

Results of Directional Survey

API number:	30-025-41358		
OGRID:		Operator:	COG OPERATING LLC
		Property:	TUSK FEDERAL # 4H

surface	ULSTR:	O	25	T	19S	R	34E
				250	FSL	2080	FEL

BH Loc	ULSTR:	B	25	T	19S	R	34E
15489	MD	10837.5	TVD	325	FNL	2001	FEL
				4955	FSL		

Top Perf/OH	ULSTR:	O	25	T	19S	R	34E
11211	MD	10930.1	TVD	682	FSL	2099	FEL

Bot Perf/OH	ULSTR:	B	25	T	19S	R	34E
15375	MD	10845.8	TVD	439	FNL	2006	FEL
				4841	FSL		

	MD	N/S	E/W	VD
	11179	401.30	-19.10	10922.4
TOP PERFS/OH	11211	432.30	-19.10	10930.10
	11211	432.30	-19.10	10930.10
	15366	4581.90	74.00	10846.40
BOT PERFS/OH	15375	4590.87	74.36	10845.77
	15445	4660.60	77.20	10840.90

NEXT TO LAST	15445	4660.60	77.20	10840.90
LAST READING	15489	4704.50	79.10	10837.50
TD	15489	4704.50	79.10	10837.50

Surface Location	250	FS	2080	FE
Projected BHL	4955	FS	2001	FE
Location of				
Top Perfs/OH	682	FS	2099	FE
Bottom Perfs/OH	4841	FS	2006	FE

SUMMARY of Subsurface Locations

Surface Location	O-25-19S-34E	250	FS	2080	FE	Vert. Depth
Top Perfs/OH	O-25-19S-34E	682	FS	2099	FE	10930.10
Bottom Perfs/OH	B-25-19S-34E	4841	FS	2006	FE	10845.77
Projected TD	B-25-19S-34E	4955	FS	2001	FE	10837.50

DEC 30 2013

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

LOG OPER. , LLC
RECEIVED
OCT 17 2013
ARTESIA WEST

Well Name and Num: Tusk Federal #4H
Location: Sec 25, T19S, R34E
Operator: COG
Drilling Contractor: McVay Drilling Company

The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.60	285	1.00	7009	91.80	12535
0.30	552	0.60	7391	61.00	13006
0.30	872	0.80	7770	89.40	13474
0.30	1188	0.60	8158	90.70	13944
1.00	1503	0.70	8531	91.00	14418
2.00	1811	1.60	8918	91.90	14703
0.30	2104	1.00	9180	90.40	15082
0.10	2450	1.20	9563	94.40	15443
0.30	2879	1.20	9938		
0.70	3298	1.90	10329		
2.00	4228	0.50	10362		
1.00	4578	3.70	10394		
2.60	5053	23.90	10521		
0.04	5494	47.50	10828		
1.30	5714	77.20	11211		
1.30	6254	93.30	11498		
1.50	6678	92.80	11689		

HOBBS OCD

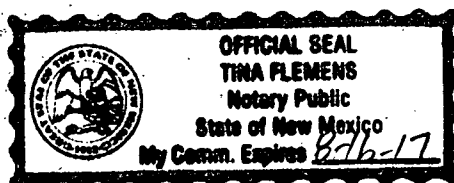
DEC 23 2013

RECEIVED

By: *Harold Crowl*

Subscribed and sworn to before me this 14th day of October, 2013

Tina FLEMENS
Notary Public, Lea County, New Mexico





P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

A GYRO TECHNOLOGIES INC. COMPANY

October 8, 2013

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

Attn: Kanicia Castillo

RE: Tusk Federal No. 004H

Please find enclosed a copy of the survey from 0.00' to 11187.00' ran on the
above referenced well.

Sincerely,


Keith Havelka
Operations

HOBBS OCD

DEC 23 2013

STATE OF TEXAS

§

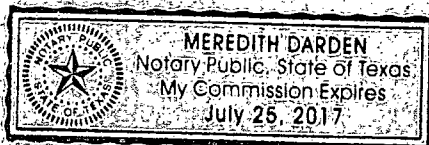
COUNTY OF NUECES

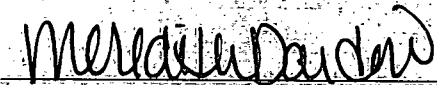
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RECEIVED

This instrument was acknowledged before me on the 8 day of October
A.D., 2013, by Keith Havelka.




Meredith Darden
Notary Public, State of Texas



Rig Name: McVay 7
State/County: New Mexico/Lea
Latitude: 32.62, Longitude: -103.51
GRID North is 0.44 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 17.5 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: tusk federal #4h-de_01.ut

Minimum Curvature Method

Report Date/Time: 10/8/2013 / 10:31

Vaughn Energy Services

West, Texas

432-563-5444

Surveyor: Chris Bankson

Tusk Federal No. 004H / API 30-025-41358

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	0.42	22.03	100.00	0.34	0.14	0.34	0.37	22.03	0.42
200.00	0.69	40.98	199.99	1.13	0.67	1.13	1.31	30.54	0.32
300.00	0.57	51.74	299.99	1.89	1.45	1.89	2.38	37.49	0.16
400.00	0.58	43.87	399.98	2.56	2.19	2.56	3.37	40.53	0.08
500.00	0.34	14.05	499.98	3.22	2.61	3.22	4.14	39.09	0.33
600.00	0.43	357.25	599.98	3.88	2.67	3.88	4.71	34.51	0.14
700.00	0.43	338.76	699.98	4.60	2.51	4.60	5.24	28.65	0.14
800.00	0.09	340.66	799.97	5.02	2.35	5.02	5.54	25.13	0.34
900.00	0.28	332.85	899.97	5.31	2.22	5.31	5.75	22.66	0.20
1000.00	0.29	328.98	999.97	5.75	1.97	5.75	6.08	18.93	0.02
1100.00	0.13	296.97	1099.97	6.02	1.73	6.02	6.27	16.06	0.19
1200.00	0.21	195.89	1199.97	5.90	1.58	5.90	6.10	14.98	0.27
1300.00	0.59	187.27	1299.97	5.21	1.46	5.21	5.41	15.68	0.38
1400.00	0.69	173.92	1399.96	4.10	1.46	4.10	4.35	19.62	0.18
1500.00	0.87	168.27	1499.95	2.76	1.68	2.76	3.23	31.35	0.19
1600.00	1.02	161.84	1599.94	1.16	2.11	1.16	2.41	61.12	0.19
1700.00	1.14	164.85	1699.92	-0.65	2.65	-0.65	2.73	103.71	0.13
1800.00	1.57	168.79	1799.89	-2.95	3.18	-2.95	4.34	132.89	0.43

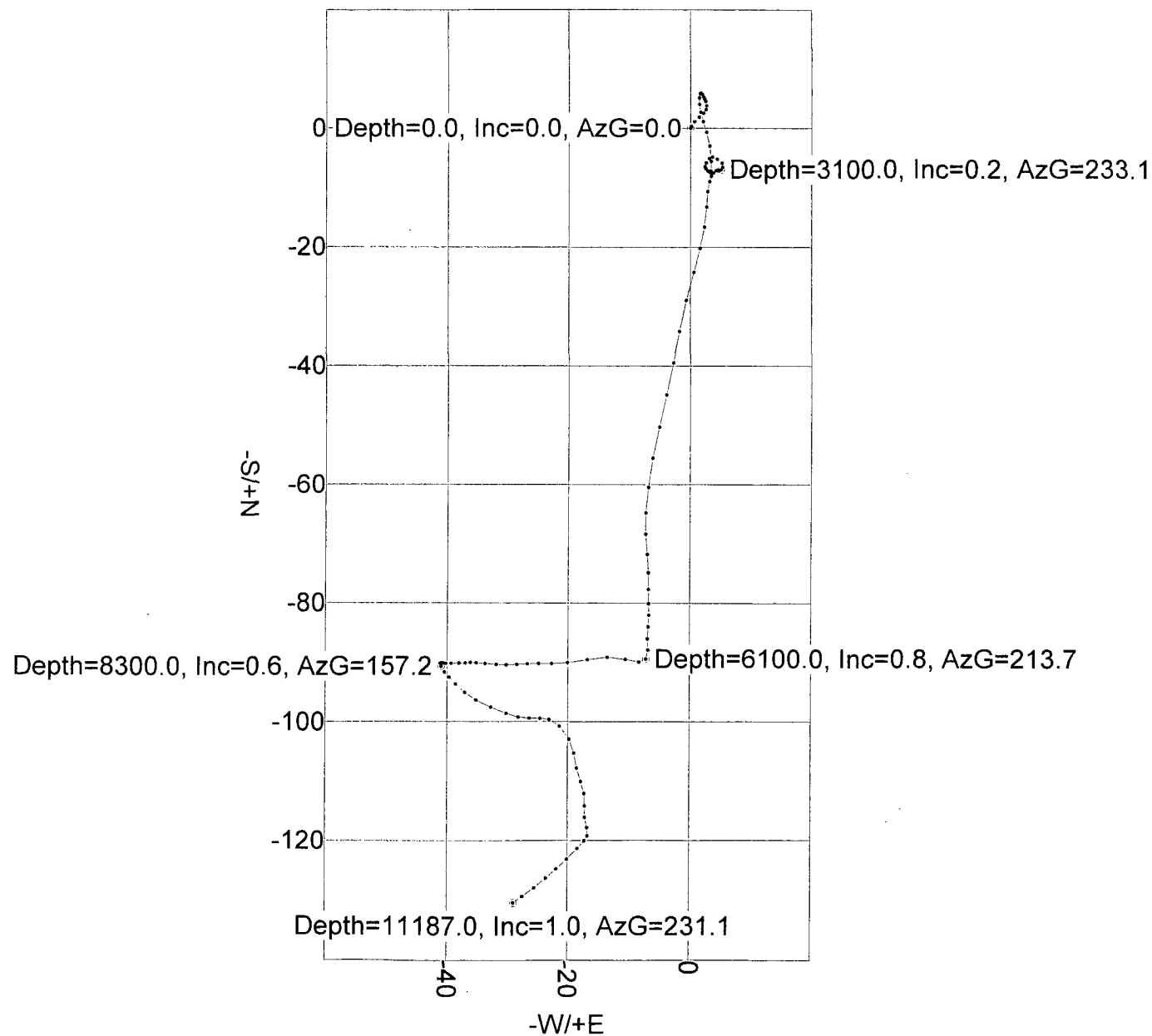
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	1.50	179.62	1899.86	-5.60	3.45	-5.60	6.58	148.35	0.30
2000.00	0.31	197.73	1999.84	-7.17	3.38	-7.17	7.92	154.77	1.20
2100.00	0.14	301.89	2099.84	-7.37	3.19	-7.37	8.03	156.56	0.37
2200.00	0.28	304.11	2199.84	-7.17	2.89	-7.17	7.73	158.03	0.14
2300.00	0.34	333.34	2299.84	-6.77	2.56	-6.77	7.23	159.29	0.17
2400.00	0.05	349.20	2399.84	-6.46	2.42	-6.46	6.90	159.49	0.29
2500.00	0.71	21.43	2499.84	-5.85	2.64	-5.85	6.42	155.74	0.67
2600.00	0.37	53.19	2599.83	-5.08	3.12	-5.08	5.96	148.47	0.44
2700.00	0.30	92.78	2699.83	-4.90	3.64	-4.90	6.11	143.43	0.24
2800.00	0.71	122.69	2799.83	-5.25	4.42	-5.25	6.86	139.91	0.47
2900.00	0.48	140.94	2899.82	-5.91	5.21	-5.91	7.88	138.63	0.30
3000.00	0.42	204.90	2999.82	-6.57	5.31	-6.57	8.45	141.03	0.48
3100.00	0.17	233.07	3099.82	-6.99	5.04	-6.99	8.62	144.23	0.28
3200.00	0.22	274.33	3199.82	-7.07	4.73	-7.07	8.51	146.22	0.14
3300.00	0.02	285.79	3299.82	-7.05	4.52	-7.05	8.38	147.32	0.19
3400.00	0.27	244.82	3399.82	-7.15	4.29	-7.15	8.33	149.05	0.26
3500.00	0.38	228.91	3499.82	-7.47	3.82	-7.47	8.39	152.92	0.14
3600.00	0.16	202.15	3599.81	-7.82	3.51	-7.82	8.57	155.80	0.25
3700.00	0.16	196.95	3699.81	-8.08	3.42	-8.08	8.78	157.07	0.01
3800.00	0.86	194.60	3799.81	-8.94	3.19	-8.94	9.49	160.37	0.70
3900.00	1.16	186.73	3899.79	-10.67	2.88	-10.67	11.06	164.89	0.33
4000.00	1.79	182.00	3999.76	-13.24	2.71	-13.24	13.51	168.43	0.64
4100.00	2.13	189.98	4099.70	-16.62	2.33	-16.62	16.79	172.01	0.44
4200.00	2.10	192.45	4199.63	-20.24	1.62	-20.24	20.30	175.43	0.10
4300.00	2.55	195.86	4299.55	-24.16	0.61	-24.16	24.17	178.54	0.47
4400.00	3.04	193.81	4399.43	-28.88	-0.63	-28.88	28.89	181.24	0.50
4500.00	3.11	189.52	4499.29	-34.13	-1.71	-34.13	34.18	182.87	0.24
4600.00	3.11	192.38	4599.14	-39.46	-2.74	-39.46	39.55	183.97	0.16
4700.00	3.21	190.99	4698.99	-44.85	-3.85	-44.85	45.01	184.91	0.13
4800.00	3.16	192.72	4798.84	-50.28	-4.99	-50.28	50.53	185.67	0.11
4900.00	2.94	191.36	4898.69	-55.48	-6.10	-55.48	55.82	186.28	0.23
5000.00	2.76	184.45	4998.57	-60.40	-6.80	-60.40	60.78	186.42	0.39
5100.00	2.25	186.76	5098.47	-64.75	-7.21	-64.75	65.15	186.36	0.52
5200.00	1.94	172.44	5198.41	-68.38	-7.22	-68.38	68.76	186.03	0.61
5300.00	1.96	177.61	5298.35	-71.77	-6.93	-71.77	72.10	185.51	0.18
5400.00	1.60	176.46	5398.30	-74.87	-6.77	-74.87	75.17	185.17	0.36
5500.00	1.57	181.12	5498.26	-77.63	-6.71	-77.63	77.92	184.94	0.13
5600.00	1.16	177.99	5598.24	-80.01	-6.70	-80.01	80.29	184.79	0.42
5700.00	1.05	179.48	5698.22	-81.94	-6.66	-81.94	82.21	184.65	0.10

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	1.22	185.77	5798.20	-83.92	-6.76	-83.92	84.19	184.60	0.21
5900.00	1.07	179.02	5898.18	-85.92	-6.85	-85.92	86.19	184.56	0.21
6000.00	1.11	176.81	5998.16	-87.81	-6.78	-87.81	88.08	184.42	0.06
6100.00	0.79	213.75	6098.15	-89.35	-7.11	-89.35	89.64	184.55	0.68
6200.00	0.88	273.71	6198.14	-89.87	-8.26	-89.87	90.25	185.25	0.84
6300.00	1.72	285.98	6298.11	-89.41	-10.47	-89.41	90.02	186.68	0.87
6400.00	1.80	267.66	6398.06	-89.06	-13.48	-89.06	90.08	188.61	0.57
6500.00	2.02	258.84	6498.01	-89.47	-16.78	-89.47	91.03	190.62	0.36
6600.00	1.80	263.11	6597.95	-90.00	-20.07	-90.00	92.21	192.57	0.26
6700.00	1.22	271.85	6697.92	-90.15	-22.69	-90.15	92.96	194.13	0.62
6800.00	1.23	266.94	6797.90	-90.18	-24.83	-90.18	93.53	195.39	0.11
6900.00	0.97	270.70	6897.88	-90.22	-26.74	-90.22	94.10	196.51	0.27
7000.00	1.02	263.50	6997.86	-90.31	-28.47	-90.31	94.69	197.50	0.14
7100.00	0.94	270.30	7097.85	-90.41	-30.17	-90.41	95.31	198.46	0.14
7200.00	1.01	274.73	7197.83	-90.33	-31.87	-90.33	95.79	199.43	0.10
7300.00	1.10	274.30	7297.82	-90.19	-33.70	-90.19	96.28	200.49	0.09
7400.00	0.60	276.66	7397.80	-90.05	-35.18	-90.05	96.68	201.34	0.50
7500.00	0.51	267.20	7497.80	-90.02	-36.15	-90.02	97.00	201.88	0.13
7600.00	0.45	263.51	7597.80	-90.08	-36.98	-90.08	97.38	202.32	0.06
7700.00	0.75	272.41	7697.79	-90.10	-38.03	-90.10	97.80	202.88	0.31
7800.00	0.77	263.00	7797.78	-90.15	-39.35	-90.15	98.37	203.58	0.13
7900.00	0.33	286.15	7897.78	-90.15	-40.29	-90.15	98.75	204.08	0.48
8000.00	0.16	271.68	7997.78	-90.07	-40.71	-90.07	98.84	204.32	0.18
8100.00	0.12	258.21	8097.78	-90.09	-40.95	-90.09	98.96	204.45	0.05
8200.00	0.08	226.33	8197.78	-90.16	-41.11	-90.16	99.09	204.51	0.07
8300.00	0.55	157.22	8297.77	-90.65	-40.97	-90.65	99.48	204.32	0.53
8400.00	0.68	141.44	8397.77	-91.55	-40.42	-91.55	100.08	203.82	0.21
8500.00	0.65	137.13	8497.76	-92.43	-39.66	-92.43	100.58	203.23	0.06
8600.00	1.19	137.99	8597.75	-93.62	-38.58	-93.62	101.26	202.40	0.54
8700.00	1.21	127.99	8697.73	-95.04	-37.05	-95.04	102.01	201.30	0.21
8800.00	1.38	120.64	8797.70	-96.30	-35.19	-96.30	102.53	200.07	0.23
8900.00	1.76	113.62	8897.66	-97.53	-32.75	-97.53	102.88	198.56	0.43
9000.00	1.41	111.72	8997.62	-98.60	-30.19	-98.60	103.12	197.02	0.35
9100.00	1.00	99.75	9097.60	-99.21	-28.18	-99.21	103.13	195.86	0.48
9200.00	1.07	92.58	9197.59	-99.40	-26.39	-99.40	102.84	194.87	0.15
9300.00	0.98	88.96	9297.57	-99.42	-24.60	-99.42	102.42	193.90	0.11
9400.00	0.81	105.90	9397.56	-99.60	-23.06	-99.60	102.24	193.04	0.31
9500.00	1.58	132.85	9497.54	-100.74	-21.37	-100.74	102.98	191.98	0.94
9600.00	1.56	152.92	9597.50	-102.88	-19.74	-102.88	104.76	190.86	0.55

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
9700.00	1.38	170.66	9697.47	-105.28	-18.93	-105.28	106.97	190.19	0.48
9800.00	1.53	168.05	9797.44	-107.77	-18.46	-107.77	109.34	189.72	0.16
9900.00	1.18	158.03	9897.41	-110.03	-17.80	-110.03	111.46	189.19	0.42
10000.00	1.22	169.45	9997.39	-112.03	-17.22	-112.03	113.35	188.74	0.24
10100.00	1.28	185.19	10097.36	-114.19	-17.12	-114.19	115.47	188.53	0.35
10200.00	0.90	172.89	10197.34	-116.09	-17.12	-116.09	117.34	188.39	0.44
10300.00	1.13	163.60	10297.33	-117.82	-16.75	-117.82	119.00	188.09	0.29
10400.00	0.55	204.97	10397.32	-119.20	-16.67	-119.20	120.36	187.96	0.81
10500.00	0.62	215.82	10497.31	-120.07	-17.19	-120.07	121.29	188.15	0.13
10600.00	1.37	222.12	10597.30	-121.39	-18.31	-121.39	122.77	188.58	0.76
10700.00	1.53	227.77	10697.26	-123.18	-20.10	-123.18	124.81	189.27	0.21
10800.00	1.26	224.80	10797.23	-124.86	-21.86	-124.86	126.76	189.93	0.28
10900.00	1.39	229.07	10897.21	-126.44	-23.56	-126.44	128.61	190.55	0.16
11000.00	1.50	231.11	10997.18	-128.05	-25.49	-128.05	130.56	191.26	0.12
11100.00	1.37	237.30	11097.15	-129.51	-27.51	-129.51	132.40	191.99	0.20
11187.00	1.00	231.08	11184.13	-130.55	-28.97	-130.55	133.73	192.51	0.45



Vaughn Energy Services
West, Texas
432-563-5444
Surveyor: Chris Bankson
Tusk Federal No. 004H / API 30-025-41358



VES Survey Date: 10/01/2013



COG Operating LLC

Lea County, NM (NAD27 NME)

Tusk Federal

4H

OH

Survey: MWD

Survey Report - Geographic

15 October, 2013

NEXUS
DIRECTIONAL SOLUTIONS, L.P.



Nexus Directional Solutions L.P.

Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Tusk Federal	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Project:	Lea County, NM (NAD27 NME)		
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:	Tusk Federal		
Site Position:	Northings:	0.00 usft	Latitude: 30° 59' 24.512 N
From: Map	Easting:	0.00 usft	Longitude: 105° 55' 44.137 W
Position Uncertainty:	Slot Radius:	13-3/16 "	Grid Convergence: -0.82 °

Well:	4H		
Well Position	+N/-S	0.0 usft	Northings: 591,927.60 usft
	+E/-W	0.0 usft	Easting: 753,046.60 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
			Ground Level: 0.0 usft

Wellbore:	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	10/15/13	7.30
			Dip Angle
			60.51
			Field Strength
			48,656

Design:	OH		
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
			(°)
			0.71

Survey Program	Date 10/15/13		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	10,300.0	Gyro (OH)	MWD
10,394.0	15,489.0	MWD (OH)	MWD
			Description
			MWD - Standard
			MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude	
Depth	(°)	(°)	Depth	(usft)	(usft)	Northings	Easting			
(usft)			(usft)			(usft)	(usft)			
10,300.0	1.13	163.60	10,297.3	-117.8	-16.7	591,809.82	753,029.86	32° 37' 27.477 N	103° 30' 41.359 W	
10,394.0	3.70	12.70	10,391.3	-115.7	-15.8	591,811.89	753,030.79	32° 37' 27.497 N	103° 30' 41.348 W	
10,425.0	11.60	20.00	10,422.0	-111.8	-14.5	591,815.80	753,032.08	32° 37' 27.536 N	103° 30' 41.333 W	
10,457.0	15.90	12.80	10,453.1	-104.5	-12.4	591,823.10	753,034.15	32° 37' 27.608 N	103° 30' 41.308 W	
10,489.0	19.40	4.60	10,483.5	-94.9	-11.0	591,832.68	753,035.55	32° 37' 27.703 N	103° 30' 41.291 W	
10,521.0	23.90	2.70	10,513.3	-83.1	-10.3	591,844.46	753,036.28	32° 37' 27.819 N	103° 30' 41.281 W	
10,553.0	27.70	1.40	10,542.1	-69.2	-9.8	591,858.37	753,036.77	32° 37' 27.957 N	103° 30' 41.274 W	
10,584.0	29.50	359.10	10,569.3	-54.4	-9.8	591,873.21	753,036.82	32° 37' 28.103 N	103° 30' 41.272 W	
10,616.0	30.10	356.10	10,597.1	-38.5	-10.4	591,889.10	753,036.15	32° 37' 28.261 N	103° 30' 41.279 W	
10,648.0	32.50	355.90	10,624.4	-21.9	-11.6	591,905.68	753,034.99	32° 37' 28.425 N	103° 30' 41.291 W	
10,680.0	35.90	356.90	10,650.9	-4.0	-12.7	591,923.63	753,033.87	32° 37' 28.603 N	103° 30' 41.302 W	



Nexus Directional Solutions L.P.

Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Tusk Federal	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,712.0	38.30	357.40	10,676.4	15.3	-13.7	591,942.90	753,032.91	32° 37' 28.793 N	103° 30' 41.312 W	
10,744.0	39.00	359.00	10,701.4	35.3	-14.3	591,962.88	753,032.29	32° 37' 28.991 N	103° 30' 41.317 W	
10,776.0	43.00	359.80	10,725.5	56.3	-14.5	591,983.87	753,032.07	32° 37' 29.199 N	103° 30' 41.318 W	
10,807.0	46.80	1.00	10,747.5	78.1	-14.4	592,005.74	753,032.23	32° 37' 29.415 N	103° 30' 41.314 W	
10,828.0	47.50	359.70	10,761.8	93.5	-14.3	592,021.14	753,032.33	32° 37' 29.568 N	103° 30' 41.311 W	
10,860.0	48.90	358.90	10,783.1	117.4	-14.6	592,044.99	753,032.03	32° 37' 29.804 N	103° 30' 41.313 W	
10,892.0	52.10	358.70	10,803.5	142.1	-15.1	592,069.67	753,031.52	32° 37' 30.048 N	103° 30' 41.317 W	
10,924.0	55.90	359.00	10,822.3	167.9	-15.6	592,095.55	753,031.00	32° 37' 30.304 N	103° 30' 41.320 W	
10,956.0	59.60	359.00	10,839.3	195.0	-16.1	592,122.61	753,030.53	32° 37' 30.572 N	103° 30' 41.323 W	
10,988.0	63.00	358.90	10,854.7	223.1	-16.6	592,150.67	753,030.01	32° 37' 30.849 N	103° 30' 41.327 W	
11,020.0	65.50	358.60	10,868.6	251.9	-17.2	592,179.48	753,029.38	32° 37' 31.134 N	103° 30' 41.332 W	
11,051.0	67.00	358.50	10,881.1	280.2	-17.9	592,207.84	753,028.66	32° 37' 31.415 N	103° 30' 41.337 W	
11,083.0	69.50	359.10	10,892.9	310.0	-18.6	592,237.56	753,028.04	32° 37' 31.709 N	103° 30' 41.342 W	
11,115.0	71.40	359.40	10,903.6	340.1	-18.9	592,267.71	753,027.65	32° 37' 32.008 N	103° 30' 41.344 W	
11,147.0	72.70	359.90	10,913.5	370.5	-19.1	592,298.15	753,027.46	32° 37' 32.309 N	103° 30' 41.343 W	
11,179.0	74.90	0.10	10,922.4	401.3	-19.1	592,328.88	753,027.46	32° 37' 32.613 N	103° 30' 41.340 W	
11,211.0	77.20	359.90	10,930.1	432.3	-19.1	592,359.93	753,027.46	32° 37' 32.920 N	103° 30' 41.338 W	
11,243.0	79.30	359.80	10,936.7	463.7	-19.2	592,391.26	753,027.38	32° 37' 33.230 N	103° 30' 41.336 W	
11,275.0	81.50	0.70	10,942.0	495.2	-19.1	592,422.81	753,027.52	32° 37' 33.542 N	103° 30' 41.331 W	
11,306.0	84.30	1.60	10,945.8	526.0	-18.5	592,453.56	753,028.14	32° 37' 33.847 N	103° 30' 41.321 W	
11,338.0	87.40	2.40	10,948.1	557.9	-17.3	592,485.45	753,029.25	32° 37' 34.162 N	103° 30' 41.305 W	
11,370.0	88.80	3.00	10,949.2	589.8	-15.8	592,517.40	753,030.76	32° 37' 34.478 N	103° 30' 41.285 W	
11,402.0	89.30	3.20	10,949.7	621.7	-14.1	592,549.35	753,032.49	32° 37' 34.794 N	103° 30' 41.262 W	
11,498.0	93.30	3.60	10,947.6	717.5	-8.4	592,645.13	753,038.18	32° 37' 35.741 N	103° 30' 41.187 W	
11,593.0	92.40	2.70	10,942.8	812.3	-3.2	592,739.87	753,043.39	32° 37' 36.678 N	103° 30' 41.117 W	
11,689.0	92.80	2.00	10,938.5	908.1	0.7	592,835.69	753,047.32	32° 37' 37.626 N	103° 30' 41.062 W	
11,784.0	90.80	0.70	10,935.5	1,003.0	3.0	592,930.61	753,049.56	32° 37' 38.565 N	103° 30' 41.028 W	
11,879.0	91.50	0.10	10,933.6	1,098.0	3.6	593,025.59	753,050.22	32° 37' 39.505 N	103° 30' 41.011 W	
11,974.0	91.70	359.30	10,930.9	1,192.9	3.1	593,120.55	753,049.73	32° 37' 40.445 N	103° 30' 41.009 W	
12,068.0	92.70	359.20	10,927.3	1,286.9	1.9	593,214.47	753,048.50	32° 37' 41.374 N	103° 30' 41.014 W	
12,161.0	91.30	359.30	10,924.1	1,379.8	0.7	593,307.40	753,047.28	32° 37' 42.294 N	103° 30' 41.020 W	
12,256.0	89.10	359.70	10,923.8	1,474.8	-0.1	593,402.39	753,046.45	32° 37' 43.234 N	103° 30' 41.021 W	
12,348.0	89.90	359.50	10,924.6	1,566.8	-0.8	593,494.39	753,045.81	32° 37' 44.144 N	103° 30' 41.021 W	
12,441.0	91.20	359.70	10,923.7	1,659.8	-1.4	593,587.38	753,045.16	32° 37' 45.064 N	103° 30' 41.020 W	
12,535.0	91.80	0.10	10,921.2	1,753.7	-1.6	593,681.35	753,045.00	32° 37' 45.994 N	103° 30' 41.013 W	
12,630.0	92.80	0.20	10,917.4	1,848.7	-1.4	593,776.27	753,045.24	32° 37' 46.933 N	103° 30' 41.002 W	
12,724.0	93.70	0.00	10,912.1	1,942.5	-1.2	593,870.12	753,045.41	32° 37' 47.862 N	103° 30' 40.991 W	
12,817.0	92.60	1.80	10,907.0	2,035.4	0.3	593,962.96	753,046.87	32° 37' 48.780 N	103° 30' 40.966 W	
12,912.0	90.60	2.70	10,904.3	2,130.2	4.0	594,057.84	753,050.60	32° 37' 49.719 N	103° 30' 40.914 W	
13,006.0	91.00	2.50	10,903.0	2,224.1	8.3	594,151.74	753,054.86	32° 37' 50.647 N	103° 30' 40.855 W	
13,100.0	91.30	2.30	10,901.1	2,318.0	12.2	594,245.63	753,058.80	32° 37' 51.576 N	103° 30' 40.801 W	
13,193.0	91.90	2.20	10,898.5	2,410.9	15.8	594,338.53	753,062.45	32° 37' 52.495 N	103° 30' 40.750 W	
13,288.0	92.50	2.10	10,894.9	2,505.8	19.4	594,433.39	753,066.01	32° 37' 53.433 N	103° 30' 40.699 W	
13,382.0	91.10	0.50	10,891.9	2,599.7	21.5	594,527.31	753,068.14	32° 37' 54.363 N	103° 30' 40.666 W	
13,474.0	89.40	359.70	10,891.5	2,691.7	21.7	594,619.31	753,068.30	32° 37' 55.273 N	103° 30' 40.656 W	
13,568.0	91.10	359.20	10,891.1	2,785.7	20.8	594,713.30	753,067.40	32° 37' 56.203 N	103° 30' 40.658 W	
13,662.0	92.60	359.50	10,888.1	2,879.6	19.7	594,807.24	753,066.33	32° 37' 57.133 N	103° 30' 40.662 W	
13,756.0	91.30	0.80	10,884.9	2,973.6	20.0	594,901.18	753,066.58	32° 37' 58.062 N	103° 30' 40.650 W	
13,849.0	89.50	2.70	10,884.2	3,066.5	22.8	594,994.13	753,069.42	32° 37' 58.982 N	103° 30' 40.609 W	
13,944.0	90.70	2.40	10,884.0	3,161.4	27.0	595,089.03	753,073.64	32° 37' 59.920 N	103° 30' 40.551 W	
14,038.0	92.00	3.00	10,881.8	3,255.3	31.5	595,182.90	753,078.07	32° 38' 0.849 N	103° 30' 40.491 W	
14,133.0	93.00	3.30	10,877.7	3,350.1	36.7	595,277.66	753,083.28	32° 38' 1.786 N	103° 30' 40.421 W	
14,227.0	91.70	2.60	10,873.8	3,443.9	41.5	595,371.46	753,088.12	32° 38' 2.714 N	103° 30' 40.356 W	
14,323.0	90.20	1.30	10,872.2	3,539.8	44.8	595,467.38	753,091.38	32° 38' 3.663 N	103° 30' 40.309 W	
14,418.0	91.00	1.90	10,871.2	3,634.7	47.4	595,562.34	753,094.04	32° 38' 4.602 N	103° 30' 40.270 W	



Nexus Directional Solutions L.P.
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Tusk Federal	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,513.0	91.80	2.40	10,868.9	3,729.6	51.0	595,657.25	753,097.60	32° 38' 5.541 N	103° 30' 40.219 W
14,608.0	91.10	1.40	10,866.5	3,824.6	54.2	595,752.16	753,100.75	32° 38' 6.480 N	103° 30' 40.174 W
14,703.0	91.90	1.40	10,864.0	3,919.5	56.5	595,847.10	753,103.07	32° 38' 7.419 N	103° 30' 40.138 W
14,798.0	92.70	1.60	10,860.2	4,014.4	59.0	595,941.99	753,105.55	32° 38' 8.358 N	103° 30' 40.101 W
14,893.0	91.20	1.10	10,857.0	4,109.3	61.2	596,036.90	753,107.79	32° 38' 9.297 N	103° 30' 40.066 W
14,987.0	89.30	1.20	10,856.6	4,203.3	63.1	596,130.88	753,109.68	32° 38' 10.226 N	103° 30' 40.035 W
15,082.0	90.40	1.40	10,856.8	4,298.3	65.2	596,225.85	753,111.83	32° 38' 11.166 N	103° 30' 40.001 W
15,176.0	91.50	1.60	10,855.3	4,392.2	67.7	596,319.81	753,114.29	32° 38' 12.095 N	103° 30' 39.964 W
15,271.0	92.80	1.90	10,851.7	4,487.1	70.6	596,414.69	753,117.19	32° 38' 13.034 N	103° 30' 39.922 W
15,366.0	93.60	2.20	10,846.4	4,581.9	74.0	596,509.48	753,120.58	32° 38' 13.972 N	103° 30' 39.873 W
15,445.0	94.40	2.50	10,840.9	4,660.6	77.2	596,588.23	753,123.81	32° 38' 14.751 N	103° 30' 39.828 W
15,489.0	94.40	2.50	10,837.5	4,704.5	79.1	596,632.05	753,125.73	32° 38' 15.184 N	103° 30' 39.802 W

Checked By: _____ Approved By: _____ Date: _____

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

LOG OPER. , LLC
RECEIVED
OCT 17 2013
ARTESIA WEST

Well Name and Num: Tusk Federal #4H
Location: Sec 25, T19S, R34E
Operator: COG
Drilling Contractor: McVay Drilling Company

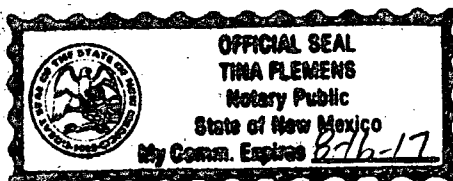
The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

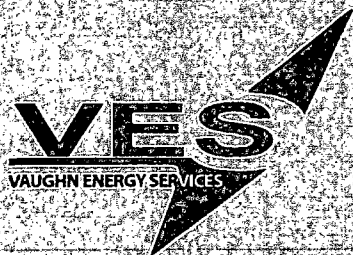
<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.60	285	1.00	7009	91.80	12535
0.30	552	0.60	7391	61.00	13006
0.30	872	0.80	7770	89.40	13474
0.30	1188	0.60	8158	90.70	13944
1.00	1503	0.70	8531	91.00	14418
2.00	1811	1.60	8918	91.90	14703
0.30	2104	1.00	9180	90.40	15082
0.10	2450	1.20	9563	94.40	15443
0.30	2879	1.20	9938		
0.70	3298	1.90	10329		
2.00	4228	0.50	10362		
1.00	4578	3.70	10394		
2.60	5053	23.90	10521		
0.04	5494	47.50	10828		
1.30	5714	77.20	11211		
1.30	6254	93.30	11498		
1.50	6678	92.80	11689		

By: Hunter Crowl

Subscribed and sworn to before me this 14th day of October, 2013

Tina Flemens
Notary Public, Lea County, New Mexico





A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

October 8, 2013

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

Attn: Kanicia Castillo

RE: **Tusk Federal No. 004H**

Please find enclosed a copy of the survey from 0 00' to 11187 00' ran on the
above referenced well.

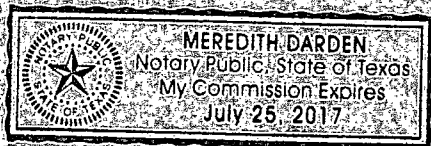
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 8 day of October
A.D., 2013, by Keith Havelka


Meredith Darden
Notary Public, State of Texas



Company: COG Operating, LLC (Concho)

Lease/Well: Tusk Federal /No. 004H



Rig Name: McVay 7

State/County: New Mexico/Lea

Latitude: 32.62, Longitude: -103.51

GRID North is 0.44 Degrees East of True North

VS-Azi: 0.00 Degrees



Depth Reference : RKB = 17.5 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: tusk federal #4h-de_01.ut

Minimum Curvature Method

Report Date/Time: 10/8/2013 / 10:31

Vaughn Energy Services

West, Texas

432-563-5444

Surveyor: Chris Bankson

Tusk Federal No. 004H / API 30-025-41358

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	0.42	22.03	100.00	0.34	0.14	0.34	0.37	22.03	0.42
200.00	0.69	40.98	199.99	1.13	0.67	1.13	1.31	30.54	0.32
300.00	0.57	51.74	299.99	1.89	1.45	1.89	2.38	37.49	0.16
400.00	0.58	43.87	399.98	2.56	2.19	2.56	3.37	40.53	0.08
500.00	0.34	14.05	499.98	3.22	2.61	3.22	4.14	39.09	0.33
600.00	0.43	357.25	599.98	3.88	2.67	3.88	4.71	34.51	0.14
700.00	0.43	338.76	699.98	4.60	2.51	4.60	5.24	28.65	0.14
800.00	0.09	340.66	799.97	5.02	2.35	5.02	5.54	25.13	0.34
900.00	0.28	332.85	899.97	5.31	2.22	5.31	5.75	22.66	0.20
1000.00	0.29	328.98	999.97	5.75	1.97	5.75	6.08	18.93	0.02
1100.00	0.13	296.97	1099.97	6.02	1.73	6.02	6.27	16.06	0.19
1200.00	0.21	195.89	1199.97	5.90	1.58	5.90	6.10	14.98	0.27
1300.00	0.59	187.27	1299.97	5.21	1.46	5.21	5.41	15.68	0.38
1400.00	0.69	173.92	1399.96	4.10	1.46	4.10	4.35	19.62	0.18
1500.00	0.87	168.27	1499.95	2.76	1.68	2.76	3.23	31.35	0.19
1600.00	1.02	161.84	1599.94	1.16	2.11	1.16	2.41	61.12	0.19
1700.00	1.14	164.85	1699.92	-0.65	2.65	-0.65	2.73	103.71	0.13
1800.00	1.57	168.79	1799.89	-2.95	3.18	-2.95	4.34	132.89	0.43

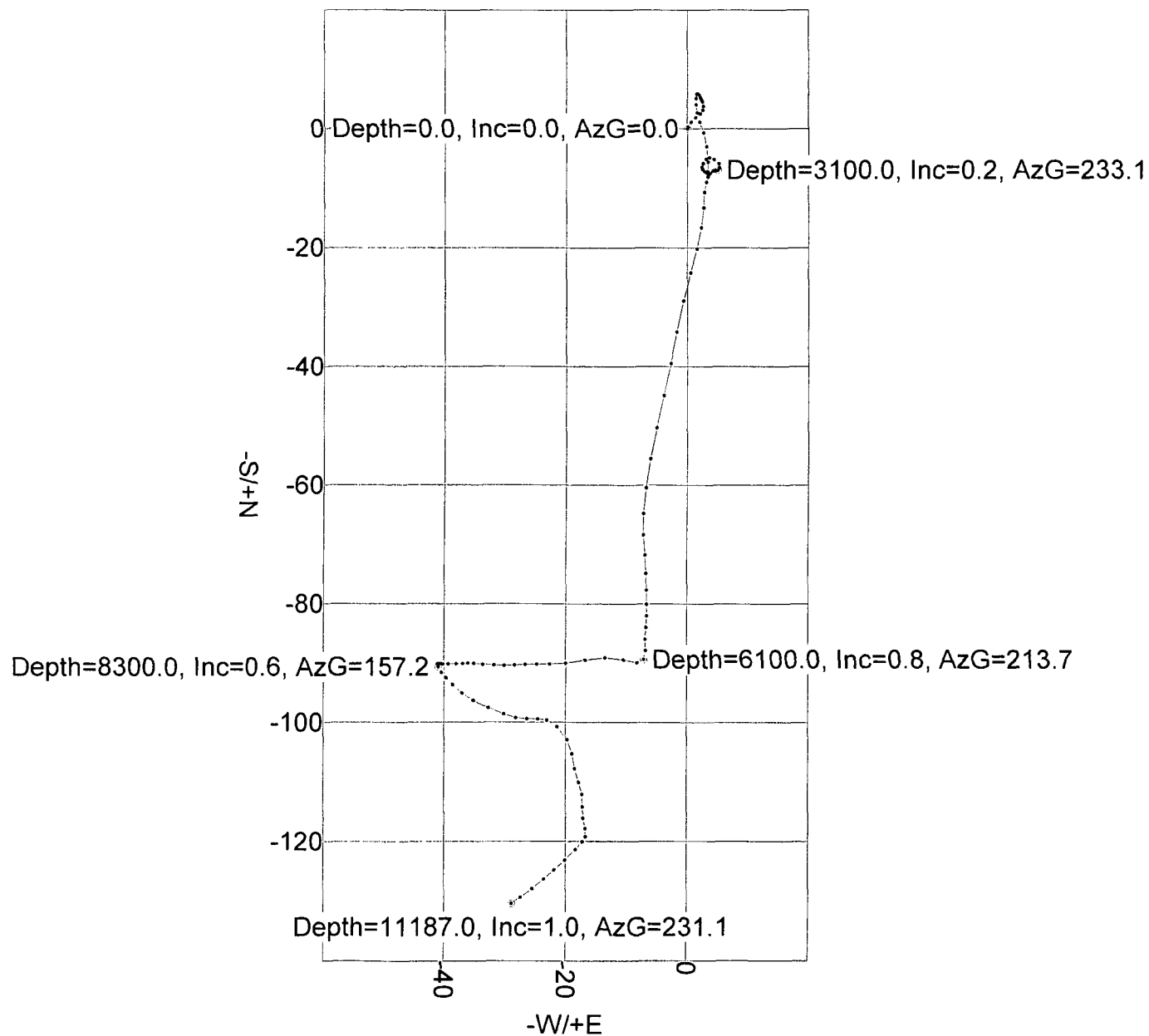
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	1.50	179.62	1899.86	-5.60	3.45	-5.60	6.58	148.35	0.30
2000.00	0.31	197.73	1999.84	-7.17	3.38	-7.17	7.92	154.77	1.20
2100.00	0.14	301.89	2099.84	-7.37	3.19	-7.37	8.03	156.56	0.37
2200.00	0.28	304.11	2199.84	-7.17	2.89	-7.17	7.73	158.03	0.14
2300.00	0.34	333.34	2299.84	-6.77	2.56	-6.77	7.23	159.29	0.17
2400.00	0.05	349.20	2399.84	-6.46	2.42	-6.46	6.90	159.49	0.29
2500.00	0.71	21.43	2499.84	-5.85	2.64	-5.85	6.42	155.74	0.67
2600.00	0.37	53.19	2599.83	-5.08	3.12	-5.08	5.96	148.47	0.44
2700.00	0.30	92.78	2699.83	-4.90	3.64	-4.90	6.11	143.43	0.24
2800.00	0.71	122.69	2799.83	-5.25	4.42	-5.25	6.86	139.91	0.47
2900.00	0.48	140.94	2899.82	-5.91	5.21	-5.91	7.88	138.63	0.30
3000.00	0.42	204.90	2999.82	-6.57	5.31	-6.57	8.45	141.03	0.48
3100.00	0.17	233.07	3099.82	-6.99	5.04	-6.99	8.62	144.23	0.28
3200.00	0.22	274.33	3199.82	-7.07	4.73	-7.07	8.51	146.22	0.14
3300.00	0.02	285.79	3299.82	-7.05	4.52	-7.05	8.38	147.32	0.19
3400.00	0.27	244.82	3399.82	-7.15	4.29	-7.15	8.33	149.05	0.26
3500.00	0.38	228.91	3499.82	-7.47	3.82	-7.47	8.39	152.92	0.14
3600.00	0.16	202.15	3599.81	-7.82	3.51	-7.82	8.57	155.80	0.25
3700.00	0.16	196.95	3699.81	-8.08	3.42	-8.08	8.78	157.07	0.01
3800.00	0.86	194.60	3799.81	-8.94	3.19	-8.94	9.49	160.37	0.70
3900.00	1.16	186.73	3899.79	-10.67	2.88	-10.67	11.06	164.89	0.33
4000.00	1.79	182.00	3999.76	-13.24	2.71	-13.24	13.51	168.43	0.64
4100.00	2.13	189.98	4099.70	-16.62	2.33	-16.62	16.79	172.01	0.44
4200.00	2.10	192.45	4199.63	-20.24	1.62	-20.24	20.30	175.43	0.10
4300.00	2.55	195.86	4299.55	-24.16	0.61	-24.16	24.17	178.54	0.47
4400.00	3.04	193.81	4399.43	-28.88	-0.63	-28.88	28.89	181.24	0.50
4500.00	3.11	189.52	4499.29	-34.13	-1.71	-34.13	34.18	182.87	0.24
4600.00	3.11	192.38	4599.14	-39.46	-2.74	-39.46	39.55	183.97	0.16
4700.00	3.21	190.99	4698.99	-44.85	-3.85	-44.85	45.01	184.91	0.13
4800.00	3.16	192.72	4798.84	-50.28	-4.99	-50.28	50.53	185.67	0.11
4900.00	2.94	191.36	4898.69	-55.48	-6.10	-55.48	55.82	186.28	0.23
5000.00	2.76	184.45	4998.57	-60.40	-6.80	-60.40	60.78	186.42	0.39
5100.00	2.25	186.76	5098.47	-64.75	-7.21	-64.75	65.15	186.36	0.52
5200.00	1.94	172.44	5198.41	-68.38	-7.22	-68.38	68.76	186.03	0.61
5300.00	1.96	177.61	5298.35	-71.77	-6.93	-71.77	72.10	185.51	0.18
5400.00	1.60	176.46	5398.30	-74.87	-6.77	-74.87	75.17	185.17	0.36
5500.00	1.57	181.12	5498.26	-77.63	-6.71	-77.63	77.92	184.94	0.13
5600.00	1.16	177.99	5598.24	-80.01	-6.70	-80.01	80.29	184.79	0.42
5700.00	1.05	179.48	5698.22	-81.94	-6.66	-81.94	82.21	184.65	0.10

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	1.22	185.77	5798.20	-83.92	-6.76	-83.92	84.19	184.60	0.21
5900.00	1.07	179.02	5898.18	-85.92	-6.85	-85.92	86.19	184.56	0.21
6000.00	1.11	176.81	5998.16	-87.81	-6.78	-87.81	88.08	184.42	0.06
6100.00	0.79	213.75	6098.15	-89.35	-7.11	-89.35	89.64	184.55	0.68
6200.00	0.88	273.71	6198.14	-89.87	-8.26	-89.87	90.25	185.25	0.84
6300.00	1.72	285.98	6298.11	-89.41	-10.47	-89.41	90.02	186.68	0.87
6400.00	1.80	267.66	6398.06	-89.06	-13.48	-89.06	90.08	188.61	0.57
6500.00	2.02	258.84	6498.01	-89.47	-16.78	-89.47	91.03	190.62	0.36
6600.00	1.80	263.11	6597.95	-90.00	-20.07	-90.00	92.21	192.57	0.26
6700.00	1.22	271.85	6697.92	-90.15	-22.69	-90.15	92.96	194.13	0.62
6800.00	1.23	266.94	6797.90	-90.18	-24.83	-90.18	93.53	195.39	0.11
6900.00	0.97	270.70	6897.88	-90.22	-26.74	-90.22	94.10	196.51	0.27
7000.00	1.02	263.50	6997.86	-90.31	-28.47	-90.31	94.69	197.50	0.14
7100.00	0.94	270.30	7097.85	-90.41	-30.17	-90.41	95.31	198.46	0.14
7200.00	1.01	274.73	7197.83	-90.33	-31.87	-90.33	95.79	199.43	0.10
7300.00	1.10	274.30	7297.82	-90.19	-33.70	-90.19	96.28	200.49	0.09
7400.00	0.60	276.66	7397.80	-90.05	-35.18	-90.05	96.68	201.34	0.50
7500.00	0.51	267.20	7497.80	-90.02	-36.15	-90.02	97.00	201.88	0.13
7600.00	0.45	263.51	7597.80	-90.08	-36.98	-90.08	97.38	202.32	0.06
7700.00	0.75	272.41	7697.79	-90.10	-38.03	-90.10	97.80	202.88	0.31
7800.00	0.77	263.00	7797.78	-90.15	-39.35	-90.15	98.37	203.58	0.13
7900.00	0.33	286.15	7897.78	-90.15	-40.29	-90.15	98.75	204.08	0.48
8000.00	0.16	271.68	7997.78	-90.07	-40.71	-90.07	98.84	204.32	0.18
8100.00	0.12	258.21	8097.78	-90.09	-40.95	-90.09	98.96	204.45	0.05
8200.00	0.08	226.33	8197.78	-90.16	-41.11	-90.16	99.09	204.51	0.07
8300.00	0.55	157.22	8297.77	-90.65	-40.97	-90.65	99.48	204.32	0.53
8400.00	0.68	141.44	8397.77	-91.55	-40.42	-91.55	100.08	203.82	0.21
8500.00	0.65	137.13	8497.76	-92.43	-39.66	-92.43	100.58	203.23	0.06
8600.00	1.19	137.99	8597.75	-93.62	-38.58	-93.62	101.26	202.40	0.54
8700.00	1.21	127.99	8697.73	-95.04	-37.05	-95.04	102.01	201.30	0.21
8800.00	1.38	120.64	8797.70	-96.30	-35.19	-96.30	102.53	200.07	0.23
8900.00	1.76	113.62	8897.66	-97.53	-32.75	-97.53	102.88	198.56	0.43
9000.00	1.41	111.72	8997.62	-98.60	-30.19	-98.60	103.12	197.02	0.35
9100.00	1.00	99.75	9097.60	-99.21	-28.18	-99.21	103.13	195.86	0.48
9200.00	1.07	92.58	9197.59	-99.40	-26.39	-99.40	102.84	194.87	0.15
9300.00	0.98	88.96	9297.57	-99.42	-24.60	-99.42	102.42	193.90	0.11
9400.00	0.81	105.90	9397.56	-99.60	-23.06	-99.60	102.24	193.04	0.31
9500.00	1.58	132.85	9497.54	-100.74	-21.37	-100.74	102.98	191.98	0.94
9600.00	1.56	152.92	9597.50	-102.88	-19.74	-102.88	104.76	190.86	0.55

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
9700.00	1.38	170.66	9697.47	-105.28	-18.93	-105.28	106.97	190.19	0.48
9800.00	1.53	168.05	9797.44	-107.77	-18.46	-107.77	109.34	189.72	0.16
9900.00	1.18	158.03	9897.41	-110.03	-17.80	-110.03	111.46	189.19	0.42
10000.00	1.22	169.45	9997.39	-112.03	-17.22	-112.03	113.35	188.74	0.24
10100.00	1.28	185.19	10097.36	-114.19	-17.12	-114.19	115.47	188.53	0.35
10200.00	0.90	172.89	10197.34	-116.09	-17.12	-116.09	117.34	188.39	0.44
10300.00	1.13	163.60	10297.33	-117.82	-16.75	-117.82	119.00	188.09	0.29
10400.00	0.55	204.97	10397.32	-119.20	-16.67	-119.20	120.36	187.96	0.81
10500.00	0.62	215.82	10497.31	-120.07	-17.19	-120.07	121.29	188.15	0.13
10600.00	1.37	222.12	10597.30	-121.39	-18.31	-121.39	122.77	188.58	0.76
10700.00	1.53	227.77	10697.26	-123.18	-20.10	-123.18	124.81	189.27	0.21
10800.00	1.26	224.80	10797.23	-124.86	-21.86	-124.86	126.76	189.93	0.28
10900.00	1.39	229.07	10897.21	-126.44	-23.56	-126.44	128.61	190.55	0.16
11000.00	1.50	231.11	10997.18	-128.05	-25.49	-128.05	130.56	191.26	0.12
11100.00	1.37	237.30	11097.15	-129.51	-27.51	-129.51	132.40	191.99	0.20
11187.00	1.00	231.08	11184.13	-130.55	-28.97	-130.55	133.73	192.51	0.45



Vaughn Energy Services
West, Texas
432-563-5444
Surveyor: Chris Bankson
Tusk Federal No. 004H / API 30-025-41358



VES Survey Date: 10/01/2013



COG Operating LLC

Lea County, NM (NAD27 NME)

Tusk Federal

4H

OH

Survey: MWD

Survey Report - Geographic

15 October, 2013

NEXUS
DIRECTIONAL SOLUTIONS, L.P.



Nexus Directional Solutions L.P.
Survey Report - Geographic

NEXUS
DIRECTIONAL SOLUTIONS, L.P.

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Tusk Federal	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Project	Lea County, NM (NAD27 NME)		
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	Tusk Federal		
Site Position:		Northing:	0.00 usft
From:	Map	Easting:	0.00 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	30° 59' 24.512 N
		Longitude:	105° 55' 44.137 W
		Grid Convergence:	-0.82 °

Well	4H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 37' 28.641 N
		Longitude:	103° 30' 41.153 W
		Ground Level:	0.0 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	10/15/13	(°)
			7.30
			Dip Angle
			(°)
			60.51
			Field Strength
			(nT)
			48,656

Design	OH		
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
			(°)
			0.71

Survey Program	Date 10/15/13		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	10,300.0	Gyro (OH)	MWD
10,394.0	15,489.0	MWD (OH)	MWD
			Description
			MWD - Standard
			MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map			
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting	Latitude	Longitude	
(usft)			(usft)			(usft)	(usft)			
10,300.0	1.13	163.60	10,297.3	-117.8	-16.7	591,809.82	753,029.86	32° 37' 27.477 N	103° 30' 41.359 W	
10,394.0	3.70	12.70	10,391.3	-115.7	-15.8	591,811.89	753,030.79	32° 37' 27.497 N	103° 30' 41.348 W	
10,425.0	11.60	20.00	10,422.0	-111.8	-14.5	591,815.80	753,032.08	32° 37' 27.536 N	103° 30' 41.333 W	
10,457.0	15.90	12.80	10,453.1	-104.5	-12.4	591,823.10	753,034.15	32° 37' 27.608 N	103° 30' 41.308 W	
10,489.0	19.40	4.60	10,483.5	-94.9	-11.0	591,832.68	753,035.55	32° 37' 27.703 N	103° 30' 41.291 W	
10,521.0	23.90	2.70	10,513.3	-83.1	-10.3	591,844.46	753,036.28	32° 37' 27.819 N	103° 30' 41.281 W	
10,553.0	27.70	1.40	10,542.1	-69.2	-9.8	591,858.37	753,036.77	32° 37' 27.957 N	103° 30' 41.274 W	
10,584.0	29.50	359.10	10,569.3	-54.4	-9.8	591,873.21	753,036.82	32° 37' 28.103 N	103° 30' 41.272 W	
10,616.0	30.10	356.10	10,597.1	-38.5	-10.4	591,889.10	753,036.15	32° 37' 28.261 N	103° 30' 41.279 W	
10,648.0	32.50	355.90	10,624.4	-21.9	-11.6	591,905.68	753,034.99	32° 37' 28.425 N	103° 30' 41.291 W	
10,680.0	35.90	356.90	10,650.9	-4.0	-12.7	591,923.63	753,033.87	32° 37' 28.603 N	103° 30' 41.302 W	



Nexus Directional Solutions L.P.

Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Tusk Federal	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,712.0	38.30	357.40	10,676.4	15.3	-13.7	591,942.90	753,032.91	32° 37' 28.793 N	103° 30' 41.312 W	
10,744.0	39.00	359.00	10,701.4	35.3	-14.3	591,962.88	753,032.29	32° 37' 28.991 N	103° 30' 41.317 W	
10,776.0	43.00	359.80	10,725.5	56.3	-14.5	591,983.87	753,032.07	32° 37' 29.199 N	103° 30' 41.318 W	
10,807.0	46.80	1.00	10,747.5	78.1	-14.4	592,005.74	753,032.23	32° 37' 29.415 N	103° 30' 41.314 W	
10,828.0	47.50	359.70	10,761.8	93.5	-14.3	592,021.14	753,032.33	32° 37' 29.568 N	103° 30' 41.311 W	
10,860.0	48.90	358.90	10,783.1	117.4	-14.6	592,044.99	753,032.03	32° 37' 29.804 N	103° 30' 41.313 W	
10,892.0	52.10	358.70	10,803.5	142.1	-15.1	592,069.67	753,031.52	32° 37' 30.048 N	103° 30' 41.317 W	
10,924.0	55.90	359.00	10,822.3	167.9	-15.6	592,095.55	753,031.00	32° 37' 30.304 N	103° 30' 41.320 W	
10,956.0	59.60	359.00	10,839.3	195.0	-16.1	592,122.61	753,030.53	32° 37' 30.572 N	103° 30' 41.323 W	
10,988.0	63.00	358.90	10,854.7	223.1	-16.6	592,150.67	753,030.01	32° 37' 30.849 N	103° 30' 41.327 W	
11,020.0	65.50	358.60	10,868.6	251.9	-17.2	592,179.48	753,029.38	32° 37' 31.134 N	103° 30' 41.332 W	
11,051.0	67.00	358.50	10,881.1	280.2	-17.9	592,207.84	753,028.66	32° 37' 31.415 N	103° 30' 41.337 W	
11,083.0	69.50	359.10	10,892.9	310.0	-18.6	592,237.56	753,028.04	32° 37' 31.709 N	103° 30' 41.342 W	
11,115.0	71.40	359.40	10,903.6	340.1	-18.9	592,267.71	753,027.65	32° 37' 32.008 N	103° 30' 41.344 W	
11,147.0	72.70	359.90	10,913.5	370.5	-19.1	592,298.15	753,027.46	32° 37' 32.309 N	103° 30' 41.343 W	
11,179.0	74.90	0.10	10,922.4	401.3	-19.1	592,328.88	753,027.46	32° 37' 32.613 N	103° 30' 41.340 W	
11,211.0	77.20	359.90	10,930.1	432.3	-19.1	592,359.93	753,027.46	32° 37' 32.920 N	103° 30' 41.338 W	
11,243.0	79.30	359.80	10,936.7	463.7	-19.2	592,391.26	753,027.38	32° 37' 33.230 N	103° 30' 41.336 W	
11,275.0	81.50	0.70	10,942.0	495.2	-19.1	592,422.81	753,027.52	32° 37' 33.542 N	103° 30' 41.331 W	
11,306.0	84.30	1.60	10,945.8	526.0	-18.5	592,453.56	753,028.14	32° 37' 33.847 N	103° 30' 41.321 W	
11,338.0	87.40	2.40	10,948.1	557.9	-17.3	592,485.45	753,029.25	32° 37' 34.162 N	103° 30' 41.305 W	
11,370.0	88.80	3.00	10,949.2	589.8	-15.8	592,517.40	753,030.76	32° 37' 34.478 N	103° 30' 41.285 W	
11,402.0	89.30	3.20	10,949.7	621.7	-14.1	592,549.35	753,032.49	32° 37' 34.794 N	103° 30' 41.262 W	
11,498.0	93.30	3.60	10,947.6	717.5	-8.4	592,645.13	753,038.18	32° 37' 35.741 N	103° 30' 41.187 W	
11,593.0	92.40	2.70	10,942.8	812.3	-3.2	592,739.87	753,043.39	32° 37' 36.678 N	103° 30' 41.117 W	
11,689.0	92.80	2.00	10,938.5	908.1	0.7	592,835.69	753,047.32	32° 37' 37.626 N	103° 30' 41.062 W	
11,784.0	90.80	0.70	10,935.5	1,003.0	3.0	592,930.61	753,049.56	32° 37' 38.565 N	103° 30' 41.028 W	
11,879.0	91.50	0.10	10,933.6	1,098.0	3.6	593,025.59	753,050.22	32° 37' 39.505 N	103° 30' 41.011 W	
11,974.0	91.70	359.30	10,930.9	1,192.9	3.1	593,120.55	753,049.73	32° 37' 40.445 N	103° 30' 41.009 W	
12,068.0	92.70	359.20	10,927.3	1,286.9	1.9	593,214.47	753,048.50	32° 37' 41.374 N	103° 30' 41.014 W	
12,161.0	91.30	359.30	10,924.1	1,379.8	0.7	593,307.40	753,047.28	32° 37' 42.294 N	103° 30' 41.020 W	
12,256.0	89.10	359.70	10,923.8	1,474.8	-0.1	593,402.39	753,046.45	32° 37' 43.234 N	103° 30' 41.021 W	
12,348.0	89.90	359.50	10,924.6	1,566.8	-0.8	593,494.39	753,045.81	32° 37' 44.144 N	103° 30' 41.021 W	
12,441.0	91.20	359.70	10,923.7	1,659.8	-1.4	593,587.38	753,045.16	32° 37' 45.064 N	103° 30' 41.020 W	
12,535.0	91.80	0.10	10,921.2	1,753.7	-1.6	593,681.35	753,045.00	32° 37' 45.994 N	103° 30' 41.013 W	
12,630.0	92.80	0.20	10,917.4	1,848.7	-1.4	593,776.27	753,045.24	32° 37' 46.933 N	103° 30' 41.002 W	
12,724.0	93.70	0.00	10,912.1	1,942.5	-1.2	593,870.12	753,045.41	32° 37' 47.862 N	103° 30' 40.991 W	
12,817.0	92.60	1.80	10,907.0	2,035.4	0.3	593,962.96	753,046.87	32° 37' 48.780 N	103° 30' 40.966 W	
12,912.0	90.60	2.70	10,904.3	2,130.2	4.0	594,057.84	753,050.60	32° 37' 49.719 N	103° 30' 40.914 W	
13,006.0	91.00	2.50	10,903.0	2,224.1	8.3	594,151.74	753,054.86	32° 37' 50.647 N	103° 30' 40.855 W	
13,100.0	91.30	2.30	10,901.1	2,318.0	12.2	594,245.63	753,058.80	32° 37' 51.576 N	103° 30' 40.801 W	
13,193.0	91.90	2.20	10,898.5	2,410.9	15.8	594,338.53	753,062.45	32° 37' 52.495 N	103° 30' 40.750 W	
13,288.0	92.50	2.10	10,894.9	2,505.8	19.4	594,433.39	753,066.01	32° 37' 53.433 N	103° 30' 40.699 W	
13,382.0	91.10	0.50	10,891.9	2,599.7	21.5	594,527.31	753,068.14	32° 37' 54.363 N	103° 30' 40.666 W	
13,474.0	89.40	359.70	10,891.5	2,691.7	21.7	594,619.31	753,068.30	32° 37' 55.273 N	103° 30' 40.656 W	
13,568.0	91.10	359.20	10,891.1	2,785.7	20.8	594,713.30	753,067.40	32° 37' 56.203 N	103° 30' 40.658 W	
13,662.0	92.60	359.50	10,888.1	2,879.6	19.7	594,807.24	753,066.33	32° 37' 57.133 N	103° 30' 40.662 W	
13,756.0	91.30	0.80	10,884.9	2,973.6	20.0	594,901.18	753,066.58	32° 37' 58.062 N	103° 30' 40.650 W	
13,849.0	89.50	2.70	10,884.2	3,066.5	22.8	594,994.13	753,069.42	32° 37' 58.982 N	103° 30' 40.609 W	
13,944.0	90.70	2.40	10,884.0	3,161.4	27.0	595,089.03	753,073.64	32° 37' 59.920 N	103° 30' 40.551 W	
14,038.0	92.00	3.00	10,881.8	3,255.3	31.5	595,182.90	753,078.07	32° 38' 0.849 N	103° 30' 40.491 W	
14,133.0	93.00	3.30	10,877.7	3,350.1	36.7	595,277.66	753,083.28	32° 38' 1.786 N	103° 30' 40.421 W	
14,227.0	91.70	2.60	10,873.8	3,443.9	41.5	595,371.46	753,088.12	32° 38' 2.714 N	103° 30' 40.356 W	
14,323.0	90.20	1.30	10,872.2	3,539.8	44.8	595,467.38	753,091.38	32° 38' 3.663 N	103° 30' 40.309 W	
14,418.0	91.00	1.90	10,871.2	3,634.7	47.4	595,562.34	753,094.04	32° 38' 4.602 N	103° 30' 40.270 W	



Nexus Directional Solutions L.P.
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Tusk Federal	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,513.0	91.80	2.40	10,868.9	3,729.6	51.0	595,657.25	753,097.60	32° 38' 5.541 N	103° 30' 40.219 W
14,608.0	91.10	1.40	10,866.5	3,824.6	54.2	595,752.16	753,100.75	32° 38' 6.480 N	103° 30' 40.174 W
14,703.0	91.90	1.40	10,864.0	3,919.5	56.5	595,847.10	753,103.07	32° 38' 7.419 N	103° 30' 40.138 W
14,798.0	92.70	1.60	10,860.2	4,014.4	59.0	595,941.99	753,105.55	32° 38' 8.358 N	103° 30' 40.101 W
14,893.0	91.20	1.10	10,857.0	4,109.3	61.2	596,036.90	753,107.79	32° 38' 9.297 N	103° 30' 40.066 W
14,987.0	89.30	1.20	10,856.6	4,203.3	63.1	596,130.88	753,109.68	32° 38' 10.226 N	103° 30' 40.035 W
15,082.0	90.40	1.40	10,856.8	4,298.3	65.2	596,225.85	753,111.83	32° 38' 11.166 N	103° 30' 40.001 W
15,176.0	91.50	1.60	10,855.3	4,392.2	67.7	596,319.81	753,114.29	32° 38' 12.095 N	103° 30' 39.964 W
15,271.0	92.80	1.90	10,851.7	4,487.1	70.6	596,414.69	753,117.19	32° 38' 13.034 N	103° 30' 39.922 W
15,366.0	93.60	2.20	10,846.4	4,581.9	74.0	596,509.48	753,120.58	32° 38' 13.972 N	103° 30' 39.873 W
15,445.0	94.40	2.50	10,840.9	4,660.6	77.2	596,588.23	753,123.81	32° 38' 14.751 N	103° 30' 39.828 W
15,489.0	94.40	2.50	10,837.5	4,704.5	79.1	596,632.05	753,125.73	32° 38' 15.184 N	103° 30' 39.802 W

Checked By: _____	Approved By: _____	Date: _____
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