

PATRIOT DRILLING, LLC

NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 04 2015

RECEIVED

OPERATOR: COG Operating, LLC
WELL/LEASE: Firefox Fed Com 4H
COUNTY: Eddy Co., New Mexico
Sec. 4, T 19S, R 31E

30-015-41571

STATE OF NEW MEXICO
DEVIATION REPORT

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
352	1/2	4,224	1/4
650	1/4	4,751	1 1/2
1,042	1	5,180	2 1/4
1,546	3/4	5,679	1 3/4
1,923	1 3/4	6,165	2 1/4
2,491	1	6,639	2
2,770	2 1/2	7,023	2 1/2
3,268	3/4	7,433	2 1/4
3,742	1/4	7,911	1

Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-President

The foregoing instrument was acknowledged before me on this 8th day of June, 2015 by
M. Leroy Peterson, Executive Vice-President of Patriot Drilling, LLC.

My Commission Expires: 02/01/2019

Lori T. Rowan
Notary Public for Ector Co., Texas



June 4, 2015

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

NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 04 2015

RECEIVED

Attn: Kanicia Castillo

RE: Firefox Federal Com 4H

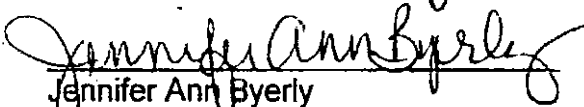
Please find enclosed a copy of the survey from 0' to 8100' ran on the above referenced well.

Sincerely,

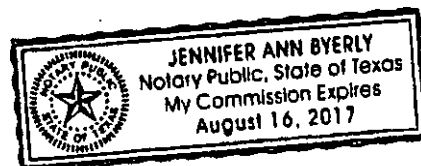

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

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


Jennifer Ann Byerly
Notary Public, State of Texas

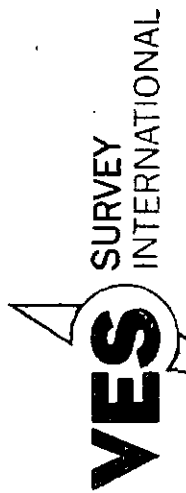
VES Survey International
P.O. Box 261021 Corpus Christi, TX 78426
T (361) 767-0602 F (361) 767-0612
www.vessurvey.com





Company: Concho

Lease/Well: FireFox Federal Com/4H
Location: L-04-19S-31E 1800 FSL 275 FWL
Rig Name: Patriot Drilling Rig 6
State/County: New Mexico/Eddy
VS-Azi: 0.00 Degrees
Latitude: 32.68719, Longitude: -103.88214
Grid Convergence Applied = -0.24 degs
Grid North = True North -0.24 degs



NM OIL CONSERVATION
ARTESIA DISTRICT
JAN 04 2015
RECEIVED

RKB : 18 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 8/4/2015 / 15:42

VES Survey International
Fort Worth Tx
Surveyor: Jason Wilson
(817) 718-1320

Firefox Federal Com 4H / API 30-016-41571

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	***
50.00	0.41	248.21	50.00	-0.07	-0.17	-0.07	0.18	248.21	0.82
100.00	0.36	230.90	100.00	-0.23	-0.45	-0.23	0.51	243.00	0.26
200.00	0.42	224.64	200.00	-0.69	-0.95	-0.69	1.18	234.14	0.07
300.00	0.31	221.92	299.99	-1.15	-1.39	-1.15	1.80	230.40	0.11
400.00	0.38	213.60	399.99	-1.62	-1.75	-1.62	2.38	227.16	0.09
500.00	0.61	222.22	499.99	-2.29	-2.29	-2.29	3.24	224.98	0.25
600.00	0.39	243.41	599.98	-2.84	-2.96	-2.84	4.10	226.13	0.29
700.00	0.24	258.27	699.98	-3.04	-3.47	-3.04	4.61	228.77	0.17
800.00	0.26	263.10	799.98	-3.11	-3.89	-3.11	4.97	231.37	0.02
900.00	0.34	241.58	899.98	-3.27	-4.37	-3.27	5.46	233.12	0.14
1000.00	0.53	224.43	999.98	-3.75	-4.95	-3.75	6.21	232.89	0.22
1100.00	0.75	210.67	1099.97	-4.64	-6.61	-4.64	7.28	230.40	0.27
1200.00	0.92	179.80	1199.96	-6.01	-6.94	-6.01	8.44	224.67	0.47
1300.00	0.74	135.02	1299.95	-7.27	-5.48	-7.27	9.10	217.00	0.66
1400.00	0.63	112.60	1399.94	-8.00	-4.35	-8.00	9.11	208.51	0.32
1500.00	0.70	107.35	1499.93	-8.47	-3.10	-8.47	9.01	200.10	0.16

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
1600.00	0.58	81.46	1599.93	-8.57	-2.02	-8.57	8.81	193.23	0.31
1700.00	1.20	99.33	1699.92	-8.67	-0.48	-8.67	8.88	183.16	0.68
1800.00	1.57	92.24	1799.89	-8.89	1.92	-8.89	9.10	167.79	0.40
1900.00	1.64	72.90	1899.86	-8.55	4.57	-8.55	9.70	151.85	0.62
2000.00	0.92	70.77	1999.83	-7.89	6.91	-7.89	10.30	140.03	0.63
2100.00	1.41	62.22	2099.81	-7.05	8.45	-7.05	11.01	129.84	0.52
2200.00	1.94	61.10	2199.76	-5.66	11.02	-5.66	12.39	117.19	0.54
2300.00	1.99	55.64	2299.70	-3.88	13.94	-3.86	14.47	105.48	0.19
2400.00	1.36	41.73	2399.68	-2.00	16.17	-2.00	16.29	97.04	0.74
2500.00	1.09	84.98	2499.64	-0.71	17.82	-0.71	17.83	92.27	0.56
2600.00	1.26	55.68	2599.62	0.31	19.58	0.31	19.58	89.10	0.25
2700.00	0.88	60.12	2699.60	1.30	21.14	1.30	21.18	86.47	0.38
2800.00	0.88	64.06	2799.59	2.02	22.49	2.02	22.58	84.87	0.06
2900.00	0.73	65.49	2899.58	2.62	23.76	2.62	23.90	83.71	0.15
3000.00	0.68	88.26	2999.57	2.92	24.92	2.92	25.10	83.32	0.26
3100.00	0.80	84.01	3099.56	3.03	26.21	3.03	26.38	83.40	0.12
3200.00	0.73	92.20	3199.55	3.08	27.54	3.08	27.71	83.62	0.13
3300.00	0.41	56.44	3299.55	3.25	28.47	3.25	28.66	83.48	0.47
3400.00	0.28	57.68	3399.55	3.58	28.98	3.58	29.20	82.95	0.13
3500.00	0.41	45.87	3499.55	3.97	29.45	3.97	29.71	82.33	0.15
3600.00	0.44	88.40	3599.54	4.23	30.08	4.23	30.39	82.01	0.31
3700.00	0.36	42.47	3699.54	4.47	30.69	4.47	31.01	81.71	0.32
3800.00	0.39	82.84	3799.54	4.74	31.24	4.74	31.60	81.36	0.26
3900.00	0.35	89.66	3899.54	4.79	31.88	4.79	32.24	81.48	0.08
4000.00	0.40	31.28	3999.54	5.09	32.36	5.09	32.76	81.07	0.37
4100.00	0.18	61.05	4099.53	5.46	32.88	5.46	33.13	80.52	0.26
4200.00	0.46	56.70	4199.53	5.75	33.15	5.75	33.65	80.15	0.28
4300.00	0.18	95.55	4299.53	5.96	33.64	5.96	34.16	79.96	0.34
4400.00	0.24	35.61	4399.53	6.11	33.92	6.11	34.46	79.78	0.22
4500.00	0.60	335.88	4499.53	6.77	33.82	6.77	34.49	78.69	0.53
4600.00	0.70	367.86	4599.52	7.86	33.59	7.86	34.49	76.83	0.27
4700.00	1.07	337.89	4699.51	9.33	33.21	9.33	34.50	74.31	0.47
4800.00	1.19	333.96	4799.49	11.13	32.41	11.13	34.27	71.05	0.15
4900.00	1.92	333.91	4899.45	13.56	31.22	13.56	34.04	66.52	0.73
5000.00	2.27	315.43	4999.39	16.47	29.09	16.47	33.43	60.49	0.75
5100.00	2.32	324.07	5099.31	19.52	26.52	19.52	32.93	53.65	0.35
5200.00	2.23	307.64	5199.23	22.34	23.79	22.34	32.64	46.80	0.66
5300.00	2.16	308.01	5299.16	24.69	20.77	24.69	32.28	40.07	0.07
5400.00	1.97	304.85	5399.09	26.83	17.87	26.83	32.24	33.57	0.23

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
5500.00	1.79	293.39	5499.04	28.43	15.03	28.43	32.16	27.86	0.41
5600.00	1.71	298.61	5698.99	29.77	12.29	29.77	32.20	22.43	0.18
5700.00	1.91	281.82	5698.94	30.82	9.35	30.82	32.21	16.87	0.57
5800.00	1.92	283.45	5798.89	31.55	6.09	31.55	32.14	10.92	0.05
5900.00	2.16	276.71	5898.82	32.16	2.59	32.16	32.27	4.60	0.34
6000.00	2.65	269.53	5998.74	32.36	-1.80	32.36	32.40	357.17	0.58
6100.00	2.68	258.88	6098.63	31.89	-6.21	31.89	32.49	348.98	0.50
6200.00	2.11	267.60	6198.54	31.37	-10.34	31.37	33.03	341.75	0.67
6300.00	2.02	261.13	6298.48	31.02	-13.93	31.02	34.00	335.82	0.25
6400.00	2.37	261.15	6398.40	30.43	-17.71	30.43	35.21	329.79	0.35
6500.00	2.04	271.06	6498.33	30.14	-21.53	30.14	37.04	324.46	0.51
6600.00	2.07	266.32	6598.26	30.06	-25.11	30.06	39.17	320.13	0.17
6700.00	1.91	279.06	6698.20	30.21	-28.55	30.21	41.57	316.61	0.47
6800.00	1.95	278.29	6798.15	30.74	-31.88	30.74	44.29	313.96	0.04
6900.00	2.12	283.31	6898.08	31.44	-35.37	31.44	47.32	311.64	0.22
7000.00	1.95	290.97	6998.02	32.48	-38.76	32.48	50.57	309.96	0.32
7100.00	2.14	282.99	7097.95	33.51	-42.16	33.51	53.86	308.47	0.34
7200.00	2.03	273.53	7197.89	34.04	-45.75	34.04	57.02	306.65	0.36
7300.00	1.73	256.78	7297.84	33.80	-48.98	33.80	59.51	304.61	0.52
7400.00	2.12	258.80	7397.78	33.10	-52.26	33.10	61.86	302.35	0.39
7500.00	3.30	252.14	7497.67	31.85	-56.81	31.85	65.13	299.28	1.23
7600.00	3.20	252.17	7597.51	30.12	-62.21	30.12	69.12	295.83	0.11
7700.00	2.44	253.16	7697.39	28.65	-66.90	28.65	72.77	293.18	0.76
7800.00	2.13	268.79	7797.31	27.99	-70.79	27.99	75.12	291.58	0.69
7900.00	1.44	279.43	7897.26	28.16	-73.89	28.16	79.07	290.86	0.76
8000.00	1.19	286.87	7997.23	28.67	-76.13	28.67	81.35	290.64	0.30
8100.00	1.26	297.32	8097.21	29.47	-78.10	29.47	83.48	290.68	0.23



COG Operating LLC

Eddy County, NM

Firefox Federal

#4H

OH

Survey: MWD #1

Survey Report - Geographic

04 June, 2015

NM OIL CONSERVATION
ARTESTA DISTRICT

JAN 04 2015

RECEIVED



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3585.6usft (Original Well Elev)
Site:	Firefox Federal	MD Reference:	WELL @ 3585.6usft (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:	Eddy County, NM		
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	Firefox Federal				
Site Position:		Northing:	613,946.30 usft	Latitude:	32° 41' 13.287 N
From:	Map	Easting:	638,985.50 usft	Longitude:	103° 52' 53.712 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.24 "

Well	#4H					
Well Position	+N/-S	0.0 usft	Northing:	613,946.30 usft	Latitude:	32° 41' 13.287 N
	+E/-W	0.0 usft	Easting:	638,985.50 usft	Longitude:	103° 52' 53.712 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,567.6 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2010	5/18/2015	(n)	(n)	(nT)
			7.28	60.48	48,487

Design:		OH			
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction:	
	(usft)	(usft)	(usft)	(°)	
	0.0	0.0	0.0	87.45	

Survey Program		Date	6/4/2015	
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
50.0	13,365.0	MWD #1 (OH)	MWD	MWD - Standard

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.0	0.00	0.00	0.0	0.0	0.0	613,946.30	638,985.50	32° 41' 13.287 N	103° 52' 53.712 W
50.0	0.41	248.21	50.0	-0.1	-0.2	613,946.24	638,985.34	32° 41' 13.286 N	103° 52' 53.714 W
100.0	0.36	230.80	100.0	-0.2	-0.5	613,946.07	638,985.05	32° 41' 13.284 N	103° 52' 53.717 W
200.0	0.42	224.54	200.0	-0.7	-1.0	613,945.61	638,984.55	32° 41' 13.280 N	103° 52' 53.723 W
300.0	0.31	221.82	300.0	-1.2	-1.4	613,945.15	638,984.11	32° 41' 13.275 N	103° 52' 53.728 W
400.0	0.38	213.60	400.0	-1.6	-1.8	613,944.67	638,983.75	32° 41' 13.270 N	103° 52' 53.732 W
500.0	0.61	222.22	500.0	-2.3	-2.3	613,944.00	638,983.21	32° 41' 13.264 N	103° 52' 53.739 W
600.0	0.39	243.41	600.0	-2.6	-3.0	613,943.46	638,982.54	32° 41' 13.258 N	103° 52' 53.746 W
700.0	0.24	256.27	700.0	-3.0	-3.5	613,943.26	638,982.03	32° 41' 13.257 N	103° 52' 53.752 W
800.0	0.25	263.10	800.0	-3.1	-3.9	613,943.19	638,981.61	32° 41' 13.256 N	103° 52' 53.757 W
900.0	0.34	241.58	900.0	-3.3	-4.4	613,943.02	638,981.14	32° 41' 13.254 N	103° 52' 53.763 W
1,000.0	0.53	224.43	1,000.0	-3.8	-5.0	613,942.55	638,980.55	32° 41' 13.250 N	103° 52' 53.770 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3585 Bush (Original Well Elev)
Site:	Firefox Federal	MD Reference:	WELL @ 3585 Bush (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
1,100.0	0.75	210.57	1,100.0	-4.6	-5.8	613,941.66	638,979.69	32° 41' 13.241 N	103° 52' 53.777 W
1,200.0	0.92	179.80	1,200.0	-8.0	-5.9	613,940.29	638,979.56	32° 41' 13.227 N	103° 52' 53.781 W
1,300.0	0.74	135.02	1,300.0	-7.3	-5.5	613,939.03	638,980.02	32° 41' 13.215 N	103° 52' 53.778 W
1,400.0	0.83	112.60	1,399.9	-8.0	-4.4	613,938.30	638,981.15	32° 41' 13.207 N	103° 52' 53.783 W
1,500.0	0.70	107.35	1,499.9	-8.5	-3.1	613,937.84	638,982.40	32° 41' 13.203 N	103° 52' 53.748 W
1,600.0	0.56	81.46	1,599.9	-8.6	-2.0	613,937.73	638,983.48	32° 41' 13.202 N	103° 52' 53.738 W
1,700.0	1.20	99.33	1,699.9	-8.7	-0.5	613,937.64	638,985.02	32° 41' 13.201 N	103° 52' 53.718 W
1,800.0	1.57	92.24	1,799.9	-8.9	1.9	613,937.41	638,987.42	32° 41' 13.198 N	103° 52' 53.690 W
1,900.0	1.54	72.90	1,899.9	-8.5	4.8	613,937.75	638,990.07	32° 41' 13.202 N	103° 52' 53.659 W
2,000.0	0.92	70.77	1,999.8	-7.9	8.6	613,938.41	638,992.12	32° 41' 13.208 N	103° 52' 53.635 W
2,100.0	1.41	62.22	2,099.8	-7.1	8.5	613,939.25	638,993.96	32° 41' 13.216 N	103° 52' 53.613 W
2,200.0	1.94	61.10	2,199.8	-5.7	11.0	613,940.64	638,996.53	32° 41' 13.230 N	103° 52' 53.583 W
2,300.0	1.99	55.64	2,299.7	-3.9	13.9	613,942.44	638,999.45	32° 41' 13.248 N	103° 52' 53.549 W
2,400.0	1.36	41.73	2,399.7	-2.0	18.2	613,944.31	639,001.67	32° 41' 13.266 N	103° 52' 53.522 W
2,500.0	1.09	84.98	2,499.8	-0.7	17.8	613,945.59	639,003.32	32° 41' 13.279 N	103° 52' 53.503 W
2,600.0	1.25	55.58	2,599.8	0.3	19.6	613,946.61	639,005.08	32° 41' 13.289 N	103° 52' 53.482 W
2,700.0	0.88	60.12	2,699.8	1.3	21.1	613,947.61	639,006.65	32° 41' 13.299 N	103° 52' 53.464 W
2,800.0	0.88	84.06	2,799.8	2.0	22.5	613,948.33	639,008.01	32° 41' 13.306 N	103° 52' 53.448 W
2,900.0	0.73	85.49	2,899.8	2.6	23.8	613,948.93	639,009.28	32° 41' 13.312 N	103° 52' 53.433 W
3,000.0	0.68	86.26	2,899.8	2.9	24.9	613,949.23	639,010.45	32° 41' 13.314 N	103° 52' 53.420 W
3,100.0	0.80	84.01	3,099.8	3.0	26.2	613,949.35	639,011.73	32° 41' 13.316 N	103° 52' 53.404 W
3,200.0	0.73	82.20	3,199.8	3.1	27.6	613,949.39	639,013.07	32° 41' 13.316 N	103° 52' 53.389 W
3,300.0	0.41	56.44	3,299.5	3.3	28.5	613,949.57	639,014.00	32° 41' 13.318 N	103° 52' 53.378 W
3,400.0	0.28	57.66	3,399.5	3.6	29.0	613,949.90	639,014.50	32° 41' 13.321 N	103° 52' 53.372 W
3,500.0	0.41	45.87	3,499.5	4.0	29.5	613,950.28	639,014.97	32° 41' 13.325 N	103° 52' 53.367 W
3,600.0	0.44	88.40	3,599.5	4.2	30.1	613,950.54	639,015.61	32° 41' 13.327 N	103° 52' 53.359 W
3,700.0	0.36	42.47	3,699.5	4.5	30.7	613,950.76	639,016.20	32° 41' 13.330 N	103° 52' 53.352 W
3,800.0	0.39	62.64	3,799.5	4.7	31.2	613,951.05	639,016.75	32° 41' 13.332 N	103° 52' 53.346 W
3,900.0	0.35	89.66	3,899.5	4.8	31.9	613,951.10	639,017.40	32° 41' 13.333 N	103° 52' 53.338 W
4,000.0	0.40	31.28	3,999.5	5.1	32.4	613,951.40	639,017.88	32° 41' 13.336 N	103° 52' 53.332 W
4,100.0	0.18	61.05	4,099.5	5.5	32.7	613,951.77	639,018.20	32° 41' 13.339 N	103° 52' 53.329 W
4,200.0	0.46	56.70	4,199.5	5.8	33.2	613,952.07	639,018.68	32° 41' 13.342 N	103° 52' 53.323 W
4,300.0	0.18	95.55	4,299.5	6.0	33.7	613,952.27	639,018.17	32° 41' 13.344 N	103° 52' 53.317 W
4,400.0	0.24	35.61	4,399.5	6.1	33.9	613,952.43	639,018.45	32° 41' 13.346 N	103° 52' 53.314 W
4,500.0	0.60	335.86	4,499.5	6.6	33.8	613,953.08	639,018.35	32° 41' 13.352 N	103° 52' 53.315 W
4,600.0	0.70	357.86	4,599.5	7.9	33.8	613,954.16	639,018.12	32° 41' 13.363 N	103° 52' 53.318 W
4,700.0	1.07	337.99	4,699.5	8.3	33.2	613,955.64	639,018.74	32° 41' 13.378 N	103° 52' 53.322 W
4,800.0	1.19	333.96	4,799.5	11.1	32.4	613,957.44	639,017.94	32° 41' 13.395 N	103° 52' 53.332 W
4,900.0	1.92	333.91	4,899.5	13.6	31.2	613,959.88	639,018.75	32° 41' 13.420 N	103° 52' 53.345 W
5,000.0	2.27	315.43	4,999.4	16.5	29.1	613,962.79	639,014.62	32° 41' 13.448 N	103° 52' 53.370 W
5,100.0	2.32	324.07	5,099.3	19.5	28.5	613,965.64	639,012.04	32° 41' 13.479 N	103° 52' 53.400 W
5,200.0	2.23	307.64	5,199.2	22.4	23.8	613,968.67	639,009.31	32° 41' 13.507 N	103° 52' 53.432 W
5,300.0	2.16	308.01	5,299.2	24.7	20.8	613,971.02	639,006.29	32° 41' 13.530 N	103° 52' 53.467 W
5,400.0	1.97	304.85	5,399.1	26.9	17.9	613,973.16	639,003.39	32° 41' 13.552 N	103° 52' 53.501 W
5,500.0	1.79	293.39	5,499.0	28.5	15.0	613,974.76	639,000.55	32° 41' 13.587 N	103° 52' 53.534 W
5,600.0	1.71	298.61	5,599.0	29.8	12.3	613,976.10	638,997.80	32° 41' 13.581 N	103° 52' 53.566 W
5,700.0	1.91	281.82	5,698.9	30.8	9.4	613,977.15	638,994.86	32° 41' 13.591 N	103° 52' 53.601 W
5,800.0	1.82	283.45	5,798.9	31.6	8.1	613,977.88	638,991.80	32° 41' 13.589 N	103° 52' 53.639 W
5,900.0	2.16	276.71	5,898.8	32.2	2.6	613,978.49	638,988.10	32° 41' 13.605 N	103° 52' 53.680 W
6,000.0	2.66	269.53	5,998.7	32.4	-1.6	613,978.69	638,983.91	32° 41' 13.607 N	103° 52' 53.729 W
6,100.0	2.68	258.88	6,098.6	31.9	-6.2	613,978.22	638,979.30	32° 41' 13.603 N	103° 52' 53.783 W
6,200.0	2.11	267.60	6,198.5	31.4	-10.3	613,977.70	638,975.18	32° 41' 13.598 N	103° 52' 53.831 W
6,300.0	2.02	261.13	6,298.5	31.0	-13.9	613,977.35	638,971.58	32° 41' 13.594 N	103° 52' 53.873 W
6,400.0	2.37	261.15	6,398.4	30.5	-17.7	613,976.76	638,967.60	32° 41' 13.589 N	103° 52' 53.917 W
6,500.0	2.04	271.06	6,498.3	30.2	-21.5	613,976.47	638,963.98	32° 41' 13.586 N	103° 52' 53.962 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC	(Local Co-ordinate Reference):	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3585.6usft (Original Well Elev)
Site:	Firefox Federal	MD Reference:	WELL @ 3585.6usft (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
6,600.0	2.07	266.32	6,598.3	30.1	-25.1	813,978.39	838,980.39	32° 41' 13.585 N	103° 52' 54.004 W
6,700.0	1.91	279.08	6,698.2	30.2	-28.6	813,978.54	838,958.95	32° 41' 13.587 N	103° 52' 54.044 W
6,800.0	1.95	279.29	6,798.1	30.8	-31.9	813,977.07	838,953.62	32° 41' 13.592 N	103° 52' 54.083 W
6,900.0	2.12	283.31	6,898.1	31.5	-35.4	813,977.77	838,950.14	32° 41' 13.599 N	103° 52' 54.124 W
7,000.0	1.95	290.97	6,998.0	32.5	-38.8	813,978.81	838,946.75	32° 41' 13.610 N	103° 52' 54.163 W
7,100.0	2.14	282.99	7,098.0	33.5	-42.2	813,979.84	838,943.35	32° 41' 13.620 N	103° 52' 54.203 W
7,200.0	2.03	273.53	7,197.9	34.1	-45.7	813,980.37	838,939.78	32° 41' 13.626 N	103° 52' 54.245 W
7,300.0	1.73	256.78	7,297.8	33.8	-49.0	813,980.13	838,938.52	32° 41' 13.623 N	103° 52' 54.283 W
7,400.0	2.12	258.80	7,397.8	33.1	-52.3	813,979.42	838,933.24	32° 41' 13.616 N	103° 52' 54.321 W
7,500.0	3.30	252.14	7,497.7	31.9	-58.8	813,978.18	838,928.88	32° 41' 13.604 N	103° 52' 54.375 W
7,600.0	3.20	252.17	7,597.5	30.1	-62.2	813,978.45	838,923.29	32° 41' 13.587 N	103° 52' 54.438 W
7,700.0	2.44	253.16	7,697.4	28.7	-66.9	813,974.97	838,918.59	32° 41' 13.573 N	103° 52' 54.493 W
7,800.0	2.13	268.79	7,797.3	28.0	-70.8	813,974.32	838,914.70	32° 41' 13.587 N	103° 52' 54.539 W
7,900.0	1.44	279.43	7,897.3	28.2	-73.9	813,974.48	838,911.60	32° 41' 13.569 N	103° 52' 54.575 W
8,000.0	1.19	288.87	7,997.2	26.7	-76.1	813,974.89	838,908.37	32° 41' 13.574 N	103° 52' 54.601 W
8,100.0	1.28	297.32	8,097.2	29.5	-78.1	813,975.80	838,907.40	32° 41' 13.582 N	103° 52' 54.624 W
8,127.0	1.30	295.60	8,124.2	29.8	-78.6	813,978.07	838,908.88	32° 41' 13.584 N	103° 52' 54.630 W
8,258.0	1.50	324.10	8,255.2	31.8	-81.0	813,978.10	838,904.51	32° 41' 13.605 N	103° 52' 54.658 W
8,290.0	1.40	352.50	8,287.2	32.5	-81.3	813,978.82	838,904.21	32° 41' 13.612 N	103° 52' 54.681 W
8,322.0	3.20	68.50	8,319.1	33.3	-80.5	813,979.57	838,904.98	32° 41' 13.619 N	103° 52' 54.652 W
8,353.0	5.50	85.10	8,350.0	33.7	-78.2	813,980.04	838,907.28	32° 41' 13.624 N	103° 52' 54.625 W
8,385.0	7.80	88.50	8,381.8	33.9	-74.5	813,980.23	838,910.85	32° 41' 13.625 N	103° 52' 54.582 W
8,417.0	11.30	88.50	8,413.4	34.1	-69.2	813,980.37	838,918.28	32° 41' 13.627 N	103° 52' 54.520 W
8,448.0	14.80	88.10	8,443.8	34.3	-62.2	813,980.58	838,923.28	32° 41' 13.628 N	103° 52' 54.438 W
8,480.0	18.00	88.80	8,474.3	34.5	-53.2	813,980.81	838,932.29	32° 41' 13.630 N	103° 52' 54.333 W
8,512.0	20.80	90.10	8,504.4	34.6	-42.8	813,980.89	838,942.91	32° 41' 13.631 N	103° 52' 54.208 W
8,543.0	23.80	88.80	8,533.1	34.7	-30.8	813,981.01	838,954.87	32° 41' 13.631 N	103° 52' 54.071 W
8,575.0	27.30	88.50	8,562.0	35.0	-17.0	813,981.34	838,968.47	32° 41' 13.634 N	103° 52' 53.909 W
8,607.0	30.70	88.40	8,590.0	35.5	-1.5	813,981.78	838,983.98	32° 41' 13.637 N	103° 52' 53.728 W
8,638.0	34.20	88.40	8,618.1	35.9	15.1	813,982.23	839,000.80	32° 41' 13.641 N	103° 52' 53.533 W
8,670.0	38.00	88.30	8,642.0	36.5	33.9	813,982.77	839,018.44	32° 41' 13.646 N	103° 52' 53.313 W
8,702.0	41.90	88.30	8,666.5	37.1	54.5	813,983.38	839,039.88	32° 41' 13.651 N	103° 52' 53.072 W
8,734.0	45.40	88.90	8,689.7	37.6	76.8	813,983.92	839,062.08	32° 41' 13.655 N	103° 52' 52.814 W
8,765.0	49.10	89.10	8,710.7	38.0	99.3	813,984.31	839,084.81	32° 41' 13.658 N	103° 52' 52.548 W
8,797.0	52.50	88.90	8,730.9	38.4	124.1	813,984.75	839,109.80	32° 41' 13.662 N	103° 52' 52.258 W
8,829.0	55.70	88.00	8,749.7	39.1	150.0	813,985.45	839,135.51	32° 41' 13.666 N	103° 52' 51.954 W
8,861.0	59.40	87.00	8,768.8	40.3	177.0	813,986.83	839,162.48	32° 41' 13.678 N	103° 52' 51.639 W
8,892.0	63.30	87.20	8,781.7	41.7	204.1	813,988.01	839,189.65	32° 41' 13.691 N	103° 52' 51.321 W
8,924.0	67.10	88.10	8,795.1	42.9	233.2	813,989.20	839,218.67	32° 41' 13.701 N	103° 52' 50.981 W
8,956.0	70.60	88.80	8,806.7	43.7	263.0	813,990.00	839,248.50	32° 41' 13.708 N	103° 52' 50.632 W
8,987.0	73.70	88.50	8,816.2	44.4	292.5	813,990.70	839,277.99	32° 41' 13.713 N	103° 52' 50.287 W
9,019.0	77.10	87.60	8,824.2	45.4	323.4	813,991.75	839,308.94	32° 41' 13.723 N	103° 52' 49.925 W
9,051.0	80.70	87.20	8,830.4	46.9	354.8	813,993.18	839,340.30	32° 41' 13.735 N	103° 52' 49.558 W
9,083.0	84.20	88.30	8,834.8	48.1	386.5	813,994.42	839,371.99	32° 41' 13.748 N	103° 52' 49.187 W
9,114.0	88.10	87.80	8,837.2	49.2	417.4	813,995.47	839,402.86	32° 41' 13.755 N	103° 52' 48.826 W
9,146.0	87.80	88.70	8,838.9	50.1	449.3	813,998.45	839,434.80	32° 41' 13.784 N	103° 52' 48.452 W
9,209.0	89.00	87.30	8,840.7	52.3	512.2	813,998.65	839,497.73	32° 41' 13.783 N	103° 52' 47.715 W
9,273.0	91.20	87.30	8,840.6	55.4	578.2	814,001.68	839,581.66	32° 41' 13.810 N	103° 52' 46.967 W
9,399.0	87.20	87.90	8,842.3	60.6	702.0	814,008.94	839,687.51	32° 41' 13.857 N	103° 52' 45.494 W
9,494.0	88.40	85.80	8,848.0	65.8	798.8	814,012.15	839,782.29	32° 41' 13.904 N	103° 52' 44.385 W
9,590.0	88.20	87.40	8,848.8	71.5	892.6	814,017.64	839,878.08	32° 41' 13.957 N	103° 52' 43.264 W
9,685.0	89.50	87.10	8,850.7	78.1	987.4	814,022.40	839,972.84	32° 41' 13.998 N	103° 52' 42.154 W
9,780.0	89.30	87.50	8,851.6	80.6	1,082.3	814,026.87	840,067.83	32° 41' 14.038 N	103° 52' 41.043 W
9,875.0	90.80	88.30	8,851.6	84.1	1,177.3	814,030.38	840,162.77	32° 41' 14.068 N	103° 52' 39.932 W
9,970.0	89.70	86.80	8,851.2	88.1	1,272.2	814,034.42	840,257.67	32° 41' 14.105 N	103° 52' 38.822 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3585.6usft (Original Well Elev)
Site:	Firefox Federal	MD Reference:	WELL @ 3585.6usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,065.0	89.20	88.80	8,852.1	81.9	1,387.1	814,038.23	640,352.59	32° 41' 14.138 N	103° 52' 37.711 W
10,160.0	88.70	87.80	8,853.8	94.9	1,482.0	814,041.21	640,447.53	32° 41' 14.164 N	103° 52' 38.800 W
10,255.0	88.20	87.20	8,856.5	99.1	1,556.9	814,045.35	640,542.40	32° 41' 14.201 N	103° 52' 35.480 W
10,350.0	88.40	86.80	8,858.4	104.0	1,651.7	814,050.33	640,637.25	32° 41' 14.246 N	103° 52' 34.380 W
10,445.0	88.50	86.00	8,860.2	108.3	1,746.8	814,054.83	640,732.13	32° 41' 14.284 N	103° 52' 33.289 W
10,541.0	89.30	87.20	8,862.0	112.3	1,842.5	814,058.65	640,828.03	32° 41' 14.320 N	103° 52' 32.147 W
10,636.0	89.70	89.00	8,863.7	115.5	1,937.5	814,061.80	640,922.96	32° 41' 14.347 N	103° 52' 31.036 W
10,731.0	89.40	89.70	8,865.3	116.6	2,032.4	814,062.88	641,017.94	32° 41' 14.354 N	103° 52' 29.825 W
10,826.0	90.50	90.40	8,865.3	116.5	2,127.4	814,062.80	641,112.93	32° 41' 14.349 N	103° 52' 28.813 W
10,952.0	87.70	88.30	8,867.3	117.9	2,253.4	814,064.23	641,238.89	32° 41' 14.358 N	103° 52' 27.339 W
11,047.0	89.30	88.30	8,869.8	120.7	2,348.3	814,067.04	641,333.81	32° 41' 14.381 N	103° 52' 26.228 W
11,142.0	88.00	87.80	8,872.0	124.1	2,443.2	814,070.44	641,428.72	32° 41' 14.411 N	103° 52' 25.118 W
11,237.0	89.40	87.50	8,874.2	128.2	2,538.1	814,074.50	641,523.61	32° 41' 14.447 N	103° 52' 24.007 W
11,332.0	88.70	87.80	8,875.8	132.1	2,633.0	814,078.39	641,618.52	32° 41' 14.482 N	103° 52' 22.898 W
11,427.0	89.80	86.40	8,877.0	136.9	2,727.9	814,083.20	641,713.38	32° 41' 14.525 N	103° 52' 21.788 W
11,522.0	88.80	88.00	8,878.2	141.5	2,822.8	814,087.84	641,808.28	32° 41' 14.567 N	103° 52' 20.676 W
11,617.0	90.10	88.20	8,879.1	144.7	2,917.7	814,090.99	641,903.20	32° 41' 14.594 N	103° 52' 19.585 W
11,712.0	88.70	88.80	8,880.1	147.1	3,012.7	814,093.39	641,998.18	32° 41' 14.614 N	103° 52' 18.454 W
11,807.0	87.40	88.90	8,883.3	150.8	3,107.5	814,096.87	642,093.03	32° 41' 14.644 N	103° 52' 17.343 W
11,902.0	87.80	87.10	8,887.3	155.5	3,202.3	814,101.84	642,187.82	32° 41' 14.689 N	103° 52' 16.234 W
11,997.0	89.10	87.80	8,889.9	159.8	3,297.2	814,106.08	642,282.69	32° 41' 14.727 N	103° 52' 15.124 W
12,092.0	89.90	87.20	8,890.7	163.8	3,382.1	814,110.21	642,377.59	32° 41' 14.764 N	103° 52' 14.013 W
12,187.0	89.20	87.20	8,891.4	168.5	3,487.0	814,114.85	642,472.48	32° 41' 14.808 N	103° 52' 12.903 W
12,282.0	88.40	87.10	8,893.4	173.3	3,581.8	814,119.57	642,567.34	32° 41' 14.848 N	103° 52' 11.792 W
12,409.0	87.30	86.10	8,898.2	180.8	3,708.5	814,127.10	642,694.02	32° 41' 14.917 N	103° 52' 10.310 W
12,535.0	88.70	89.10	8,902.6	186.1	3,834.3	814,132.37	642,819.82	32° 41' 14.964 N	103° 52' 8.837 W
12,630.0	90.20	88.70	8,903.5	187.9	3,929.3	814,134.19	642,914.79	32° 41' 14.978 N	103° 52' 7.726 W
12,757.0	90.10	87.80	8,903.2	191.8	4,058.2	814,138.07	643,041.73	32° 41' 15.011 N	103° 52' 6.241 W
12,852.0	91.60	87.50	8,901.8	195.7	4,151.1	814,141.96	643,136.84	32° 41' 15.045 N	103° 52' 5.130 W
12,947.0	93.00	87.50	8,898.0	199.8	4,246.0	814,146.11	643,231.47	32° 41' 15.082 N	103° 52' 4.020 W
13,074.0	90.40	88.00	8,894.2	204.8	4,372.8	814,151.09	643,358.30	32° 41' 15.128 N	103° 52' 2.538 W
13,169.0	91.80	88.40	8,892.5	207.8	4,467.7	814,154.07	643,453.24	32° 41' 15.151 N	103° 52' 1.425 W
13,385.0	91.60	88.40	8,887.1	213.2	4,663.6	814,159.54	643,649.09	32° 41' 15.197 N	103° 51' 59.133 W
PBL(FFF#4H)									

Checked By: _____ Approved By: _____ Date: _____



VES Survey International
Fort Worth Tx
Surveyor: Jason Wilson
(817) 718-1320
Firefox Federal Com 4H / API 30-015-41571

