1.37	-0.32
6,926.00	90.20	88.90	4,057.15	164.75	2,923.27	2,927.39	0.67	-0.21	-0.63
7,020.00	91.50	89.40	4,055.76	166.14	3,017.24	3,021.35	1.48	1.38	0.53
7,115.00	90.20	89.70	4,054.35	166.89	3,112.23	3,116.30	1.40	-1.37	0.32
7,210.00	91.50	89.50	4,052.94	167.55	3,207.21	3,211.24	1.38	1.37	-0.21
7,305.00	92.60	89.90	4,049.54	168.05	3,302.15	3,306.13	1.23	1.16	0.42
7,400.00	91.40	90.20	4,046.23	167.96	3,397.09	3,401.00	1.30	-1.26	0.32
7,495.00	90.10	90.20	4,044.98	167.63	3,492.08	3,495.91	1.37	-1.37	0.00
7,590.00	90.70	90.90	4,044.32	166.72	3,587.07	3,590.80	0.97	0.83	0.74
7,684.00	88.10	88.90	4,045.30	166.88	3,681.05	3,684.72	3.49	-2.77	-2.13
7,779.00	88.60	88.80	4,048.04	168.79	3,776.00	3,779.67	0.54	0.53	-0.11
7,874.00	89.90	88.90	4,049.28	170.70	3,870.97	3,874.64	1.37	1.37	0.11
7,968.00	91.00	89.30	4,048.54	172.17	3,964.95	3,968.62	1.25	1.17	0.43
8,063.00	91.70	89.40	4,046.31	173.25	4,059.92	4,063.56	0.74	0.74	0.11
8,157.00	90.70	89.30	4,044.34	174.32	4,153.89	4,157.50	1.07	-1.06	-0.11
8,252.00	91.20	89.30	4,042.76	175.48	4,248.87	4,252.46	0.53	0.53	0.00
8,346.00	92.20	89.50	4,039.97	176.46	4,342.82	4,346.38	1.08	1.06	0.21
8,441.00	90.50	89.60	4,037.74	177.21	4,437.79	4,441.31	1.79	-1.79	0.11
8,535.00	91.10	89.80	4,036.42	177.70	4,531.78	4,535.25	0.67	0.64	0.21
8,630.00	92.00	89.70	4,033.85	178.11	4,626.74	4,630.17	0.95	0.95	-0.11
Final MWD Survey									
8,727.00	92.00	89.70	4,030.47	178.62	4,723.68	4,727.06	0.00	0.00	0.00
Projection to Bit/TD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
877.00	876.86	7.12	12.06	Final VES Gyro Survey
945.00	944.85	7.56	13.26	First TDS MWD Survey
8,630.00	4,033.85	178.11	4,626.74	Final MWD Survey
8,727.00	4,030.47	178.62	4,723.68	Projection to Bit/TD



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3616.00usft (Silver Oak 3)
Site:	Bose Ikard 4 State Com #15H	MD Reference:	KB @ 3616.00usft (Silver Oak 3)
Well:	SHL: 2140' FSL, 150' FWL, Sec 4, T17S, R29E, Unit L	North Reference:	Grid
Wellbore:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	Survey Calculation Method:	Minimum Curvature
Design:	BHL: 2289' FSL, 350' FEL, Sec 4, T17S, R29E, Unit I	Database:	EDM 5000.1 Single User Db

Checked By:

Deborah L. Mason

Approved By:

[Signature]

Date:

2/2/16

