

Results of Directional Survey

API number:	30-025-41622		
OGRID:		Operator:	BTA OIL PRODUCERS, LLC
		Property:	VACA DRAW 9418 JV-P # 3H

surface	ULSTR:	B	10	T	25S	R	33E
				190	FNL	2310	FEL

BH Loc	ULSTR:	O	10	T	25S	R	33E
15626	MD	11176.9	TVD	346	FSL	2221	FEL
4934 FNL							

Top Perf/OH	ULSTR:	B	10	T	25S	R	33E
11348	MD	11109.9	TVD	663	FNL	2280	FEL

Bot Perf/OH	ULSTR:	O	10	T	25S	R	33E
15475	MD	11166.4	TVD	496	FSL	2210	FEL
				4784	FNL		

	MD	N/S	E/W	VD
	11317	-443.40	28.00	11101.5
TOP PERFS/OH	11348	-473.20	30.10	11109.90
	11348	-473.20	30.10	11109.90
	15471	-4589.70	100.00	11166.10
BOT PERFS/OH	15475	-4593.68	99.71	11166.38
	15565	-4683.30	93.20	11172.60

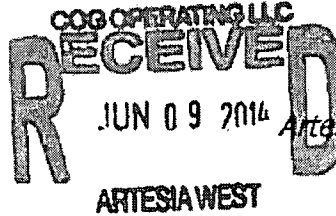
NEXT TO LAST	15565	-4683.30	93.20	11172.60
LAST READING	15626	-4744.00	89.10	11176.90
TD	15626	-4744.00	89.10	11176.90

Surface Location	190	FN	2310	FE
Projected BHL	4934	FN	2221	FE
Location of				
Top Perfs/OH	663	FN	2280	FE
Bottom Perfs/OH	4784	FN	2210	FE

SUMMARY of Subsurface Locations

Surface Location	B-10-25S-33E	190	FN	2310	FE	Vert. Depth
Top Perfs/OH	B-10-25S-33E	663	FN	2280	FE	11109.90
Bottom Perfs/OH	O-10-25S-33E	4784	FN	2210	FE	11166.38
Projected TD	O-10-25S-33E	4934	FN	2221	FE	11176.90

AUG 11 2014



HODS OGD

AUG 06 2014

RECEIVED

PO Box 1570

Artesia, NM 88211-1370

(575) 748-1288

May 31, 2014

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

RE: 9418 JV-P Vaca Draw 3H
190' FNL & 2310' FEL
Sec. 10, T25S, R33E
Eddy County, New Mexico

Dear Sir,

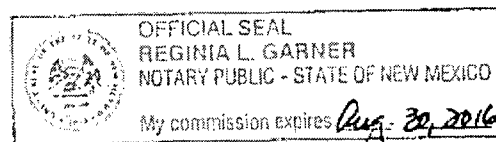
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Eddie LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 31st day of May, 2014.

Notary Public

9418 JV-P Vaca Draw 3H

Date	Depth	Deviation	Direction	TVD
5/7/2014	161	0.70	0.00	0.00
5/7/2014	250	0.80	0.00	0.00
5/7/2014	338	0.60	0.00	0.00
5/8/2014	500	0.80	0.00	0.00
5/8/2014	682	0.30	0.00	0.00
5/8/2014	874	0.10	0.00	0.00
5/8/2014	1006	0.20	0.00	0.00
5/10/2014	1264	0.90	0.00	0.00
5/10/2014	1452	0.70	322.60	0.00
5/10/2014	1641	0.20	22.40	0.00
5/10/2014	1825	0.40	346.20	0.00
5/10/2014	2017	0.40	0.00	0.00
5/10/2014	2300	0.70	0.00	0.00
5/10/2014	2584	0.70	0.00	0.00
5/11/2014	2868	0.70	0.00	0.00
5/11/2014	3152	0.90	0.00	0.00
5/11/2014	3435	1.10	0.00	0.00
5/11/2014	3718	39.00	55.80	0.00
5/11/2014	4002	0.70	0.00	0.00
5/12/2014	4287	1.10	0.00	0.00
5/12/2014	4570	1.20	0.00	0.00
5/12/2014	4852	1.90	0.00	0.00
5/14/2014	5279	1.30	0.00	0.00
5/14/2014	5532	0.40	0.00	0.00
5/15/2014	5970	1.10	0.00	0.00
5/15/2014	6412	0.50	0.00	0.00
5/15/2014	6887	0.10	0.00	0.00
5/15/2014	7326	0.70	0.00	0.00
5/15/2014	7796	0.80	0.00	0.00
5/16/2014	8236	0.30	0.00	0.00
5/16/2014	8674	1.10	0.00	0.00
5/16/2014	9117	1.10	0.00	0.00
5/17/2014	9557	0.70	0.00	0.00
5/19/2014	9993	1.40	0.00	0.00
5/19/2014	10438	2.40	0.00	0.00
5/20/2014	10566	3.50	3237.00	0.00
5/20/2014	10597	2.30	262.20	0.00
5/20/2014	10660	11.40	188.70	10651.43
5/20/2014	10755	23.20	177.10	10747.80
5/20/2014	10786	26.90	173.90	10775.89
5/21/2014	10818	30.40	171.50	0.00
5/21/2014	10849	33.30	171.10	0.00
5/21/2014	10880	35.90	171.50	0.00
5/21/2014	10912	38.70	171.80	0.00
5/21/2014	10944	42.20	171.80	0.00

Date	Depth	Deviation	Direction	TVD
5/22/2014	10971	45.20	172.20	0.00
5/22/2014	11002	47.50	172.20	0.00
5/22/2014	11034	48.60	173.90	0.00
5/22/2014	11066	51.00	175.70	0.00
5/22/2014	11160	61.60	176.40	0.00
5/22/2014	11245	68.40	176.00	0.00
5/22/2014	11285	70.70	176.00	0.00
5/22/2014	11348	75.10	176.00	11009.35
5/22/2014	11474	85.70	176.40	11130.82
5/22/2014	11600	89.00	175.70	0.00
5/23/2014	11694	90.30	175.30	0.00
5/23/2014	11788	91.50	176.00	0.00
5/23/2014	11883	89.90	176.70	0.00
5/23/2014	11978	88.50	177.80	0.00
5/23/2014	12073	89.60	178.50	0.00
5/23/2014	12166	90.40	178.50	0.00
5/23/2014	12450	90.80	178.90	11131.00
5/23/2014	12544	91.10	178.90	11129.80
5/24/2014	12655	91.10	178.50	0.00
5/24/2014	12718	90.60	179.60	0.00
5/24/2014	12778	91.00	179.90	0.00
5/24/2014	12827	91.00	178.90	11125.11
5/24/2014	12922	91.70	179.60	11122.81
5/25/2014	13249	90.80	179.90	0.00
5/25/2014	13315	90.40	179.60	0.00
5/25/2014	13487	90.80	177.80	0.00
5/25/2014	13581	89.90	178.50	0.00
5/25/2014	13676	90.40	178.10	0.00
5/25/2014	13770	90.10	178.50	0.00
5/25/2014	13864	91.00	179.60	0.00
5/26/2014	14037	89.00	179.60	0.00
5/26/2014	14194	88.70	180.60	0.00
5/26/2014	14226	88.70	180.60	0.00
5/26/2014	14240	89.00	181.00	11116.21
5/26/2014	14429	89.20	180.60	0.00
5/26/2014	14522	88.70	180.60	0.00
5/26/2014	14617	89.60	181.30	0.00
5/26/2014	14712	89.40	180.30	0.00
5/27/2014	14854	88.50	179.20	0.00
5/27/2014	14981	86.60	177.80	0.00
5/27/2014	14955	88.50	179.20	0.00
5/28/2014	15089	88.00	176.70	0.00
5/28/2014	15188	85.70	177.40	0.00
5/28/2014	15376	85.00	183.80	11158.04
5/29/2014	15471	86.00	184.50	0.00



May 23, 2014

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

Attn: Kanicia Castillo

RE: VACA Draw 9418 JV-P No. 003H

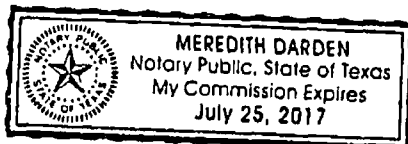
Please find enclosed a copy of the survey from 0.00' to 10,510.00' ran on the above referenced well.

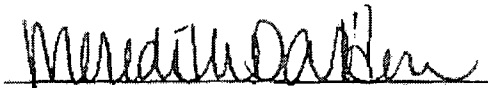
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 23rd day of May, A.D., 2014, by Keith Havelka.




Meredith Darden
Notary Public, State of Texas



Company: COG OPERATING , LLC
Lease/Well: VACA DRAW 9418 JV-P /NO. 003H

Rig Name: SILVER OAK RIG 12
State/County: NEW MEXICO/LEA
Latitude: 31.15, Longitude: -103.56
GRID North is 0.40 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : R.K.B = 18FT

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: 9418 jv-p vaca draw 3h.ut

Minimum Curvature Method

Report Date/Time: 5/23/2014 / 14:55

VES Survey International

(432) 563-5444

West, Texas

Surveyor: Javier Estrada

VACA Draw 9418 JV-P No. 003H / API 30-025-41622

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	0.30	110.46	100.00	-0.09	0.24	-0.09	0.26	110.46	0.30
200.00	0.40	79.58	200.00	-0.12	0.82	-0.12	0.83	98.16	0.21
300.00	0.68	91.51	299.99	-0.07	1.75	-0.07	1.76	92.33	0.30
400.00	0.49	86.15	399.99	-0.06	2.77	-0.06	2.77	91.21	0.20
500.00	0.50	149.40	499.99	-0.41	3.41	-0.41	3.44	96.84	0.52
600.00	0.42	183.05	599.98	-1.16	3.62	-1.16	3.80	107.72	0.28
700.00	0.52	228.82	699.98	-1.82	3.25	-1.82	3.73	119.27	0.38
800.00	0.67	265.45	799.97	-2.17	2.33	-2.17	3.18	133.00	0.40
900.00	0.43	293.78	899.97	-2.06	1.40	-2.06	2.49	145.89	0.35
1000.00	0.30	262.34	999.97	-1.95	0.79	-1.95	2.10	157.85	0.24
1100.00	0.27	313.64	1099.97	-1.82	0.36	-1.82	1.85	168.75	0.25
1200.00	0.40	314.30	1199.96	-1.41	-0.06	-1.41	1.41	182.43	0.13
1300.00	0.39	307.51	1299.96	-0.96	-0.58	-0.96	1.12	211.07	0.05
1400.00	0.43	315.27	1399.96	-0.49	-1.11	-0.49	1.21	246.27	0.07
1500.00	0.39	333.75	1499.96	0.08	-1.62	0.08	1.52	272.97	0.14
1600.00	0.17	331.60	1599.96	0.51	-1.74	0.51	1.81	286.40	0.21
1700.00	0.26	25.35	1699.96	0.85	-1.72	0.85	1.91	296.31	0.21
1800.00	0.16	10.33	1799.95	1.19	-1.59	1.19	1.99	306.76	0.11
1900.00	0.13	318.39	1899.95	1.42	-1.65	1.42	2.17	310.69	0.13

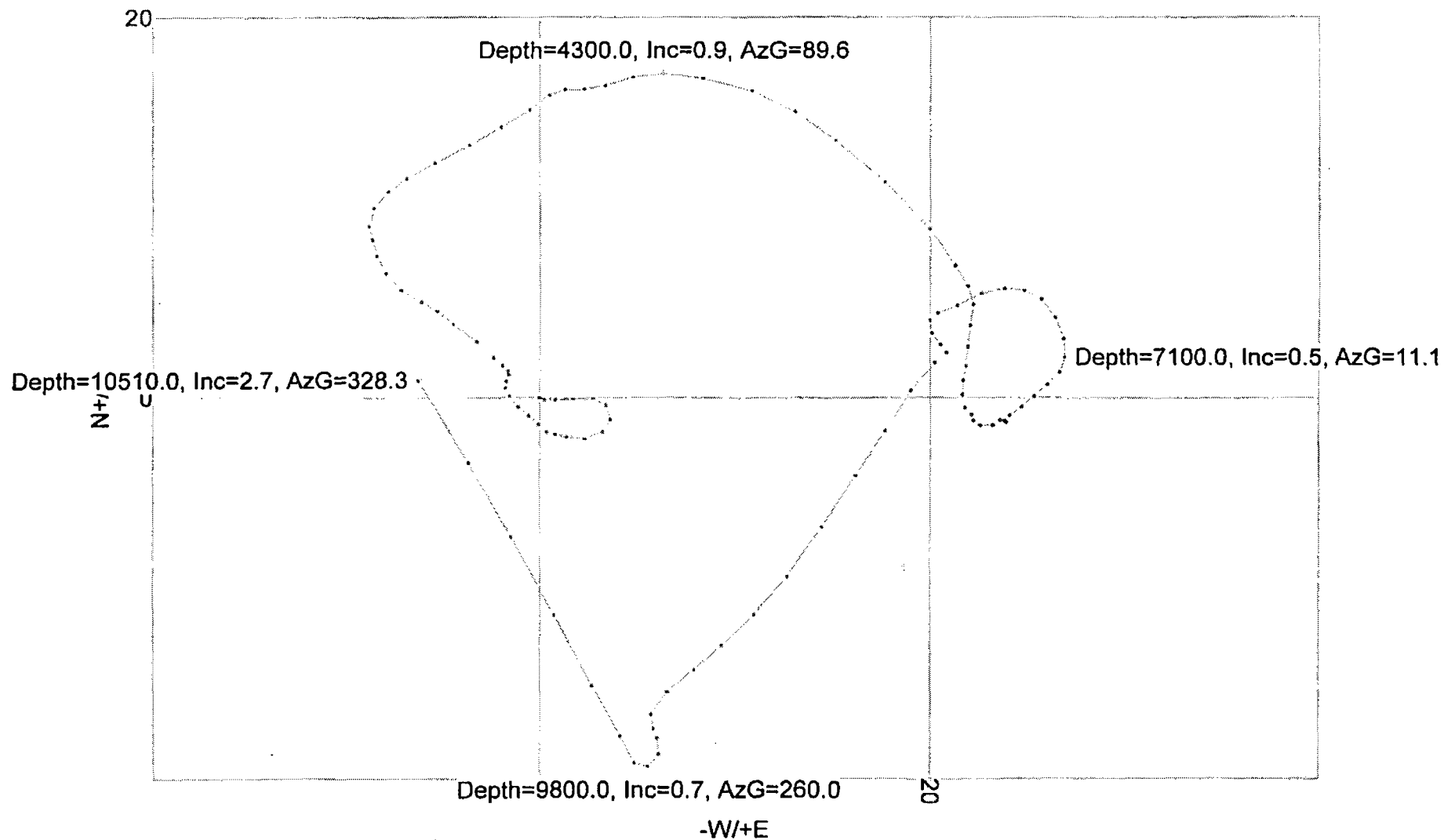
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
2000.00	0.29	315.18	1999.95	1.68	-1.90	1.68	2.54	311.49	0.15
2100.00	0.44	312.94	2099.95	2.12	-2.36	2.12	3.17	311.96	0.15
2200.00	0.95	313.43	2199.94	2.95	-3.24	2.95	4.38	312.32	0.52
2300.00	0.84	300.11	2299.93	3.89	-4.47	3.89	5.93	310.98	0.24
2400.00	0.41	325.52	2399.93	4.55	-5.31	4.55	6.99	310.59	0.50
2500.00	0.74	286.12	2499.92	5.03	-6.14	5.03	7.93	309.31	0.50
2600.00	0.72	315.87	2599.91	5.66	-7.20	5.66	9.16	308.16	0.38
2700.00	0.61	323.12	2699.91	6.54	-7.96	6.54	10.30	309.40	0.14
2800.00	0.61	343.83	2799.90	7.47	-8.43	7.47	11.26	311.57	0.22
2900.00	0.38	346.74	2899.90	8.31	-8.65	8.31	11.99	313.84	0.22
3000.00	0.46	344.55	2999.89	9.02	-8.83	9.02	12.62	315.59	0.07
3100.00	0.75	32.56	3099.89	9.95	-8.59	9.95	13.15	319.22	0.56
3200.00	0.59	51.83	3199.88	10.83	-7.83	10.83	13.36	324.13	0.27
3300.00	0.75	53.95	3299.88	11.53	-6.89	11.53	13.43	329.14	0.16
3400.00	1.16	65.40	3399.86	12.34	-5.44	12.34	13.49	336.19	0.45
3500.00	1.17	61.05	3499.84	13.25	-3.63	13.25	13.74	344.69	0.09
3600.00	1.01	58.01	3599.82	14.22	-1.99	14.22	14.35	352.04	0.18
3700.00	1.01	58.40	3699.81	15.14	-0.49	15.14	15.15	358.15	0.01
3800.00	0.41	39.72	3799.80	15.89	0.50	15.89	15.89	1.79	0.64
3900.00	0.67	87.12	3899.80	16.19	1.30	16.19	16.24	4.61	0.49
4000.00	0.48	93.64	3999.79	16.19	2.31	16.19	16.36	8.10	0.19
4100.00	0.78	69.44	4099.78	16.40	3.36	16.40	16.74	11.58	0.39
4200.00	0.91	76.64	4199.77	16.82	4.77	16.82	17.49	15.82	0.17
4300.00	0.90	89.61	4299.76	17.01	6.33	17.01	18.15	20.40	0.21
4400.00	1.42	100.83	4399.74	16.79	8.33	16.79	18.74	26.39	0.56
4500.00	1.58	108.65	4499.71	16.12	10.85	16.12	19.43	33.94	0.26
4600.00	1.28	125.10	4599.68	15.03	13.06	15.03	19.92	40.98	0.50
4700.00	1.67	126.81	4699.64	13.52	15.14	13.52	20.30	48.23	0.39
4800.00	2.16	133.72	4799.59	11.35	17.66	11.35	20.99	57.28	0.54
4900.00	1.72	140.67	4899.53	8.89	19.98	8.89	21.86	66.02	0.50
5000.00	0.98	155.44	4999.50	6.95	21.28	6.95	22.39	71.92	0.81
5100.00	0.48	140.39	5099.49	5.85	21.90	5.85	22.67	75.05	0.53
5200.00	0.72	177.21	5199.49	4.90	22.20	4.90	22.74	77.55	0.44
5300.00	0.60	200.44	5299.48	3.78	22.05	3.78	22.37	80.26	0.29
5400.00	0.70	173.20	5399.47	2.69	21.94	2.69	22.10	83.02	0.32
5500.00	0.54	203.13	5499.47	1.65	21.82	1.65	21.89	85.67	0.35
5600.00	0.37	171.81	5599.47	0.90	21.69	0.90	21.71	87.63	0.29
5700.00	0.50	191.10	5699.46	0.14	21.65	0.14	21.65	89.62	0.20
5800.00	0.37	138.74	5799.46	-0.53	21.78	-0.53	21.79	91.40	0.40
5900.00	0.20	139.90	5899.46	-0.91	22.11	-0.91	22.13	92.36	0.18

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
6000.00	0.20	184.29	5999.46	-1.21	22.21	-1.21	22.24	93.13	0.15
6100.00	0.42	103.05	6099.46	-1.47	22.55	-1.47	22.60	93.73	0.44
6200.00	0.36	70.44	6199.46	-1.45	23.20	-1.45	23.25	93.68	0.23
6300.00	0.20	35.26	6299.45	-1.21	23.59	-1.21	23.62	92.92	0.22
6400.00	0.24	149.16	6399.45	-1.24	23.80	-1.24	23.83	92.98	0.37
6500.00	0.12	346.96	6499.45	-1.32	23.88	-1.32	23.92	93.15	0.36
6600.00	0.39	40.25	6599.45	-0.95	24.08	-0.95	24.10	92.26	0.33
6700.00	0.50	61.40	6699.45	-0.48	24.68	-0.48	24.69	91.12	0.19
6800.00	0.52	36.69	6799.45	0.09	25.33	0.09	25.33	89.80	0.22
6900.00	0.53	61.43	6899.44	0.67	26.01	0.67	26.01	88.52	0.22
7000.00	0.54	26.62	6999.44	1.31	26.62	1.31	26.65	87.18	0.32
7100.00	0.46	11.10	7099.43	2.13	26.91	2.13	26.99	85.48	0.16
7200.00	0.69	346.68	7199.43	3.11	26.85	3.11	27.03	83.40	0.33
7300.00	0.69	329.37	7299.42	4.21	26.40	4.21	26.74	80.95	0.21
7400.00	0.69	315.26	7399.41	5.15	25.67	5.15	26.18	78.65	0.17
7500.00	0.54	278.42	7499.41	5.65	24.78	5.65	25.42	77.15	0.42
7600.00	0.81	271.69	7599.40	5.74	23.78	5.74	24.46	76.44	0.10
7700.00	0.79	247.78	7699.40	5.49	22.61	5.49	23.27	76.35	0.34
7800.00	0.83	237.69	7799.39	4.84	21.36	4.84	21.90	77.22	0.15
7900.00	0.43	271.71	7899.38	4.47	20.37	4.47	20.86	77.63	0.53
8000.00	0.45	186.38	7999.38	4.09	19.95	4.09	20.37	78.42	0.60
8100.00	0.39	152.16	8099.38	3.39	20.07	3.39	20.36	80.40	0.25
8200.00	0.47	132.75	8199.37	2.81	20.53	2.81	20.72	82.19	0.17
8300.00	0.16	175.02	8299.37	2.40	20.85	2.40	20.98	83.44	0.37
8400.00	0.85	235.61	8399.37	1.84	20.25	1.84	20.33	84.81	0.78
8500.00	1.40	210.61	8499.35	0.37	19.01	0.37	19.01	88.89	0.73
8600.00	1.46	212.88	8599.32	-1.76	17.70	-1.76	17.78	95.67	0.08
8700.00	1.73	213.58	8699.28	-4.08	16.17	-4.08	16.68	104.16	0.26
8800.00	2.01	211.46	8799.23	-6.83	14.42	-6.83	15.96	115.35	0.30
8900.00	1.61	217.62	8899.18	-9.45	12.64	-9.45	15.78	126.77	0.44
9000.00	1.35	223.69	8999.14	-11.41	10.97	-11.41	15.83	136.12	0.31
9100.00	1.30	226.97	9099.12	-13.04	9.33	-13.04	16.03	144.41	0.09
9200.00	0.89	230.25	9199.10	-14.31	7.91	-14.31	16.35	151.08	0.42
9300.00	1.14	230.43	9299.08	-15.44	6.54	-15.44	16.77	157.04	0.26
9400.00	0.66	184.38	9399.07	-16.65	5.73	-16.65	17.81	161.02	0.84
9500.00	0.29	142.01	9499.07	-17.42	5.84	-17.42	18.37	161.47	0.48
9600.00	0.35	173.95	9599.06	-17.93	6.03	-17.93	18.91	161.42	0.19
9700.00	0.60	174.40	9699.06	-18.75	6.11	-18.75	19.72	161.95	0.25
9800.00	0.68	259.97	9799.06	-19.38	5.58	-19.38	20.16	163.93	0.87
9900.00	0.36	334.68	9899.05	-19.20	4.87	-19.20	19.80	165.78	0.68

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
10000.00	1.43	332.38	9999.04	-17.81	4.16	-17.81	18.29	166.87	1.07
10100.00	2.03	331.18	10098.99	-15.15	2.72	-15.15	15.40	169.81	0.61
10200.00	2.77	332.04	10198.91	-11.47	0.74	-11.47	11.49	176.33	0.74
10300.00	2.59	331.40	10298.80	-7.35	-1.48	-7.35	7.50	191.36	0.18
10400.00	2.56	329.78	10398.70	-3.44	-3.68	-3.44	5.04	226.91	0.08
10510.00	2.73	328.26	10508.58	0.91	-6.29	0.91	6.36	278.20	0.17



VES Survey International
(432) 563-5444
West, Texas
Surveyor: Javier Estrada
VACA Draw 9418 JV-P No. 003H / API 30-025-41622



VES Survey Date: 05/19/2014



COG Operating LLC

Lea County, NM (NAD27 NME)

9418 JV-P Vaca Draw

3H

OH

Survey: MWD #1

Standard Survey Report

03 June, 2014



Wellplanning Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 3440.2usft (Original Well Elev)
Site:	9418 JV-P Vaca Draw	MD Reference:	WELL @ 3440.2usft (Original Well Elev)
Well:	3H	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	9418 JV-P Vaca Draw			
Site Position:		Northing:	419,780.50 usft	Latitude: 32° 8' 8.058 N
From:	Map	Easting:	741,734.30 usft	Longitude: 103° 33' 8.114 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: 0.42 °

Well	3H			
Well Position	+N/-S	0.0 usft	Northing: 419,788.30 usft	Latitude: 32° 8' 8.079 N
	+E/-W	0.0 usft	Easting: 739,754.40 usft	Longitude: 103° 33' 31.144 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level: 3,422.2 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2010	8/24/2013	(°)	(°)	(nT)
			7.29	80.07	48,348

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	178.96

Survey Program	Date 8/3/2014			
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100.0	10,510.0	GYRO (OH)	MWD	MWD - Standard
10,568.0	15,826.0	MWD #1 (OH)	MWD	MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
10,510.0	2.73	328.26	10,508.6	0.9	-6.2	-1.0	0.00	0.00	0.00	
10,568.0	3.50	323.70	10,584.5	3.4	-8.0	-3.6	1.44	1.38	-8.14	
10,597.0	2.30	262.20	10,595.5	4.1	-9.1	-4.3	10.13	-3.87	-198.39	
10,628.0	8.00	200.60	10,628.4	2.5	-10.3	-2.7	17.11	11.94	-198.71	
10,680.0	11.40	188.70	10,658.0	-2.2	-11.4	2.0	17.70	16.88	-37.19	
10,691.0	15.80	183.10	10,688.1	-9.4	-12.1	9.2	14.80	14.19	-18.06	
10,723.0	19.70	179.60	10,718.8	-18.2	-12.3	18.9	12.63	12.19	-10.94	
10,755.0	23.20	177.10	10,748.4	-30.9	-11.9	30.6	11.30	10.94	-7.81	
10,786.0	26.90	173.90	10,776.5	-43.9	-10.9	43.7	12.71	11.94	-10.32	
10,818.0	30.40	171.50	10,804.5	-59.2	-8.9	59.0	11.51	10.94	-7.50	



Wellplanning Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 3440.2usft (Original Well Elev)
Site:	9418 JV-P Vaca Draw	MD Reference:	WELL @ 3440.2usft (Original Well Elev)
Well:	3H	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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,849.0	33.30	171.10	10,830.9	-75.3	-8.4	75.2	9.38	9.35	-1.29
10,880.0	35.80	171.50	10,856.4	-92.7	-3.8	92.8	8.42	8.39	1.29
10,912.0	38.70	171.80	10,881.8	-111.9	-1.0	111.9	8.77	8.75	0.94
10,944.0	42.20	171.80	10,906.2	-132.5	2.0	132.5	10.94	10.94	0.00
10,971.0	45.20	172.20	10,925.7	-150.9	4.6	151.0	11.18	11.11	1.48
11,002.0	47.50	172.20	10,947.1	-173.1	7.6	173.3	7.42	7.42	0.00
11,034.0	48.80	173.90	10,968.5	-196.8	10.5	196.9	5.24	3.44	5.31
11,066.0	51.00	175.70	10,989.1	-221.1	12.7	221.3	8.64	7.50	5.63
11,097.0	54.70	176.70	11,007.9	-245.8	14.4	246.0	12.21	11.94	3.23
11,129.0	56.80	176.70	11,025.5	-272.4	15.9	272.7	12.19	12.19	0.00
11,160.0	61.60	176.40	11,040.9	-299.3	17.5	299.5	9.71	9.88	-0.97
11,191.0	63.70	175.30	11,055.1	-326.7	18.5	327.0	7.47	6.77	-3.55
11,222.0	66.00	175.70	11,068.3	-354.7	21.7	355.0	7.51	7.42	1.29
11,254.0	68.40	176.00	11,080.7	-384.1	23.8	384.5	7.55	7.50	0.94
11,285.0	70.70	176.00	11,091.6	-413.1	25.9	413.5	7.42	7.42	0.00
11,317.0	73.20	176.00	11,101.5	-443.4	28.0	443.9	7.81	7.81	0.00
11,348.0	75.10	176.00	11,109.9	-473.2	30.1	473.6	6.13	6.13	0.00
11,380.0	77.60	176.70	11,117.5	-504.2	32.1	504.7	8.10	7.81	2.19
11,411.0	79.90	177.10	11,123.5	-534.8	33.7	535.1	7.53	7.42	1.29
11,443.0	82.80	176.70	11,128.3	-566.2	35.4	566.7	9.46	9.38	-1.25
11,474.0	85.70	176.40	11,131.4	-596.9	37.3	597.5	9.08	9.03	-0.97
11,506.0	88.00	176.70	11,133.2	-626.8	39.2	629.4	7.25	7.19	0.94
11,537.0	89.40	176.40	11,133.9	-659.8	41.1	680.4	4.82	4.52	-0.97
11,600.0	89.00	175.70	11,134.7	-722.6	45.4	723.3	1.28	-0.63	-1.11
11,694.0	90.30	175.30	11,135.3	-816.3	52.8	817.1	1.45	1.38	-0.43
11,788.0	91.50	176.00	11,133.8	-910.0	59.9	911.0	1.48	1.28	0.74
11,883.0	89.90	176.70	11,132.7	-1,004.8	65.9	1,005.9	1.84	-1.68	0.74
11,978.0	88.50	177.80	11,134.0	-1,099.7	70.5	1,100.8	1.87	-1.47	1.16
12,073.0	89.60	178.50	11,135.6	-1,194.6	73.6	1,195.8	1.37	1.16	0.74
12,166.0	90.40	178.50	11,135.6	-1,287.6	76.0	1,288.8	0.86	0.86	0.00
12,261.0	90.80	177.40	11,134.6	-1,382.5	79.4	1,383.8	1.23	0.42	-1.16
12,355.0	90.80	177.60	11,133.3	-1,476.5	83.3	1,477.7	0.43	0.00	0.43
12,450.0	90.80	178.90	11,131.9	-1,571.4	86.1	1,572.7	1.16	0.00	1.16
12,544.0	91.10	178.90	11,130.4	-1,665.4	87.9	1,666.7	0.32	0.32	0.00
12,638.0	90.80	179.80	11,128.8	-1,759.4	89.1	1,760.7	0.81	-0.32	0.74
12,733.0	91.00	178.90	11,127.3	-1,854.3	89.5	1,855.7	0.38	0.21	0.32
12,827.0	91.00	178.90	11,125.7	-1,948.3	90.5	1,949.6	1.08	0.00	-1.08
12,922.0	91.70	179.80	11,123.5	-2,043.3	91.7	2,044.6	1.04	0.74	0.74
13,016.0	90.80	180.60	11,121.4	-2,137.3	91.8	2,138.6	1.43	-0.96	1.06
13,110.0	90.80	180.60	11,120.1	-2,231.2	90.6	2,232.5	0.00	0.00	0.00
13,204.0	90.80	179.90	11,118.8	-2,325.2	90.2	2,326.5	0.74	0.00	-0.74
13,298.0	90.60	179.60	11,117.6	-2,419.2	90.6	2,420.5	0.38	-0.21	-0.32
13,393.0	91.00	178.90	11,116.3	-2,514.2	91.8	2,515.5	0.85	0.42	-0.74



Wellplanning Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	WELL @ 3440.2usft (Original Well Elev)
Site:	9418 JV-P Vaca Draw	MD Reference:	WELL @ 3440.2usft (Original Well Elev)
Well:	3H	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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,487.0	90.80	177.80	11,114.8	-2,608.2	94.5	2,809.4	1.19	-0.21	-1.17
13,581.0	89.90	178.50	11,114.3	-2,702.1	97.6	2,703.4	1.21	-0.98	0.74
13,676.0	90.40	178.10	11,114.0	-2,797.1	100.4	2,798.4	0.67	0.53	-0.42
13,770.0	90.10	178.50	11,113.6	-2,891.0	103.2	2,892.4	0.53	-0.32	0.43
13,864.0	91.00	179.60	11,112.7	-2,985.0	104.7	2,986.4	1.51	0.98	1.17
13,958.0	89.40	180.30	11,112.4	-3,079.0	104.8	3,080.4	1.86	-1.70	0.74
14,052.0	89.20	179.90	11,113.5	-3,173.0	104.7	3,174.4	0.48	-0.21	-0.43
14,146.0	88.70	180.60	11,115.2	-3,267.0	104.3	3,268.3	0.92	-0.53	0.74
14,240.0	89.40	181.00	11,116.8	-3,360.9	102.9	3,362.3	0.86	0.74	0.43
14,334.0	88.70	180.60	11,118.3	-3,454.9	101.6	3,458.2	0.86	-0.74	-0.43
14,429.0	89.20	180.80	11,120.1	-3,548.9	100.6	3,551.1	0.53	0.53	0.00
14,522.0	88.70	180.60	11,121.8	-3,642.9	99.7	3,644.1	0.54	-0.54	0.00
14,617.0	89.60	181.30	11,123.2	-3,737.9	98.1	3,739.0	1.20	0.95	0.74
14,712.0	89.40	180.30	11,124.0	-3,832.8	96.8	3,834.0	1.07	-0.21	-1.05
14,806.0	88.50	179.20	11,125.8	-3,926.8	97.2	3,927.9	1.51	-0.98	-1.17
14,901.0	86.90	177.80	11,129.6	-4,021.7	99.7	4,022.9	2.24	-1.88	-1.47
14,994.0	88.50	179.20	11,133.3	-4,114.8	102.1	4,115.8	2.29	1.72	1.51
15,089.0	88.00	178.70	11,136.2	-4,209.5	105.5	4,210.7	2.68	-0.53	-2.83
15,186.0	85.70	177.40	11,141.6	-4,308.2	110.6	4,309.5	2.43	-2.32	0.71
15,282.0	84.30	181.70	11,149.8	-4,401.8	111.3	4,403.1	4.79	-1.49	4.57
15,376.0	85.00	183.80	11,158.6	-4,495.3	108.8	4,498.5	2.35	0.74	2.23
15,471.0	86.00	184.50	11,166.1	-4,589.7	100.0	4,590.8	1.28	1.05	0.74
15,565.0	86.00	183.80	11,172.6	-4,683.3	93.2	4,684.2	0.74	0.00	-0.74
15,626.0	86.00	183.80	11,176.9	-4,744.0	89.1	4,744.8	0.00	0.00	0.00

PBHL 9418 JV-P Vaca Draw #3H

Checked By: _____ Approved By: _____ Date: _____



9418 JV-P Vaca Draw 3H
Lea County, NM (NAD27 NME)
Northing: (Y) 419768.30
Easting: (X) 739754.40
Plan #3

NEXUS

DIRECTIONAL SOLUTIONS, L.P.



Azimuths to Grid North
True North: -0.41°
Magnetic North: 6.63°

Magnetic Field
To convert a Magnetic Direction to a Grid Direction, Add 6.88 degrees
To convert a True Direction to a Grid Direction, Subtract 0.41°
Date: 9/24/2013
Model: KGRF2010

WELL DETAILS:						
WELL @ 3440.2usft (Original Well Elev)						
+N-S	+E-W	Northing	Easting	Latitude	Longitude	
0.0	0.0	419768.30	739754.40	32° 5' 8.078 N	103° 33' 31.144 W	

SECTION DETAILS						
MD	Inc	AS	TVD	+N-S	+E-W	Target
10510.0	2.73	326.26	10506.8	0.9	-6.2	0.00
10643.5	2.73	326.26	10641.9	6.3	-9.6	0.00
11418.8	90.53	172.00	11140.0	-471.7	47.8	12.00
11729.3	90.53	179.77	11137.1	-781.3	70.1	2.50
15714.1	90.53	179.77	11100.0	-4785.9	86.3	0.00

DESIGN TARGET DETAILS						
Name	TVD	+N-S	+E-W	Northing	Easting	
PBHL 9418 JV-P Vaca Draw 3H	11100.0	-4785.9	86.3	415002.40	739840.70	

LEGEND
- 3H, CH, MWD #1
- Plan #3

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Eipsoid: Clarke 1866
Zone Name: New Mexico East 3001
Local Origin: Well 3H, Grid North
Latitude: 32° 5' 8.078 N
Longitude: 103° 33' 31.144 W
Grid East: 739754.40
Grid North: 419768.30
Scale Factor: 1.000
Geographic Model: KGRF2010
Sample Date: 24-Sep-13
Magnetic Declination: 7.29°
Dip Angle from Horizontal: 80.07°
Magnetic Field Strength: 48346
To convert a Magnetic Direction to a Grid Direction, Add 6.88°
To convert a Magnetic Direction to a True Direction, Add 7.29° East
To convert a True Direction to a Grid Direction, Subtract 0.41°

Well Survey
11/08, June 03 2014

Home Directional Solutions
3825 CR 1385
Odessa TX 79768

