



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

September 30, 2015

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

RE: 7811 JV-P Rojo C 1H
 190' FSL & 380' FEL
 Sec. 27, T25S, R33E
 Lea County, New Mexico

Dear Sir,

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

Very truly yours,

Chris Graham
 Drilling Superintendent

State of New Mexico }
 County of Eddy }

The foregoing was acknowledged before me this 30th day of September, 2015.

Notary Public



JAN 29 2016

7811 JV-P Rojo C 1H

Date	Depth	Deviation	Direction	TVD	Horiz Disp
8/30/2015	276	1.20	0.00	0.00	0.00
8/31/2015	457	0.50	0.00	0.00	0.00
8/31/2015	739	0.40	0.00	0.00	0.00
8/31/2015	926	0.50	0.00	0.00	0.00
8/31/2015	1127	1.00	0.00	0.00	0.00
9/2/2015	1336	0.30	0.00	0.00	0.00
9/2/2015	1631	0.50	0.00	0.00	0.00
9/2/2015	1947	0.30	0.00	0.00	0.00
9/2/2015	2200	0.10	0.00	0.00	0.00
9/2/2015	2484	0.60	0.00	0.00	0.00
9/2/2015	2769	1.00	50.20	2768.00	0.82
9/2/2015	3053	1.10	46.50	3052.00	2.60
9/3/2015	3338	1.10	0.00	0.00	0.00
9/3/2015	3622	1.00	0.00	0.00	0.00
9/3/2015	3907	1.40	0.00	0.00	0.00
9/3/2015	4192	1.80	38.10	4191.00	23.12
9/4/2015	4476	1.40	0.00	0.00	0.00
9/4/2015	4761	2.20	0.00	0.00	0.00
9/4/2015	5012	1.30	97.90	0.00	0.00
9/6/2015	5131	1.60	0.00	0.00	0.00
9/6/2015	5470	1.00	0.00	0.00	0.00
9/6/2015	5571	0.80	0.00	0.00	0.00
9/6/2015	5887	0.90	0.00	0.00	0.00
9/6/2015	6105	0.50	0.00	0.00	0.00
9/6/2015	6326	0.40	0.00	0.00	0.00
9/7/2015	6540	0.50	0.00	0.00	0.00
9/7/2015	6765	0.70	0.00	0.00	0.00
9/7/2015	6987	0.30	0.00	0.00	0.00
9/7/2015	7240	0.80	0.00	0.00	0.00
9/7/2015	7467	1.10	0.00	0.00	0.00
9/7/2015	7699	0.50	0.00	0.00	0.00
9/7/2015	7938	1.10	0.00	0.00	0.00
9/7/2015	8162	1.10	0.00	0.00	0.00
9/8/2015	8381	0.90	0.00	0.00	0.00
9/8/2015	8569	0.90	0.00	0.00	0.00
9/8/2015	8789	1.20	0.00	0.00	0.00
9/8/2015	8985	0.40	0.00	0.00	0.00
9/9/2015	9195	0.90	0.00	0.00	0.00
9/9/2015	9415	1.60	0.00	0.00	0.00
9/9/2015	9556	1.30	0.00	0.00	0.00
9/10/2015	9630	2.00	0.00	0.00	0.00
9/10/2015	9777	4.50	0.00	0.00	0.00
9/10/2015	9843	3.10	0.00	0.00	0.00

Date	Depth	Deviation	Direction	TVD	Horiz Disp
9/10/2015	9938	2.90	0.00	0.00	0.00
9/11/2015	10065	2.60	0.00	0.00	0.00
9/11/2015	10160	1.90	0.00	0.00	0.00
9/11/2015	10255	1.60	0.00	0.00	0.00
9/11/2015	10350	2.20	0.00	0.00	0.00
9/12/2015	10445	2.40	0.00	0.00	0.00
9/12/2015	10540	2.40	0.00	0.00	0.00
9/12/2015	10635	2.30	281.40	10633.00	21.26
9/12/2015	10730	1.60	282.50	10728.00	21.95
9/12/2015	10825	1.50	266.90	10823.00	22.18
9/12/2015	10920	1.30	305.90	10918.00	22.76
9/12/2015	11015	2.30	344.50	11013.00	23.40
9/12/2015	11110	2.90	0.00	0.00	0.00
9/12/2015	11205	3.10	0.00	0.00	0.00
9/13/2015	11300	2.60	0.00	0.00	0.00
9/13/2015	11395	2.60	0.00	0.00	0.00
9/13/2015	11490	2.60	0.00	0.00	0.00
9/16/2015	11688	1.70	0.00	0.00	0.00
9/16/2015	11783	1.60	0.00	0.00	0.00
9/16/2015	11878	1.60	0.00	0.00	0.00
9/16/2015	11972	1.40	0.00	0.00	0.00
9/16/2015	12163	1.80	0.00	0.00	0.00
9/16/2015	12275	1.80	0.00	0.00	0.00
9/16/2015	12352	1.50	0.00	0.00	0.00
9/16/2015	12447	1.80	0.00	0.00	0.00
9/16/2015	12542	1.60	0.00	0.00	0.00
9/16/2015	12637	1.80	0.00	0.00	0.00
9/16/2015	12697	1.80	0.00	0.00	0.00
9/21/2015	8836	5.00	350.10	8834.00	0.32
9/21/2015	8867	9.90	358.00	8865.00	3.68
9/21/2015	8899	14.70	1.70	8896.00	10.49
9/21/2015	8962	21.20	3.40	0.00	0.00
9/21/2015	8994	22.30	1.50	8986.39	42.90
9/22/2015	9025	24.90	357.40	9014.00	55.36
9/22/2015	9057	28.50	355.20	9043.00	69.72
9/22/2015	9088	32.50	353.40	9070.00	85.40
9/22/2015	9120	37.00	353.90	0.00	0.00
9/22/2015	9152	40.50	354.00	0.00	0.00
9/22/2015	9183	44.60	355.00	0.00	0.00
9/22/2015	9247	48.60	354.70	0.00	0.00
9/22/2015	9278	50.10	353.30	0.00	0.00
9/23/2015	9310	53.30	351.70	9227.00	239.40
9/23/2015	9342	56.40	350.80	9246.00	265.33
9/23/2015	9373	55.50	352.20	9263.00	290.80
9/23/2015	9404	56.70	354.00	0.00	0.00

Date	Depth	Deviation	Direction	TVD	Horiz Disp
9/23/2015	9436	58.90	355.10	0.00	0.00
9/23/2015	9467	62.50	353.50	0.00	0.00
9/24/2015	9499	66.90	350.30	0.00	0.00
9/24/2015	9531	72.00	348.90	0.00	0.00
9/24/2015	9562	78.20	349.20	0.00	0.00
9/25/2015	9624	86.00	350.80	9354.80	518.74
9/25/2015	9687	88.50	351.40	9357.00	580.00
9/25/2015	9720	87.40	351.50	9358.20	616.77
9/25/2015	9750	90.10	351.50	9358.00	643.55
9/25/2015	9845	91.80	351.30	9356.00	737.39
9/25/2015	9940	91.80	351.20	0.00	0.00
9/25/2015	10035	90.30	351.70	0.00	0.00
9/25/2015	10130	91.30	354.00	0.00	0.00
9/25/2015	10319	88.90	356.10	0.00	0.00
9/25/2015	10414	88.70	359.90	0.00	0.00
9/25/2015	10509	87.80	0.50	0.00	0.00
9/25/2015	10604	89.20	0.70	0.00	0.00
9/25/2015	10699	91.00	1.20	0.00	0.00
9/25/2015	10793	91.10	0.40	0.00	0.00
9/25/2015	10888	90.20	359.00	0.00	0.00
9/26/2015	10983	89.20	358.60	6353.00	1872.89
9/26/2015	11078	87.00	357.60	9357.00	1967.50
9/26/2015	11173	86.80	357.90	9362.00	2062.00
9/26/2015	11268	88.00	358.60	9366.54	2157.56
9/26/2015	11363	87.90	0.60	9369.00	2252.00
9/26/2015	11457	90.20	1.00	0.00	0.00
9/26/2015	11552	91.40	0.70	0.00	0.00
9/26/2015	11647	93.40	0.80	0.00	0.00
9/26/2015	11742	92.30	360.00	0.00	0.00
9/26/2015	11837	90.00	0.10	0.00	0.00
9/26/2015	11932	88.00	1.80	0.00	0.00
9/26/2015	12027	88.30	0.90	0.00	0.00
9/26/2015	12121	89.80	0.90	0.00	0.00
9/26/2015	12364	88.10	0.30	0.00	0.00
9/27/2015	12406	89.50	0.10	9369.00	3297.00
9/27/2015	12501	88.50	359.00	9370.00	3389.00
9/27/2015	12596	90.20	358.20	9371.00	3484.00
9/27/2015	12691	89.60	358.70	9371.00	3579.00
9/27/2015	12786	88.50	358.70	9373.00	3677.00
9/27/2015	12881	88.60	359.60	0.00	0.00
9/27/2015	12976	90.60	0.30	0.00	0.00
9/27/2015	13070	89.80	359.30	0.00	0.00
9/27/2015	13165	91.70	359.20	0.00	0.00
9/27/2015	13261	90.30	358.70	0.00	0.00
9/27/2015	13356	90.80	359.20	0.00	0.00

Date	Depth	Deviation	Direction	TVD	Horiz Disp
9/28/2015	13451	92.30	358.20	9369.00	4339.00
9/28/2015	13543	92.30	357.40	9366.00	4431.00
9/28/2015	13640	93.00	358.20	9361.00	4527.00
9/28/2015	13735	88.70	359.50	9360.14	4623.11
9/28/2015	13805	90.10	359.30	9360.80	4716.10



September 25, 2015

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

Attn: Kanicia Castillo

RE: Rojo C 7811 JV-P No 001H

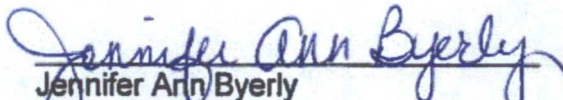
Please find enclosed a copy of the survey from 0' to 12,695' ran on the above referenced well.

Sincerely,

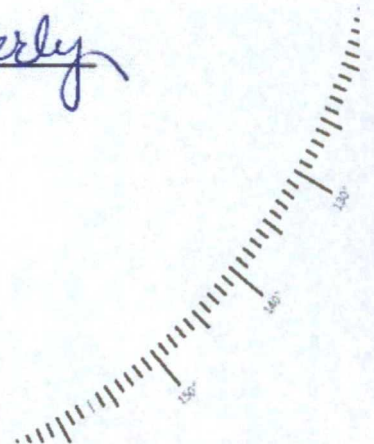
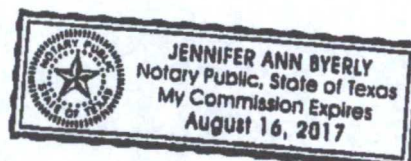
Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 25 day of September A.D., 2015, 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: Cog Operating LLC
Lease/Well: Rojo C 7811 JV-P No/001H

Rig Name: Silver Oak 12
State/County: New Mexico / Lea
VS-Azi: 0.00 Degrees

Latitude: 32.09461, Longitude: -103.55223
Grid North = True North -0.42 degs (NAD 27)
Grid Correction Applied = -0.42 degs



Depth Reference : R.K.B = 18 FT

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: rojo c 7811 JV-P 1h.ut
Minimum Curvature Method
Report Date/Time: 9/25/2015 / 15:32

VES Survey International
Midland, Texas
432-563-5444

Surveyor: Javier Estrada

Rojo C 7811 JV-P No 001H / API 30-025-42458

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	0.84	209.85	100.00	-0.84	-0.37	-0.84	0.74	209.85	0.84
200.00	0.81	191.02	199.99	-1.97	-0.87	-1.97	2.15	203.78	0.27
300.00	0.81	216.31	299.98	-3.23	-1.42	-3.23	3.53	203.75	0.35
400.00	0.50	227.76	399.97	-4.10	-2.17	-4.10	4.84	207.87	0.33
500.00	0.60	296.05	499.97	-4.16	-2.96	-4.16	5.11	215.45	0.63
600.00	0.78	261.22	599.96	-4.04	-4.11	-4.04	5.76	225.49	0.44
700.00	0.58	250.74	699.95	-4.31	-5.26	-4.31	6.79	230.67	0.23
800.00	0.56	238.98	799.95	-4.72	-6.15	-4.72	7.76	232.48	0.12
900.00	0.32	202.36	899.94	-5.23	-6.67	-5.23	8.48	231.90	0.35
1000.00	0.60	220.80	999.94	-5.89	-7.12	-5.89	9.24	230.42	0.31
1100.00	0.74	224.40	1099.93	-6.75	-7.92	-6.75	10.40	229.57	0.15
1200.00	0.30	192.96	1199.93	-7.47	-8.43	-7.47	11.28	228.46	0.51
1300.00	0.38	172.52	1299.93	-8.05	-8.45	-8.05	11.57	226.37	0.14
1400.00	0.21	220.03	1399.93	-8.52	-8.52	-8.52	12.05	225.00	0.28
1500.00	0.22	233.34	1499.93	-8.77	-8.79	-8.77	12.42	225.06	0.05
1600.00	0.50	248.12	1599.92	-9.05	-9.35	-9.05	13.02	225.94	0.30

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	0.34	227.70	1899.92	-9.42	-9.99	-8.42	13.73	226.67	0.22
1800.00	0.16	236.54	1799.92	-9.70	-10.33	-8.70	14.17	226.79	0.18
1900.00	0.44	276.96	1899.92	-9.73	-10.82	-8.73	14.56	228.04	0.33
2000.00	0.50	262.29	1999.92	-9.75	-11.63	-8.75	15.18	230.05	0.14
2100.00	0.16	214.19	2099.91	-9.92	-12.14	-8.92	15.68	230.76	0.41
2200.00	0.15	353.93	2199.91	-9.90	-12.23	-8.90	15.74	231.03	0.29
2300.00	0.17	323.84	2299.91	-9.64	-12.34	-8.64	15.66	232.00	0.09
2400.00	0.36	101.51	2399.91	-9.58	-12.12	-9.58	15.45	231.69	0.50
2500.00	0.58	43.90	2499.91	-9.28	-11.47	-8.28	14.75	231.03	0.49
2600.00	0.89	36.32	2599.90	-8.29	-10.66	-8.29	13.50	232.14	0.32
2700.00	1.02	49.57	2699.89	-7.09	-9.52	-7.09	11.87	233.36	0.26
2800.00	1.04	53.04	2799.87	-5.96	-8.12	-5.96	10.07	233.71	0.07
2900.00	0.83	37.52	2899.86	-4.84	-6.95	-4.84	8.47	235.14	0.33
3000.00	1.08	50.69	2999.84	-3.67	-6.78	-3.67	6.85	237.59	0.34
3100.00	0.97	52.30	3099.83	-2.56	-4.38	-2.56	5.07	239.75	0.12
3200.00	1.42	56.53	3199.81	-1.36	-2.68	-1.36	3.01	243.16	0.47
3300.00	1.23	45.08	3299.78	0.08	-0.89	0.08	0.89	275.30	0.33
3400.00	0.78	38.27	3399.76	1.37	0.29	1.37	1.40	11.95	0.46
3500.00	0.93	21.20	3499.75	2.66	1.01	2.66	2.85	20.69	0.29
3600.00	0.65	31.51	3599.74	3.90	1.59	3.90	4.21	22.23	0.31
3700.00	0.65	5.29	3699.74	4.95	1.94	4.95	5.32	21.43	0.29
3800.00	1.11	23.70	3799.73	6.40	2.38	6.40	6.83	20.42	0.53
3900.00	1.24	15.51	3899.71	8.33	3.06	8.33	8.87	20.18	0.22
4000.00	1.69	29.88	3999.67	10.65	4.09	10.65	11.41	20.98	0.58
4100.00	1.55	28.68	4099.63	13.12	5.47	13.12	14.22	22.64	0.14
4200.00	1.52	42.96	4199.60	15.29	7.03	15.29	16.82	24.69	0.38
4300.00	1.57	53.91	4299.56	17.07	9.04	17.07	19.31	27.92	0.30
4400.00	1.71	66.02	4399.52	18.48	11.52	18.48	21.78	31.93	0.37
4500.00	1.27	80.56	4499.49	19.27	13.98	19.27	23.81	36.95	0.58
4600.00	1.37	80.55	4599.46	19.65	16.25	19.65	25.50	39.59	0.10
4700.00	1.52	101.19	4699.43	19.59	18.72	19.59	27.10	43.71	0.54
4800.00	1.87	96.33	4799.38	19.15	21.64	19.15	28.90	48.49	0.38
4900.00	1.47	99.07	4899.34	18.77	24.53	18.77	30.89	52.57	0.40
5000.00	1.19	101.19	4999.32	18.37	26.81	18.37	32.50	55.59	0.29
5100.00	0.81	100.74	5099.30	18.03	28.52	18.03	33.74	57.69	0.38
5200.00	0.91	80.39	5199.29	18.04	29.99	18.04	35.00	58.98	0.32
5300.00	1.10	90.20	5299.27	18.17	31.74	18.17	36.57	60.22	0.25
5400.00	0.74	62.21	5399.26	18.46	33.27	18.46	38.05	60.97	0.57
5500.00	0.76	77.34	5499.25	18.91	34.49	18.91	39.33	61.26	0.20

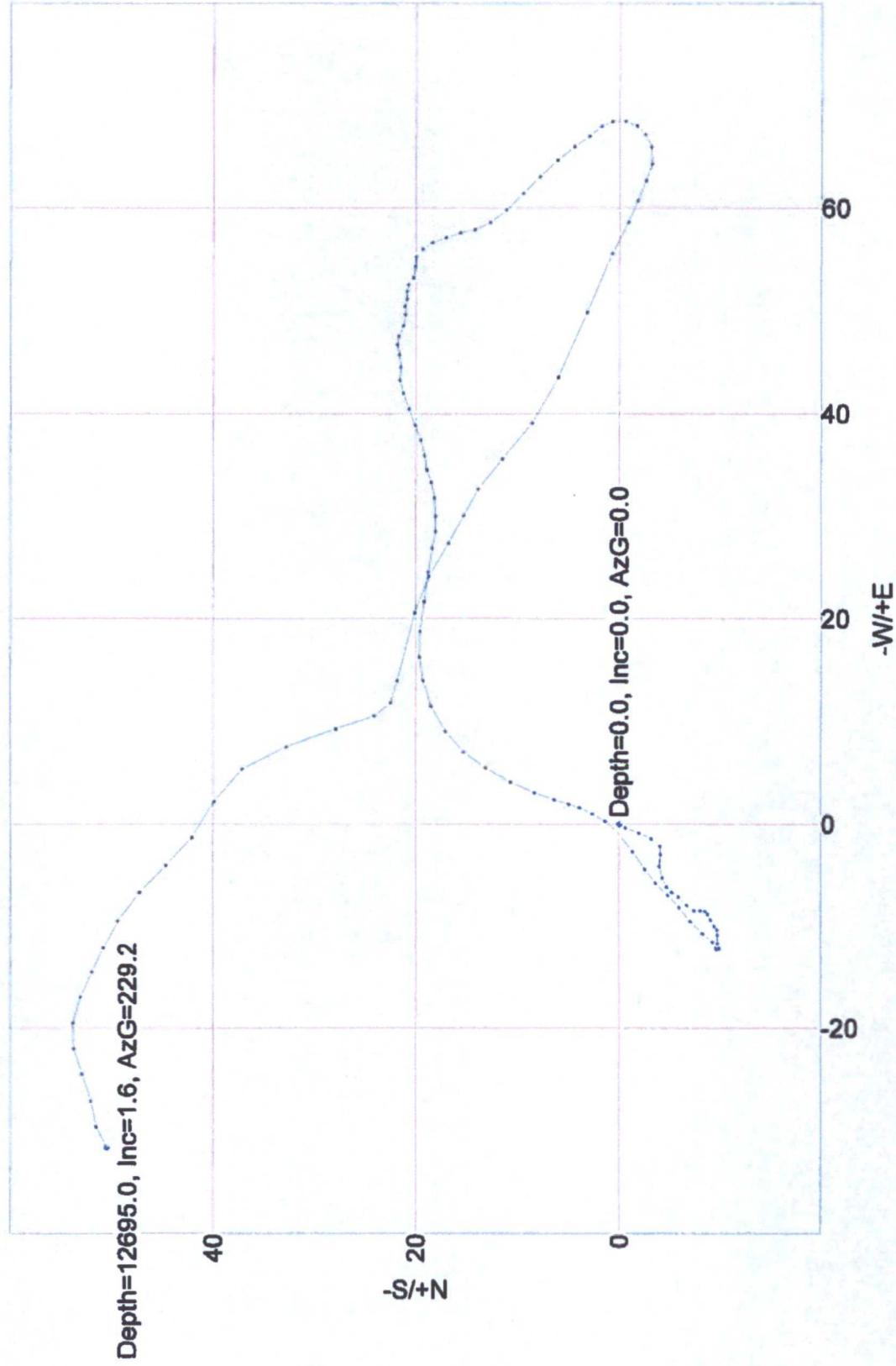
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/S FT	+E/W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5600.00	0.86	84.39	5599.24	19.13	35.88	19.13	40.66	61.94	0.14
5700.00	0.98	70.30	5699.23	19.49	37.43	19.49	42.20	62.49	0.25
5800.00	0.84	62.99	5799.22	20.11	38.88	20.11	43.78	62.65	0.18
5900.00	1.06	73.98	5899.20	20.70	40.43	20.70	45.42	62.89	0.29
6000.00	0.87	66.06	5999.19	21.26	42.01	21.26	47.09	63.16	0.24
6100.00	0.61	88.02	6099.18	21.59	43.24	21.59	48.33	63.47	0.38
6200.00	0.84	97.57	6199.17	21.51	44.50	21.51	49.43	64.20	0.26
6300.00	0.63	66.85	6299.16	21.63	46.73	21.63	50.59	64.69	0.44
6400.00	0.54	90.26	6399.16	21.84	46.71	21.84	51.57	64.94	0.25
6500.00	0.45	115.32	6499.16	21.67	47.54	21.67	52.25	65.49	0.23
6600.00	0.79	114.29	6599.15	21.22	48.53	21.22	52.97	66.38	0.34
6700.00	0.54	74.31	6699.14	21.06	49.62	21.06	53.90	67.00	0.51
6800.00	0.44	104.57	6799.14	21.10	50.44	21.10	54.68	67.31	0.28
6900.00	0.41	106.58	6899.14	20.90	51.15	20.90	55.25	67.78	0.03
7000.00	0.49	80.10	6999.13	20.87	51.91	20.87	55.95	68.10	0.22
7100.00	0.32	131.25	7099.13	20.76	52.54	20.76	56.49	68.44	0.38
7200.00	0.66	126.40	7199.13	20.24	53.22	20.24	56.93	69.18	0.34
7300.00	0.76	74.37	7299.12	20.07	54.32	20.07	57.91	69.72	0.63
7400.00	0.44	134.37	7399.12	19.98	55.23	19.98	58.73	70.11	0.66
7500.00	0.70	126.20	7499.11	19.35	56.00	19.35	59.25	70.94	0.27
7600.00	0.72	165.65	7599.10	18.38	56.64	18.38	59.55	72.02	0.48
7700.00	0.92	156.20	7699.09	17.03	57.12	17.03	59.61	73.40	0.24
7800.00	0.79	170.21	7799.08	15.62	57.57	15.62	59.65	74.82	0.24
7900.00	0.89	165.58	7899.07	14.19	57.68	14.19	59.59	76.23	0.12
8000.00	1.03	143.66	7999.06	12.71	58.60	12.71	59.96	77.76	0.39
8100.00	1.29	142.06	8099.04	11.10	59.82	11.10	60.84	79.48	0.26
8200.00	1.34	130.54	8199.01	9.46	61.40	9.46	62.12	81.24	0.27
8300.00	1.30	138.95	8298.99	7.84	63.03	7.84	63.52	82.91	0.20
8400.00	1.43	134.99	8398.96	6.11	64.66	6.11	64.95	84.60	0.16
8500.00	1.04	150.02	8498.93	4.44	66.00	4.44	66.15	86.15	0.50
8600.00	0.98	141.06	8598.92	2.98	66.99	2.98	67.06	87.45	0.17
8700.00	0.78	140.91	8698.91	1.79	67.98	1.79	67.98	88.49	0.21
8800.00	0.67	174.81	8798.90	0.68	68.44	0.68	68.44	89.43	0.43
8900.00	0.84	181.78	8898.89	-0.64	68.47	-0.64	68.47	90.53	0.19
9000.00	0.68	226.53	8998.88	-1.77	68.02	-1.77	68.04	91.49	0.59
9100.00	0.64	223.49	9098.88	-2.59	67.20	-2.59	67.25	92.21	0.05
9200.00	0.99	255.94	9198.87	-3.20	65.98	-3.20	66.06	92.78	0.56
9300.00	0.95	278.03	9298.85	-3.30	64.32	-3.30	64.41	92.93	0.37
9400.00	1.11	303.02	9398.84	-2.65	62.69	-2.65	62.75	92.42	0.47

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
9500.00	1.34	283.64	9498.81	-1.85	60.75	-1.85	60.77	91.74	0.47
9600.00	1.36	303.49	9598.79	-0.92	58.63	-0.92	58.63	90.90	0.46
9700.00	2.60	295.61	9698.73	0.71	55.59	0.71	55.60	89.27	1.27
9800.00	4.57	291.94	9798.53	3.18	49.86	3.18	49.95	86.35	1.98
9900.00	3.34	296.59	9898.29	5.97	43.55	5.97	43.96	82.19	1.27
10000.00	2.63	304.75	9998.15	8.58	39.07	8.58	40.00	77.61	0.83
10100.00	2.56	314.14	10098.06	11.44	35.58	11.44	37.37	72.17	0.43
10200.00	1.84	301.89	10197.97	13.85	32.61	13.85	35.43	67.00	0.86
10300.00	1.64	294.94	10297.93	15.26	30.04	15.26	33.89	63.07	0.36
10400.00	2.01	303.01	10397.88	16.78	27.35	16.78	32.09	58.48	0.54
10500.00	2.31	298.17	10497.81	18.68	24.11	18.68	30.50	52.23	0.35
10600.00	2.14	285.49	10597.74	20.13	20.53	20.13	28.76	45.57	0.52
10700.00	1.94	283.78	10697.67	21.03	17.09	21.03	27.10	39.09	0.20
10800.00	1.74	285.12	10797.62	21.83	13.98	21.83	25.92	32.62	0.21
10900.00	0.84	288.78	10897.60	22.48	11.82	22.48	25.40	27.74	0.91
11000.00	1.71	336.85	10997.57	24.09	10.55	24.09	26.30	23.65	1.29
11100.00	2.91	344.41	11097.49	27.91	9.28	27.91	29.41	18.40	1.23
11200.00	3.04	336.27	11197.36	32.78	7.54	32.78	33.83	12.95	0.44
11300.00	2.54	330.41	11297.24	37.13	5.38	37.13	37.51	8.24	0.58
11400.00	2.58	292.66	11397.14	39.92	2.21	39.92	39.98	3.16	1.65
11500.00	2.24	312.69	11497.06	42.11	-1.30	42.11	42.13	358.23	0.90
11600.00	2.03	313.31	11596.99	44.64	-4.02	44.64	44.82	354.85	0.21
11700.00	2.19	314.79	11696.92	47.20	-6.67	47.20	47.67	351.96	0.17
11800.00	1.88	298.20	11796.86	49.35	-8.46	49.35	50.25	349.15	0.63
11900.00	1.54	296.08	11896.81	50.74	-12.10	50.74	52.17	346.59	0.35
12000.00	1.51	296.41	11996.78	51.92	-14.49	51.92	53.90	344.41	0.03
12100.00	1.62	293.73	12096.74	53.08	-16.96	53.08	56.72	342.28	0.13
12200.00	1.48	277.65	12196.70	53.82	-19.54	53.82	57.25	340.05	0.45
12300.00	1.42	258.19	12296.67	53.73	-22.03	53.73	58.06	337.70	0.49
12400.00	1.62	245.58	12396.64	52.90	-24.53	52.90	58.31	335.12	0.39
12500.00	1.59	256.47	12496.60	51.98	-27.17	51.98	58.56	332.41	0.31
12600.00	1.35	260.49	12596.57	51.47	-29.68	51.47	59.41	330.03	0.26
12695.00	1.55	229.23	12691.54	50.44	-31.76	50.44	59.61	327.81	0.85



VES Survey International
Midland, Texas
432-563-5444

Surveyor: Javier Estrada
Rojo C 7811 JV-P No 001H / API 30-025-42458



V.E.S. Survey Date: 9/16/2015



I JAVIER ESTRADA certify that I am employed by Vaughn Energy Services. That I did on the day(s) of 09/17/15 through 09/17/15 conduct or supervise the taking of a RATE GYRO survey from a depth of 0 feet to a depth of 12695 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG OPERATING LLC for the ROJO C 7811 JV-P Well # 1H API # 30-025-42458 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 Vaughn Energy Services

A handwritten signature in blue ink that reads "Javier Estrada". The signature is written in a cursive style and is positioned above a horizontal line.

JAVIER ESTRADA
Service Technician
Vaughn Energy Services



COG Operating LLC.

Lea County, NM

Rojo

C 7811 JV-P #1H

OH

Survey: MWD #1

Survey Report - Geographic

28 September, 2015



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well C 7811 JV-P #1H
Project:	Lea County, NM	TVD Reference:	WELL @ 3351.3usft (Silver Oak #12 - 18' KB)
Site:	Rojo	MD Reference:	WELL @ 3351.3usft (Silver Oak #12 - 18' KB)
Well:	C 7811 JV-P #1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000 1 Single User Db

Project	Lea 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	Rojo		
Site Position:		Northing:	399,019.79 usft
From:	Lat/Long	Easting:	741,891.89 usft
Position Uncertainty:	5.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 5' 40.607 N
		Longitude:	103° 33' 8.032 W
		Grid Convergence:	0.42 "

Well	C 7811 JV-P #1H		
Well Position	+N-S	0.0 usft	Northing: 399,019.79 usft
	+E-W	0.0 usft	Easting: 741,891.89 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Ground Level:	3,333.3 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	9/17/2015	7.12
			Dip Angle (°)
			59.97
			Field Strength (nT)
			48,044

Design	OH		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	8,819.0
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			358.87

Survey Program	Date 9/28/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100.0	8,819.0	Survey #1 - Gyro1 (Pilot)	CB-GYRO-MS
8,836.0	13,858.0	MWD #1 (OH)	MWD
			Description
			Camera based gyro multishot
			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	
8,819.0	0.70	176.39	8,817.9	0.4	68.5	399,020.23	741,960.39	32° 5' 40.606 N	103° 33' 7.235 W	
8,836.0	5.00	350.10	8,834.9	1.1	68.4	399,020.86	741,960.27	32° 5' 40.613 N	103° 33' 7.237 W	
8,867.0	9.90	358.00	8,865.6	5.1	68.1	399,024.86	741,959.94	32° 5' 40.652 N	103° 33' 7.240 W	
8,899.0	14.70	1.70	8,896.9	11.9	68.1	399,031.67	741,959.97	32° 5' 40.719 N	103° 33' 7.239 W	
8,930.0	18.50	4.20	8,926.6	20.7	68.6	399,040.51	741,960.45	32° 5' 40.807 N	103° 33' 7.233 W	
8,962.0	21.10	3.40	8,956.7	31.5	69.3	399,051.32	741,961.16	32° 5' 40.914 N	103° 33' 7.224 W	
8,994.0	22.30	1.50	8,986.4	43.4	69.8	399,063.14	741,961.66	32° 5' 41.031 N	103° 33' 7.217 W	
9,025.0	24.90	357.40	9,014.8	55.8	69.6	399,075.55	741,961.52	32° 5' 41.154 N	103° 33' 7.218 W	
9,057.0	28.50	355.20	9,043.4	70.1	68.7	399,089.89	741,960.57	32° 5' 41.296 N	103° 33' 7.227 W	
9,088.0	32.50	353.40	9,070.1	85.7	67.1	399,105.54	741,959.00	32° 5' 41.451 N	103° 33' 7.244 W	
9,120.0	37.00	353.90	9,096.4	103.9	65.1	399,123.66	741,956.98	32° 5' 41.630 N	103° 33' 7.266 W	



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well C 7811 JV-P #1H
Project:	Lea County, NM	TVD Reference:	WELL @ 3351 Jusft (Silver Oak #12 - 18" KB)
Site:	Rojo	MD Reference:	WELL @ 3351 Jusft (Silver Oak #12 - 18" KB)
Well:	C 7811 JV-P #1H	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	
9,152.0	40.50	354.00	9,121.3	123.8	63.0	399,143.58	741,954.87	32° 5' 41.827 N	103° 33' 7.289 W	
9,183.0	44.60	355.00	9,144.2	144.6	61.0	399,164.44	741,952.87	32° 5' 42.034 N	103° 33' 7.311 W	
9,215.0	47.20	354.80	9,166.4	167.5	58.9	399,187.33	741,950.83	32° 5' 42.260 N	103° 33' 7.332 W	
9,247.0	48.60	354.70	9,187.9	191.2	56.8	399,210.97	741,948.66	32° 5' 42.495 N	103° 33' 7.356 W	
9,278.0	50.10	353.30	9,208.1	214.6	54.3	399,234.36	741,946.19	32° 5' 42.726 N	103° 33' 7.382 W	
9,310.0	53.30	351.70	9,227.9	239.5	51.0	399,259.25	741,942.91	32° 5' 42.973 N	103° 33' 7.418 W	
9,342.0	56.40	350.80	9,246.3	265.3	47.0	399,285.11	741,938.93	32° 5' 43.229 N	103° 33' 7.463 W	
9,373.0	55.50	352.20	9,263.7	290.7	43.2	399,310.51	741,935.13	32° 5' 43.481 N	103° 33' 7.505 W	
9,404.0	56.70	354.00	9,281.0	316.3	40.2	399,336.05	741,932.04	32° 5' 43.734 N	103° 33' 7.538 W	
9,436.0	58.90	355.10	9,298.0	343.2	37.6	399,363.00	741,929.47	32° 5' 44.000 N	103° 33' 7.566 W	
9,467.0	62.50	353.50	9,313.2	370.1	34.9	399,389.90	741,926.78	32° 5' 44.267 N	103° 33' 7.596 W	
9,499.0	66.90	350.30	9,326.9	398.7	30.8	399,418.53	741,922.69	32° 5' 44.550 N	103° 33' 7.640 W	
9,531.0	72.00	348.90	9,338.1	428.2	25.4	399,447.99	741,917.28	32° 5' 44.842 N	103° 33' 7.700 W	
9,562.0	78.20	349.20	9,346.1	457.6	19.7	399,477.38	741,911.59	32° 5' 45.134 N	103° 33' 7.764 W	
9,624.0	86.00	350.80	9,354.6	518.0	9.1	399,537.81	741,900.94	32° 5' 45.732 N	103° 33' 7.883 W	
9,687.0	88.50	351.40	9,357.6	580.2	-0.7	399,599.98	741,891.21	32° 5' 46.348 N	103° 33' 7.991 W	
9,719.0	89.40	351.50	9,358.2	611.8	-5.4	399,631.62	741,886.45	32° 5' 46.662 N	103° 33' 8.043 W	
9,750.0	90.10	351.50	9,358.3	642.5	-10.0	399,662.28	741,881.87	32° 5' 46.965 N	103° 33' 8.094 W	
9,845.0	91.80	351.30	9,356.8	736.4	-24.2	399,756.19	741,867.67	32° 5' 47.896 N	103° 33' 8.251 W	
9,940.0	91.80	351.20	9,353.8	830.3	-38.7	399,850.04	741,853.22	32° 5' 48.825 N	103° 33' 8.411 W	
10,035.0	90.30	351.70	9,352.0	924.2	-52.8	399,943.97	741,839.10	32° 5' 49.756 N	103° 33' 8.567 W	
10,130.0	91.30	354.00	9,350.7	1,018.4	-64.6	400,038.21	741,827.28	32° 5' 50.689 N	103° 33' 8.697 W	
10,225.0	90.90	356.40	9,348.9	1,113.1	-72.6	400,132.65	741,819.33	32° 5' 51.626 N	103° 33' 8.781 W	
10,319.0	88.90	358.10	9,346.1	1,206.9	-77.1	400,226.74	741,814.82	32° 5' 52.556 N	103° 33' 8.826 W	
10,414.0	88.70	359.90	9,351.0	1,301.9	-78.7	400,321.70	741,813.17	32° 5' 53.496 N	103° 33' 8.837 W	
10,509.0	87.80	0.50	9,353.9	1,396.9	-78.4	400,416.65	741,813.50	32° 5' 54.435 N	103° 33' 8.825 W	
10,604.0	89.20	0.70	9,356.4	1,491.8	-77.4	400,511.61	741,814.49	32° 5' 55.375 N	103° 33' 8.806 W	
10,699.0	91.00	1.20	9,356.3	1,586.8	-75.8	400,606.59	741,816.07	32° 5' 56.315 N	103° 33' 8.779 W	
10,793.0	91.10	0.40	9,354.5	1,680.8	-74.5	400,700.57	741,817.38	32° 5' 57.245 N	103° 33' 8.756 W	
10,888.0	90.20	359.00	9,353.5	1,775.8	-75.0	400,795.56	741,816.88	32° 5' 58.165 N	103° 33' 8.754 W	
10,983.0	89.20	358.60	9,354.0	1,870.7	-77.0	400,890.53	741,814.89	32° 5' 59.125 N	103° 33' 8.769 W	
11,078.0	87.00	357.60	9,357.1	1,965.6	-80.1	400,985.42	741,811.74	32° 6' 0.064 N	103° 33' 8.798 W	
11,173.0	86.80	357.90	9,362.3	2,060.4	-83.9	401,080.21	741,808.02	32° 6' 1.002 N	103° 33' 8.833 W	
11,268.0	88.00	358.60	9,366.6	2,155.3	-86.8	401,175.06	741,805.12	32° 6' 1.941 N	103° 33' 8.859 W	
11,363.0	87.90	0.30	9,370.0	2,250.2	-87.7	401,270.00	741,804.21	32° 6' 2.880 N	103° 33' 8.861 W	
11,457.0	90.20	1.00	9,371.5	2,344.2	-86.6	401,363.97	741,805.28	32° 6' 3.810 N	103° 33' 8.841 W	
11,552.0	91.40	0.70	9,370.2	2,439.2	-85.2	401,458.95	741,806.69	32° 6' 4.750 N	103° 33' 8.817 W	
11,647.0	93.40	0.80	9,366.2	2,534.1	-84.0	401,553.85	741,807.93	32° 6' 5.689 N	103° 33' 8.794 W	
11,742.0	92.30	0.00	9,361.5	2,628.9	-83.3	401,648.73	741,808.59	32° 6' 6.628 N	103° 33' 8.779 W	
11,837.0	90.00	0.10	9,359.6	2,723.9	-83.2	401,743.70	741,808.67	32° 6' 7.566 N	103° 33' 8.770 W	
11,932.0	88.00	1.80	9,361.2	2,818.9	-81.6	401,838.67	741,810.25	32° 6' 8.507 N	103° 33' 8.743 W	
12,027.0	88.30	0.90	9,364.3	2,913.8	-79.4	401,933.59	741,812.49	32° 6' 9.446 N	103° 33' 8.709 W	
12,121.0	89.80	0.90	9,365.9	3,007.8	-77.9	402,027.56	741,813.96	32° 6' 10.376 N	103° 33' 8.684 W	
12,216.0	90.30	0.80	9,365.8	3,102.8	-76.5	402,122.55	741,815.37	32° 6' 11.316 N	103° 33' 8.660 W	
12,311.0	88.10	0.30	9,367.1	3,197.7	-75.6	402,217.53	741,816.28	32° 6' 12.256 N	103° 33' 8.641 W	
12,406.0	89.50	0.10	9,369.1	3,292.7	-75.3	402,312.51	741,816.61	32° 6' 13.196 N	103° 33' 8.629 W	
12,501.0	88.50	359.00	9,370.8	3,387.7	-76.0	402,407.49	741,815.87	32° 6' 14.136 N	103° 33' 8.630 W	
12,596.0	90.20	358.80	9,371.8	3,482.7	-77.8	402,502.46	741,814.04	32° 6' 15.076 N	103° 33' 8.643 W	
12,691.0	89.60	358.70	9,372.0	3,577.7	-79.9	402,597.44	741,811.97	32° 6' 16.016 N	103° 33' 8.659 W	
12,786.0	88.50	358.70	9,373.6	3,672.6	-82.1	402,692.40	741,809.82	32° 6' 16.956 N	103° 33' 8.676 W	
12,881.0	88.60	359.60	9,376.0	3,767.6	-83.5	402,787.36	741,808.41	32° 6' 17.895 N	103° 33' 8.685 W	
12,976.0	90.70	0.30	9,376.6	3,862.6	-83.6	402,882.35	741,808.33	32° 6' 18.835 N	103° 33' 8.678 W	
13,070.0	89.80	359.30	9,376.2	3,956.6	-83.9	402,976.35	741,808.00	32° 6' 19.766 N	103° 33' 8.674 W	
13,165.0	91.70	359.20	9,374.9	4,051.5	-85.1	403,071.33	741,806.75	32° 6' 20.706 N	103° 33' 8.680 W	
13,261.0	90.30	358.70	9,373.2	4,147.5	-86.9	403,167.29	741,805.00	32° 6' 21.655 N	103° 33' 8.692 W	



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well C 7811 JV-P #1H
Project:	Lea County, NM	TVD Reference:	WELL @ 3351.3usft (Silver Oak #12 - 18' KB)
Site:	Rojo	MD Reference:	WELL @ 3351.3usft (Silver Oak #12 - 18' KB)
Well:	C 7811 JV-P #1H	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
13,356.0	90.80	359.20	9,372.3	4,242.5	-88.6	403,262.27	741,803.25	32° 6' 22.595 N	103° 33' 8.705 W
13,451.0	92.30	358.20	9,369.7	4,337.4	-90.8	403,357.21	741,801.10	32° 6' 23.535 N	103° 33' 8.722 W
13,543.0	92.30	357.40	9,366.1	4,429.3	-94.3	403,449.07	741,797.57	32° 6' 24.444 N	103° 33' 8.755 W
13,640.0	93.00	358.20	9,361.6	4,526.1	-98.0	403,545.89	741,793.85	32° 6' 25.403 N	103° 33' 8.790 W
13,735.0	88.70	359.50	9,360.2	4,621.0	-99.9	403,640.84	741,791.95	32° 6' 26.342 N	103° 33' 8.804 W
13,805.0	90.10	359.30	9,360.9	4,691.0	-100.7	403,710.83	741,791.21	32° 6' 27.035 N	103° 33' 8.807 W
13,858.0	90.10	359.30	9,360.8	4,744.0	-101.3	403,763.82	741,790.57	32° 6' 27.559 N	103° 33' 8.810 W
PBHL (RC#1H)									

Checked By: _____	Approved By: _____	Date: _____
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