



HOBBS OCD

AUG 03 2016

RECEIVED

I Andy Askew certify that I am employed by VES Survey International. That I did on the day(s) of 02/16/16 through 02/16/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,200.00 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 Branex-COG Federal Com Well # 18H API # 30-025-41007 in Lea 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 VES Survey International.

A handwritten signature in blue ink, appearing to read "Andy Askew", is written over a horizontal line.

Andy Askew
Service Technician
VES Survey International



February 24, 2016

HOBBS OCD

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

AUG 03 2016

RECEIVED

Attn: Kanicia Castillo

RE: Branex COG Federal Com No 018H

Please find enclosed a copy of the survey from 0' to 2200' ran on the above referenced well.

Sincerely,

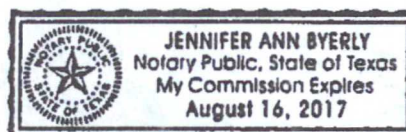

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 24th day of February, A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas

VES Survey International
P.O. Box 261021, Corpus Christi, Texas 78426
T (361) 767-0602 F (361) 767-0612
www.vessurvey.com





Company: Concho
Lease/Well: Branex COG Federal Com No/018H

Rig Name: Silver Oak 3
State/County: New Mexico/Lea
VS-Azi: 0.00 Degrees
Latitude: 32.84269, Longitude: -103.77847
Grid North = True North -0.30 degs (NAD 27)
Grid Correction Applied = -0.30 degs



Depth Reference : RKB = 18 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 2/24/2016 / 15:16

VES Survey International
Midland, TX
432-563-5444

Surveyor: Andrew Askew
Branex COG Federal Com No 018H / API 30-025-41007

HOBBS OCD

AUG 03 2016

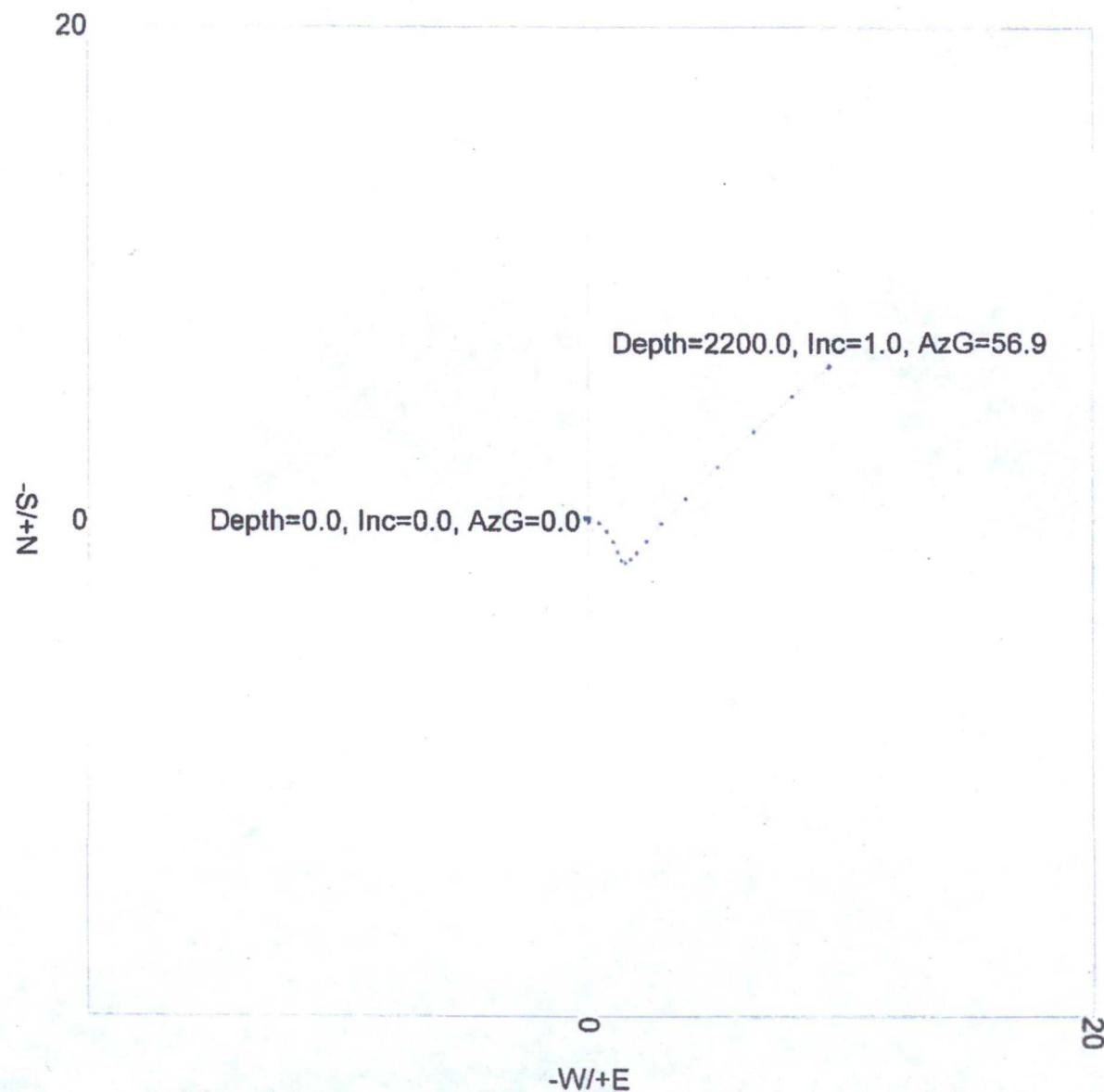
RECEIVED

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	0.21	316.08	100.00	0.13	-0.13	0.13	0.18	316.08	0.21
200.00	0.32	276.59	200.00	0.29	-0.53	0.29	0.61	298.96	0.21
300.00	0.19	321.19	300.00	0.45	-0.91	0.45	1.02	296.45	0.23
400.00	0.07	352.24	400.00	0.64	-1.02	0.64	1.21	302.19	0.13
500.00	0.24	120.72	500.00	0.60	-0.85	0.60	1.04	305.17	0.30
600.00	0.30	119.57	600.00	0.36	-0.44	0.36	0.66	309.49	0.06
700.00	0.30	110.01	699.99	0.14	0.04	0.14	0.14	16.47	0.05
800.00	0.22	132.33	799.99	-0.08	0.43	-0.08	0.44	100.54	0.13
900.00	0.30	142.67	899.99	-0.42	0.73	-0.42	0.84	119.84	0.10
1000.00	0.28	157.48	999.99	-0.85	0.98	-0.85	1.30	130.90	0.08
1100.00	0.23	153.80	1099.99	-1.26	1.16	-1.26	1.71	137.17	0.04
1200.00	0.18	160.69	1199.99	-1.59	1.31	-1.59	2.05	140.53	0.06
1300.00	0.14	69.72	1299.99	-1.69	1.48	-1.69	2.24	138.85	0.23
1400.00	0.15	34.80	1399.99	-1.54	1.67	-1.54	2.27	132.74	0.09
1500.00	0.27	50.61	1499.99	-1.29	1.92	-1.29	2.31	123.84	0.13
1600.00	0.44	32.91	1599.99	-0.82	2.31	-0.82	2.45	109.46	0.20

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
1700.00	0.63	42.72	1699.98	-0.09	2.89	-0.09	2.90	91.72	0.21
1800.00	0.96	44.72	1799.97	0.91	3.86	0.91	3.96	76.66	0.33
1900.00	1.13	44.96	1899.96	2.21	5.15	2.21	5.60	66.77	0.18
2000.00	1.20	45.29	1999.94	3.64	6.59	3.64	7.53	61.05	0.06
2100.00	1.21	47.24	2099.91	5.09	8.10	5.09	9.57	57.85	0.04
2200.00	0.99	56.85	2199.89	6.28	9.60	6.28	11.47	56.80	0.29



VES Survey International
Midland, TX
432-563-5444
Surveyor: Andrew Askew
Branex COG Federal Com No 018H / API 30-025-41007



V.E.S. Survey Date: 2/16/2016



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

HOBBS OCD

AUG 03 2016

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March 1, 2016

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

RE: Branex-COG Federal Com 18H
330' FSL & 330' FWL
Sec. 29, T17S, R32E
Lea 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 1st day of March, 2016.

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

Notary Public



Branex-COG Fed Com 18H

Date	Depth	Deviation	Direction
2/14/2016	85	0.30	
2/14/2016	210	0.40	
2/14/2016	329	0.50	
2/14/2016	509	0.70	
2/14/2016	688	0.70	
2/14/2016	850	0.50	
2/16/2016	1008	0.90	
2/16/2016	1163	0.80	
2/16/2016	1352	0.90	
2/16/2016	1574	1.00	
2/16/2016	1730	0.70	
2/16/2016	1950	1.20	
2/18/2016	2265	0.90	63.00
2/18/2016	2359	1.10	358.60
2/18/2016	2454	3.80	274.60
2/18/2016	2549	6.50	275.90
2/18/2016	2643	8.10	276.00
2/18/2016	2737	7.60	273.10
2/18/2016	2832	6.30	270.60
2/18/2016	3021	6.90	266.00
2/18/2016	3115	7.70	265.10
2/18/2016	3209	7.40	272.00
2/18/2016	3304	7.60	275.10
2/18/2016	3395	6.50	275.10
2/18/2016	3493	6.50	274.00
2/19/2016	3587	7.30	273.10
2/19/2016	3681	8.60	272.80
2/19/2016	3776	8.00	270.10
2/19/2016	3870	6.40	266.00
2/19/2016	3965	6.50	762.70
2/19/2016	4059	7.70	262.20
2/19/2016	4154	8.00	269.50
2/19/2016	4248	7.30	279.40
2/19/2016	4343	7.80	284.30
2/19/2016	4438	8.20	286.80
2/19/2016	4532	7.50	286.30
2/19/2016	4627	6.70	279.20
2/19/2016	4721	7.30	274.10
2/19/2016	4815	6.40	269.50
2/19/2016	4910	5.60	265.00
2/19/2016	5004	3.80	260.90
2/20/2016	5099	1.60	273.20
2/20/2016	5193	0.80	321.60

Date	Depth	Deviation	Direction
2/20/2016	5224	1.80	40.70
2/20/2016	5287	8.40	70.00
2/20/2016	5319	12.10	76.30
2/20/2016	5350	15.60	78.90
2/20/2016	5382	18.80	81.30
2/20/2016	5414	22.00	85.10
2/20/2016	5445	25.30	88.00
2/20/2016	5476	28.30	89.30
2/20/2016	5508	31.30	90.30
2/20/2016	5539	34.30	90.30
2/20/2016	5571	37.50	90.40
2/20/2016	5602	40.50	90.00
2/20/2016	5634	42.90	89.80
2/20/2016	5665	45.10	90.30
2/20/2016	5697	47.10	90.80
2/20/2016	5728	50.10	91.40
2/20/2016	5760	53.10	91.50
2/21/2016	5829	59.80	88.90
2/21/2016	5860	63.30	88.50
2/21/2016	5892	66.80	88.40
2/21/2016	5923	69.90	88.50
2/21/2016	5955	72.50	88.90
2/21/2016	6018	76.90	89.60
2/21/2016	6049	78.60	90.40
2/21/2016	6081	81.30	91.00
2/21/2016	6112	84.90	91.20
2/21/2016	6144	86.90	91.30
2/21/2016	6238	88.00	91.00
2/21/2016	6333	89.10	91.10
2/21/2016	6427	90.20	91.20
2/21/2016	6522	91.80	92.30
2/22/2016	6616	90.50	91.00
2/22/2016	6710	89.00	89.70
2/22/2016	6805	89.10	90.30
2/22/2016	6899	88.80	88.20
2/22/2016	6994	89.10	88.20
2/22/2016	7088	87.10	88.20
2/22/2016	7182	89.10	88.30
2/22/2016	7277	90.50	90.30
2/22/2016	7371	91.20	91.20
2/22/2016	7466	91.60	91.20
2/22/2016	7560	91.60	91.30
2/22/2016	7655	90.90	89.40
2/22/2016	7749	91.30	89.70
2/22/2016	7843	91.30	89.70

Date	Depth	Deviation	Direction
2/23/2016	7938	91.50	89.60
2/23/2016	8032	91.30	90.10
2/23/2016	8127	92.00	90.10
2/23/2016	8220	90.00	90.00
2/23/2016	8316	89.90	89.30
2/23/2016	8410	90.10	89.10
2/23/2016	8504	90.30	89.60
2/23/2016	8694	90.50	89.60
2/23/2016	8788	90.20	89.60
2/23/2016	8883	90.60	89.80
2/23/2016	8977	91.30	90.30
2/23/2016	9072	91.60	90.80
2/23/2016	9166	91.90	91.00
2/23/2016	9260	91.00	89.80
2/23/2016	9354	91.80	89.90
2/24/2016	9449	89.90	89.60
2/24/2016	9544	90.80	90.20
2/24/2016	9638	90.90	90.60
2/24/2016	9733	91.10	90.80
2/24/2016	9827	91.20	91.10
2/24/2016	9921	90.60	89.60
2/24/2016	10016	90.70	89.50
2/24/2016	10100	91.00	89.40
2/24/2016	10205	91.30	90.30
2/25/2016	10393	92.00	89.80
2/25/2016	10488	93.30	89.30
2/25/2016	10583	94.30	88.50
2/26/2016	10677	92.20	88.20
2/26/2016	10772	88.00	88.60
2/26/2016	10958	92.40	89.30
2/26/2016	11047	92.70	88.00
2/27/2016	11142	91.90	90.20
2/27/2016	11236	90.20	92.40
2/27/2016	11331	88.90	91.10
2/27/2016	11425	90.20	90.60
2/27/2016	11520	91.40	91.00
2/27/2016	11614	93.50	91.10
2/27/2016	11646	94.10	91.20



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COG Operating LLC

Lea County, NM (NAD-27 2015)

Branex-COG Federal Com #18H

API #: 30-025-41007

SHL: 330' FSL, 330' FWL, Sec 9, T17S, R32E, Unit M

PP: 362' FSL, 330' FWL, Sec 9, T17S, R32E, Unit M

BHL: 346' FSL, 929' FWL, Sec 10, T17S, R32E, Unit M

Design: BHL: 350' FSL, 970' FWL, Sec 10, T17S, R32E, Unit M

Standard Survey Report

03 May, 2016



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Branex-COG Federal Com #18H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4073 00usft (Silver Oak 3)
Site:	Branex-COG Federal Com #18H	MD Reference:	KB @ 4073 00usft (Silver Oak 3)
Well:	SHL 330' FSL 330' FWL, Sec 9, T17S, R32E, Unit M	North Reference:	Grid
Wellbore:	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M	Survey Calculation Method:	Minimum Curvature
Design:	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M	Database:	EDM 5000.1 Single User Db

Project	Lea 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	Branex-COG Federal Com #18H		
Site Position:	Map	Northing:	670.731 00 usft
From:		Easting:	670.413 90 usft
Position Uncertainty:	0 00 usft	Slot Radius:	13.20 in
		Latitude:	32° 50' 33.700 N
		Longitude:	103° 46' 42.495 W
		Grid Convergence:	0 30 °

Well	SHL 330' FSL 330' FWL, Sec 9, T17S, R32E, Unit M		
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° 50' 33.700 N
		Longitude:	103° 46' 42.495 W
		Ground Level:	4,055.00 usft

Wellbore	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	2/3/2016	7.24
			Dip Angle (°)
			60.61
			Field Strength (nT)
			48,420

Design	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M		
Audit Notes:			
Version:	1 0	Phase:	ACTUAL
		Tie On Depth:	0 00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0 00	0 00	0 00
			Direction (°)
			89.62

Survey Program	Date 5/3/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100 00	2 200 00	VES Gyro #1 (BHL 350' FSL 970' FWL, S	VES-ISCWSA-GYRO-3
2,265 00	11,729 00	TDS MWD #2 (BHL 350' FSL 970' FWL,	MWD
			Description
			Biaxial Semi-Cont. Gyro
			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 21	316.08	100 00	0 13	-0 13	-0.13	0.21	0 21	0.00
	200.00	0 32	276.59	200 00	0 30	-0 53	-0 53	0.21	0 11	-39.49
	300.00	0 19	321.19	300 00	0 46	-0 91	-0 91	0.23	-0 13	44.60
	400.00	0 07	352.24	400 00	0 65	-1 03	-1.02	0.13	-0 12	31.05
	500.00	0 24	120.72	500 00	0 60	-0 85	-0 85	0.29	0 17	128.48
	600.00	0 30	119.57	600 00	0 36	-0 45	-0 44	0 06	0 06	-1.15

Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Branex-COG Federal Com #18H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4073.00usft (Silver Oak 3)
Site:	Branex-COG Federal Com #18H	MD Reference:	KB @ 4073.00usft (Silver Oak 3)
Well:	SHL 330' FSL, 330' FWL, Sec 9, T17S, R32E, Unit M	North Reference:	Grid
Wellbore:	BHL 350' FSL, 970' FWL, Sec 10, T17S, R32E, Unit M	Survey Calculation Method:	Minimum Curvature
Design:	BHL 350' FSL, 970' FWL, Sec 10, T17S, R32E, Unit M	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	0.30	110.01	699.99	0.15	0.03	0.03	0.05	0.00	-9.56
800.00	0.22	132.33	799.99	-0.07	0.42	0.42	0.13	-0.08	22.32
900.00	0.30	142.67	899.99	-0.41	0.72	0.71	0.09	0.08	10.34
1,000.00	0.28	157.48	999.99	-0.84	0.97	0.96	0.08	-0.02	14.81
1,100.00	0.23	153.80	1,099.99	-1.25	1.15	1.14	0.05	-0.05	-3.68
1,200.00	0.18	160.59	1,199.99	-1.58	1.29	1.28	0.06	-0.05	6.79
1,300.00	0.14	69.72	1,299.99	-1.68	1.46	1.45	0.23	-0.04	-90.87
1,400.00	0.15	34.80	1,399.99	-1.53	1.65	1.64	0.09	0.01	-34.92
1,500.00	0.27	50.51	1,499.99	-1.28	1.90	1.90	0.13	0.12	15.71
1,600.00	0.44	32.91	1,599.99	-0.81	2.30	2.29	0.20	0.17	-17.60
1,700.00	0.63	42.72	1,699.98	-0.08	2.88	2.88	0.21	0.19	9.81
1,800.00	0.96	44.72	1,799.97	0.92	3.84	3.85	0.33	0.33	2.00
1,900.00	1.13	44.96	1,899.96	2.21	5.13	5.14	0.17	0.17	0.24
2,000.00	1.20	45.29	1,999.94	3.65	6.57	6.59	0.07	0.07	0.33
2,100.00	1.21	47.24	2,099.91	5.10	8.09	8.12	0.04	0.01	1.95
2,200.00	0.99	56.85	2,199.89	6.29	9.58	9.63	0.29	-0.22	9.61
TIE-IN to VES Gyro									
2,265.00	0.90	63.00	2,264.89	6.83	10.51	10.55	0.21	-0.14	9.46
First TDS MWD Survey									
2,359.00	1.10	268.60	2,358.88	7.14	10.26	10.31	2.08	0.21	-164.26
2,454.00	3.80	274.60	2,453.79	7.37	6.21	6.26	2.85	2.84	6.32
2,549.00	6.50	275.90	2,548.39	8.18	-2.27	-2.22	2.84	2.84	1.37
2,643.00	8.10	276.00	2,641.63	9.42	-14.15	-14.09	1.70	1.70	0.11
2,737.00	7.60	273.10	2,734.75	10.45	-26.95	-26.88	0.68	-0.53	-3.09
2,832.00	6.30	270.60	2,829.05	10.84	-38.43	-38.36	1.40	-1.37	-2.63
2,926.00	6.20	267.10	2,922.49	10.64	-48.66	-48.59	0.42	-0.11	-3.72
3,021.00	6.90	266.00	3,016.87	9.98	-59.47	-59.41	0.75	0.74	-1.16
3,115.00	7.70	265.10	3,110.11	9.05	-71.38	-71.32	0.86	0.85	-0.96
3,209.00	7.40	272.00	3,203.29	8.72	-83.71	-83.65	1.02	-0.32	7.34
3,304.00	7.60	275.10	3,297.48	9.49	-96.08	-96.01	0.48	0.21	3.26
3,398.00	6.50	275.10	3,390.77	10.52	-107.57	-107.50	1.17	-1.17	0.00
3,493.00	6.50	274.00	3,485.16	11.37	-118.29	-118.21	0.13	0.00	-1.16
3,587.00	7.30	273.10	3,578.48	12.07	-129.56	-129.48	0.86	0.85	-0.96
3,681.00	8.60	272.80	3,671.57	12.73	-142.54	-142.46	1.38	1.38	-0.32
3,776.00	8.00	270.10	3,765.58	13.09	-156.25	-156.16	0.75	-0.63	-2.84
3,870.00	6.40	266.00	3,858.83	12.74	-168.02	-167.93	1.79	-1.70	-4.36
3,965.00	6.50	262.70	3,953.23	11.68	-178.63	-178.55	0.40	0.11	-3.47
4,059.00	7.70	262.20	4,046.51	10.15	-190.15	-190.08	1.28	1.28	-0.53
4,154.00	8.00	269.50	4,140.62	9.23	-203.07	-203.00	1.10	0.32	7.68
4,248.00	7.30	279.40	4,233.79	10.15	-215.50	-215.43	1.58	-0.74	10.53
4,343.00	7.80	284.30	4,327.96	12.73	-227.70	-227.61	0.86	0.53	5.16
4,438.00	8.20	286.80	4,422.04	16.28	-240.43	-240.32	0.56	0.42	2.63

Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Branex-COG Federal Com #18H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4073 00usft (Silver Oak 3)
Site:	Branex-COG Federal Com #18H	MD Reference:	KB @ 4073 00usft (Silver Oak 3)
Well:	SHL 330' FSL, 330' FWL, Sec 9, T17S, R32E, Unit M	North Reference:	Grid
Wellbore:	BHL 350' FSL, 970' FWL, Sec 10, T17S, R32E, Unit M	Survey Calculation Method:	Minimum Curvature
Design:	BHL 350' FSL, 970' FWL, Sec 10, T17S, R32E, Unit M	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)
4,532.00	7.50	286.30	4,515.16	19.94	-252.74	-252.60	0.75	-0.74	-0.53
4,627.00	6.70	279.20	4,609.43	22.56	-264.16	-264.00	1.25	-0.84	-7.47
4,721.00	7.30	274.10	4,702.73	23.87	-275.53	-275.37	0.92	0.64	-5.43
4,815.00	6.90	269.50	4,796.01	24.25	-287.13	-286.97	0.74	-0.43	-4.89
4,910.00	5.60	265.00	4,890.44	23.79	-297.46	-297.29	1.46	-1.37	-4.74
5,004.00	3.80	260.90	4,984.12	22.90	-305.10	-304.94	1.95	-1.91	-4.36
5,099.00	1.60	273.20	5,079.01	22.48	-309.54	-309.38	2.38	-2.32	12.95
5,193.00	0.80	321.60	5,172.99	23.06	-311.25	-311.09	1.30	-0.85	51.49
5,224.00	1.80	40.70	5,203.99	23.60	-311.07	-310.91	5.89	3.23	255.16
5,256.00	4.70	61.90	5,235.93	24.60	-309.59	-309.42	9.66	9.06	66.25
5,287.00	8.40	70.00	5,266.73	25.97	-306.34	-306.16	12.27	11.94	26.13
5,318.00	12.10	76.30	5,296.21	27.57	-300.88	-300.69	12.06	11.56	19.69
5,350.00	15.60	78.90	5,328.31	29.14	-293.63	-293.43	11.46	11.29	8.39
5,382.00	18.80	81.30	5,358.87	30.75	-284.31	-284.10	10.24	10.00	7.50
5,413.00	22.00	85.10	5,387.92	32.00	-273.58	-273.37	11.17	10.32	12.26
5,445.00	25.30	88.00	5,417.23	32.75	-260.77	-260.55	10.93	10.31	9.06
5,476.00	28.30	89.30	5,444.90	33.07	-246.80	-246.58	9.86	9.68	4.19
5,508.00	31.30	90.30	5,472.67	33.12	-230.90	-230.68	9.50	9.38	3.13
5,539.00	34.30	90.30	5,498.72	33.03	-214.11	-213.89	9.68	9.68	0.00
5,571.00	37.50	90.40	5,524.64	32.92	-195.35	-195.13	10.00	10.00	0.31
5,602.00	40.50	90.00	5,548.73	32.85	-175.84	-175.62	9.71	9.68	-1.29
5,634.00	42.90	89.80	5,572.62	32.89	-154.56	-154.34	7.51	7.50	-0.63
5,665.00	45.10	90.30	5,594.92	32.87	-133.02	-132.80	7.18	7.10	1.61
5,697.00	47.10	90.80	5,617.11	32.65	-109.97	-109.75	6.35	6.25	1.56
5,728.00	50.10	91.40	5,637.60	32.20	-86.72	-86.51	9.79	9.68	1.94
5,760.00	53.10	91.50	5,657.48	31.56	-61.66	-61.45	9.38	9.38	0.31
5,797.00	57.10	89.30	5,678.64	31.37	-31.32	-31.11	11.86	10.81	-5.95
5,829.00	59.80	88.90	5,695.39	31.80	-4.06	-3.85	8.50	8.44	-1.25
5,833.45	60.30	88.84	5,697.61	31.87	-0.20	0.01	11.35	11.29	-1.33
As-Drilled PP									
5,860.00	63.30	88.50	5,710.15	32.42	23.19	23.40	11.35	11.29	-1.28
5,892.00	66.80	88.40	5,723.65	33.20	52.19	52.41	10.94	10.94	-0.31
5,923.00	69.90	88.50	5,735.08	33.98	80.99	81.21	10.00	10.00	0.32
5,955.00	72.50	88.90	5,745.40	34.67	111.27	111.50	8.21	8.13	1.25
5,987.00	74.90	88.90	5,754.38	35.26	141.97	142.20	7.50	7.50	0.00
6,018.00	76.90	89.60	5,761.93	35.65	172.04	172.27	6.81	6.45	2.26
6,049.00	78.60	90.40	5,768.51	35.65	202.33	202.56	6.04	5.48	2.58
6,081.00	81.50	91.00	5,774.04	35.26	233.84	234.07	9.25	9.06	1.88
6,112.00	84.90	91.20	5,777.71	34.67	264.61	264.84	10.99	10.97	0.65
6,144.00	86.90	91.30	5,779.99	33.97	296.52	296.74	6.26	6.25	0.31
6,238.00	88.00	91.00	5,784.18	32.09	390.41	390.61	1.21	1.17	-0.32
6,333.00	89.10	91.10	5,786.58	30.35	485.36	485.55	1.16	1.16	0.11

Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Branex-COG Federal Com #18H
Project:	Lea County, NM (NAD-27 2015)	TVD Reference:	KB @ 4073.00usft (Silver Oak 3)
Site:	Branex-COG Federal Com #18H	MD Reference:	KB @ 4073.00usft (Silver Oak 3)
Well:	SHL 330' FSL 330' FWL, Sec 9, T17S, R32E, Unit M	North Reference:	Grid
Wellbore:	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M	Survey Calculation Method:	Minimum Curvature
Design:	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M	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)
6,427.00	90.20	91.20	5,787.15	28.46	579.34	579.51	1.18	1.17	0.11
6,522.00	91.80	92.30	5,785.50	25.56	674.28	674.43	2.04	1.68	1.16
6,616.00	90.50	91.00	5,783.61	22.86	768.21	768.35	1.96	-1.38	-1.38
6,710.00	89.00	89.70	5,784.02	22.28	862.21	862.33	2.11	-1.60	-1.38
6,805.00	89.10	90.30	5,785.59	22.28	957.19	957.32	0.64	0.11	0.63
6,899.00	88.80	88.20	5,787.32	23.51	1,051.16	1,051.30	2.26	-0.32	-2.23
6,994.00	89.10	88.20	5,789.06	26.50	1,146.10	1,146.25	0.32	0.32	0.00
7,088.00	89.10	88.20	5,790.53	29.45	1,240.04	1,240.21	0.00	0.00	0.00
7,182.00	89.10	88.30	5,792.01	32.32	1,333.99	1,334.17	0.11	0.00	0.11
7,277.00	90.50	90.30	5,792.34	33.48	1,428.97	1,429.16	2.57	1.47	2.11
7,371.00	91.20	91.20	5,790.95	32.25	1,522.95	1,523.13	1.21	0.74	0.96
7,466.00	91.60	91.20	5,788.63	30.26	1,617.90	1,618.07	0.42	0.42	0.00
7,560.00	91.60	91.30	5,786.00	28.21	1,711.84	1,711.99	0.11	0.00	0.11
7,655.00	90.90	89.40	5,783.93	27.63	1,806.81	1,806.96	2.13	-0.74	-2.00
7,749.00	91.30	89.70	5,782.12	28.37	1,900.79	1,900.94	0.53	0.43	0.32
7,843.00	91.30	89.70	5,779.99	28.86	1,994.77	1,994.92	0.00	0.00	0.00
7,938.00	91.50	89.60	5,777.67	29.44	2,089.74	2,089.89	0.24	0.21	-0.11
8,032.00	91.30	90.10	5,775.37	29.69	2,183.71	2,183.86	0.57	-0.21	0.53
8,127.00	92.00	90.10	5,772.64	29.52	2,278.67	2,278.81	0.74	0.74	0.00
8,221.00	90.00	90.00	5,771.00	29.44	2,372.65	2,372.79	2.13	-2.13	-0.11
8,316.00	89.90	89.30	5,771.08	30.02	2,467.65	2,467.79	0.74	-0.11	-0.74
8,410.00	90.10	89.10	5,771.08	31.33	2,561.64	2,561.79	0.30	0.21	-0.21
8,504.00	90.30	89.60	5,770.75	32.40	2,655.63	2,655.79	0.57	0.21	0.53
8,599.00	90.40	89.60	5,770.17	33.06	2,750.63	2,750.79	0.11	0.11	0.00
8,694.00	90.50	89.60	5,769.43	33.72	2,845.62	2,845.78	0.11	0.11	0.00
8,788.00	90.20	89.60	5,768.85	34.38	2,939.62	2,939.78	0.32	-0.32	0.00
8,883.00	90.60	89.80	5,768.19	34.88	3,034.61	3,034.78	0.47	0.42	0.21
8,977.00	91.30	90.30	5,766.63	34.80	3,128.60	3,128.76	0.92	0.74	0.53
9,072.00	91.60	90.80	5,764.23	33.88	3,223.57	3,223.72	0.61	0.32	0.53
9,166.00	91.90	91.00	5,761.36	32.41	3,317.51	3,317.65	0.38	0.32	0.21
9,260.00	91.00	89.80	5,758.98	31.75	3,411.47	3,411.61	1.60	-0.96	-1.28
9,354.00	91.80	89.90	5,756.68	32.00	3,505.45	3,505.58	0.86	0.65	0.11
9,449.00	89.90	89.60	5,755.27	32.41	3,600.43	3,600.57	2.02	-2.00	-0.32
9,544.00	90.80	90.20	5,754.69	32.58	3,695.43	3,695.56	1.14	0.95	0.63
9,638.00	90.90	90.60	5,753.30	31.92	3,789.41	3,789.54	0.44	0.11	0.43
9,733.00	91.10	90.80	5,751.64	30.78	3,884.39	3,884.51	0.30	0.21	0.21
9,827.00	91.20	91.10	5,749.75	29.20	3,978.36	3,978.47	0.34	0.11	0.32
9,921.00	90.60	89.60	5,748.28	28.63	4,072.34	4,072.44	1.72	-0.64	-1.60
10,016.00	90.70	89.50	5,747.20	29.38	4,167.33	4,167.44	0.15	0.11	-0.11
10,110.00	91.00	89.40	5,745.80	30.28	4,261.32	4,261.43	0.34	0.32	-0.11
10,205.00	91.30	90.30	5,743.90	30.53	4,356.30	4,356.41	1.00	0.32	0.95
10,299.00	90.20	89.10	5,742.67	31.02	4,450.29	4,450.39	1.73	-1.17	-1.28

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Site:	Branex-COG Federal Com #18H	MD Reference:	KB @ 4073 00usft (Silver Oak 3)
Well:	SHL 330' FSL 330' FWL, Sec 9, T17S, R32E, Unit M	North Reference:	Grid
Wellbore:	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M	Survey Calculation Method:	Minimum Curvature
Design:	BHL 350' FSL 970' FWL, Sec 10, T17S, R32E, Unit M	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)
10 393.00	92.00	89.80	5 740.86	31.92	4 544.26	4 544.37	2.05	1.91	0.74
10 488.00	93.30	89.30	5 736.47	32.67	4 639.15	4 639.27	1.47	1.37	-0.53
10 583.00	94.30	88.50	5 730.17	34.49	4 733.93	4 734.05	1.35	1.05	-0.84
10 677.00	92.20	88.20	5 724.84	37.19	4 827.73	4 827.87	2.26	-2.23	-0.32
10 772.00	88.00	88.60	5 724.68	39.84	4 922.67	4 922.83	4.44	-4.42	0.42
10 866.00	90.10	88.90	5 726.24	41.89	5 016.63	5 016.80	2.26	2.23	0.32
10 958.00	92.40	89.30	5 724.23	43.34	5 108.59	5 108.77	2.54	2.50	0.43
11 047.00	92.70	88.00	5 720.27	45.43	5 197.48	5 197.66	1.50	0.34	-1.46
11 142.00	91.90	90.20	5 716.46	46.92	5 292.38	5 292.58	2.46	-0.84	2.32
11 236.00	90.20	92.40	5 714.74	44.79	5 386.33	5 386.51	2.96	-1.81	2.34
11 331.00	88.90	91.10	5 715.48	41.89	5 481.28	5 481.44	1.94	-1.37	-1.37
11 425.00	90.20	90.60	5 716.22	40.49	5 575.26	5 575.41	1.48	1.38	-0.53
11 520.00	91.40	91.00	5 714.89	39.17	5 670.24	5 670.38	1.33	1.26	0.42
11 614.00	93.50	91.10	5 710.88	37.45	5 764.14	5 764.26	2.24	2.23	0.11
11 646.00	94.10	91.20	5 708.75	36.80	5 796.06	5 796.18	1.90	1.88	0.31
Final MWD Survey									
11 729.00	94.10	91.20	5 702.82	35.07	5 878.83	5 878.93	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)	
2 200.00	2 199.89	6.29	9.58	TIE-IN to VES Gyro
2 265.00	2 264.89	6.83	10.51	First TDS MWD Survey
5 833.45	5 697.61	31.87	-0.20	As-Drilled PP
11 646.00	5 708.75	36.80	5 796.06	Final MWD Survey
11 729.00	5 702.82	35.07	5 878.83	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____