

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

CCG OPERATING LLC  
**RECEIVED**  
APR 28 2014  
ARTESIA WEST

30-015-42134

April 7, 2014

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

RE: Jack Federal #4H  
190' FNL & 2310' FEL  
Sec. 31, T25S, R27E  
Eddy 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 7<sup>th</sup> day of April, 2014.

Notary Public

OFFICIAL SEAL  
REGINIA L. GARNER  
NOTARY PUBLIC - STATE OF NEW MEXICO  
My commission expires Aug. 30, 2016

Jack Federal #4H

Date	Depth	Deviation	Dir
3/16/2014	150	0.50	
3/18/2014	538	1.20	
3/18/2014	730	1.40	
3/18/2014	847	1.00	
3/19/2014	1172	0.90	
3/19/2014	1298	1.10	
3/19/2014	1383	1.40	
3/19/2014	1700	1.20	
3/19/2014	1945	2.90	
3/21/2014	2162	2.20	
3/21/2014	2418	1.40	
3/21/2014	2674	1.00	
3/22/2014	3154	0.40	
3/22/2014	3594	0.20	
3/22/2014	3988	0.70	
3/22/2014	4405	0.40	
3/22/2014	4816	0.60	
3/23/2014	5296	1.20	
3/23/2014	5746	0.80	
3/23/2014	6223	2.90	
3/23/2014	6288	3.10	
3/24/2014	6332	3.00	
3/24/2014	6431	2.50	
3/24/2014	6544	2.10	
3/24/2014	6650	1.60	
3/24/2014	6815	1.20	
3/25/2014	7264	2.50	
3/25/2014	7420	2.00	
3/25/2014	7645	2.30	
3/25/2014	7789	1.10	
3/26/2014	8288	0.40	
3/27/2014	8570	0.60	
3/31/2014	6859	2.00	161.50
4/1/2014	7019	24.30	170.30
4/1/2014	7115	33.20	176.40
4/1/2014	7147	36.20	178.20
4/1/2014	7179	38.50	178.70
4/1/2014	7211	40.20	178.90
4/1/2014	7224	46.00	178.50
4/1/2014	7243	42.50	178.90
4/1/2014	7306	49.20	178.40
4/1/2014	7338	51.15	178.00
4/1/2014	7370	54.10	178.00

Date	Depth	Deviation	Dir
4/1/2014	7402	56.60	178.00
4/1/2014	7466	60.60	178.40
4/1/2014	7530	64.70	178.00
4/2/2014	7562	66.00	178.00
4/2/2014	7594	67.70	178.20
4/2/2014	7626	69.30	178.00
4/2/2014	7652	70.90	178.40
4/2/2014	7684	72.10	178.40
4/2/2014	7749	75.60	178.40
4/3/2014	8068	88.90	177.50
4/3/2014	8164	89.00	177.30
4/3/2014	8260	89.20	177.10
4/3/2014	8356	89.70	177.00
4/3/2014	8548	89.90	177.10
4/3/2014	8836	88.70	178.70
4/3/2014	8930	89.10	178.70
4/3/2014	9118	89.80	178.20
4/3/2014	9211	90.40	177.80
4/3/2014	9398	88.60	179.10
4/3/2014	9492	89.30	179.40
4/4/2014	9679	89.80	178.70
4/4/2014	9773	89.00	177.80
4/4/2014	9867	89.80	177.80
4/4/2014	9960	90.50	177.70
4/4/2014	10054	89.60	177.80
4/4/2014	10334	89.30	177.80
4/4/2014	10615	87.80	177.70
4/4/2014	10897	90.20	176.80
4/4/2014	10991	90.70	176.80
4/4/2014	11085	89.40	177.30
4/4/2014	11179	90.00	177.70
4/5/2014	11366	90.90	176.80
4/5/2014	11460	90.40	176.60
4/5/2014	11554	89.90	177.10
4/5/2014	11647	88.20	177.00
4/5/2014	11740	88.60	176.60



AIGYRO TECHNOLOGIES INC. COMPANY

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

April 3, 2014

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



Attn: Kanicia Castillo

RE Jack Federal No. 004H

Please find enclosed a copy of the survey from 0.00' to 8802.00' ran on the above referenced well.

Sincerely,

  
Keith Havelka  
Operations

STATE OF TEXAS §

§

COUNTY OF NUECES §

§

This instrument was acknowledged before me on the 3<sup>rd</sup> day of April  
A.D. 2014, by Keith Havelka.

  
Meredith Darden  
Notary Public, State of Texas



Company: COG OPERATING, LLC (CONCHO)

Lease/Well: JACK FEDERAL/NO. 004H



Rig Name: SILVER OAK 1

State/County: NEW MEXICO/EDDY

Latitude: 32.09, Longitude: -104.23

GRID North is 0.06 Degrees East of True North

VS-Azi: 176.85 Degrees



RECEIVED  
MAY 29 2014  
NIMCO D ARTESIA

Depth Reference : RKB: 17 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: eline gyro-de\_01.ut

Minimum Curvature Method

Report Date/Time: 4/3/2014 / 10:44

VES Survey International

Woodward, OK

580-254-5000

Surveyor: Charles Everett

Jack Federal No. 004H / API 30-015-42134

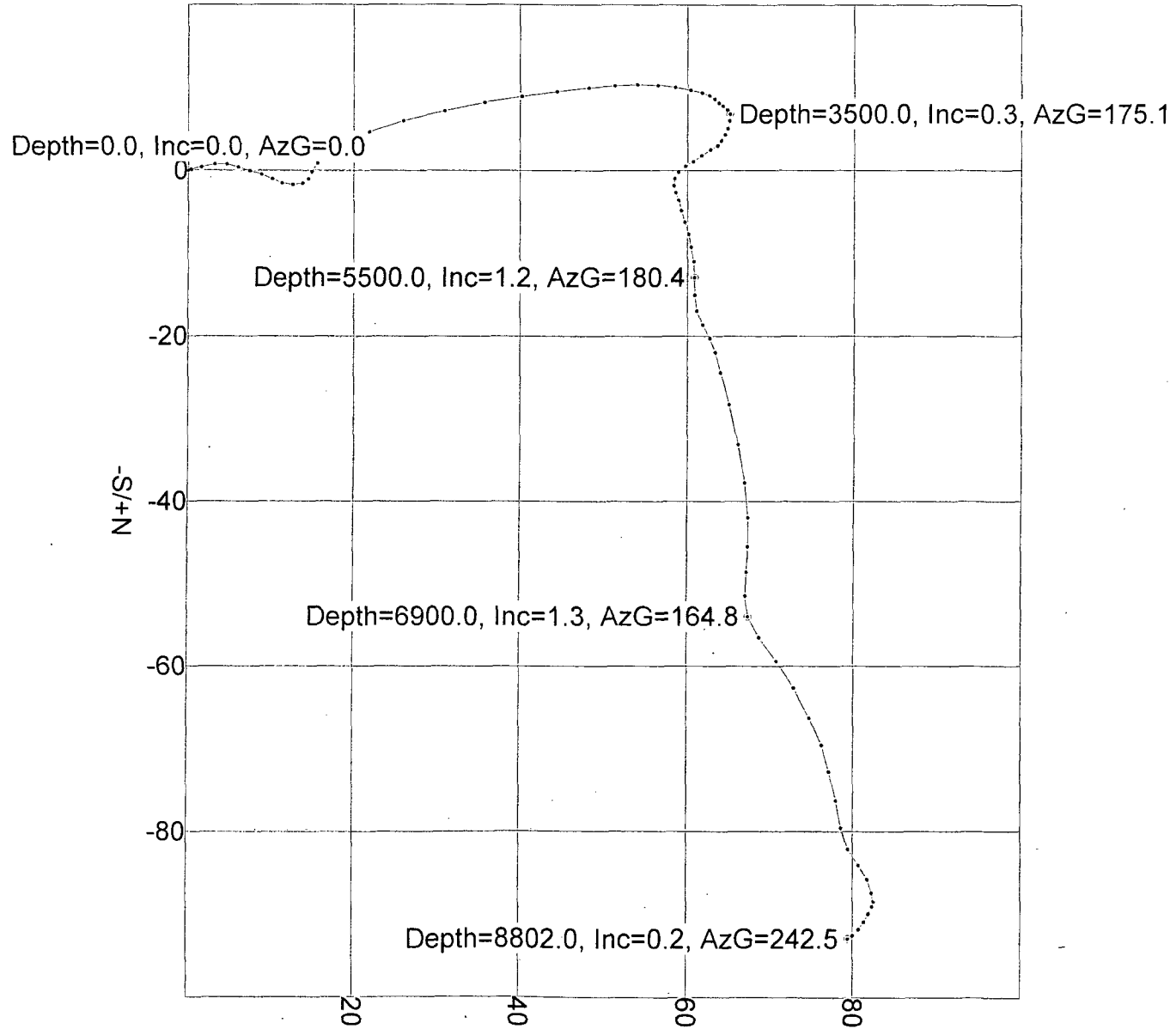
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.43	75.30	100.00	0.10	0.36	-0.08	0.38	75.30	0.43
200.00	1.00	76.20	199.99	0.40	1.58	-0.31	1.63	75.78	0.57
300.00	0.93	80.25	299.98	0.74	3.22	-0.57	3.30	76.98	0.10
400.00	0.78	101.52	399.97	0.75	4.68	-0.49	4.74	80.94	0.35
500.00	0.84	108.27	499.96	0.38	6.04	-0.05	6.05	86.38	0.11
600.00	0.88	105.86	599.94	-0.06	7.47	0.47	7.47	90.42	0.05
700.00	0.84	107.71	699.93	-0.49	8.90	0.98	8.91	93.13	0.05
800.00	0.73	118.67	799.92	-1.02	10.16	1.57	10.21	95.71	0.19
900.00	0.78	107.64	899.92	-1.53	11.37	2.15	11.47	97.66	0.15
1000.00	0.81	89.53	999.91	-1.73	12.73	2.43	12.84	97.74	0.25
1100.00	0.53	69.70	1099.90	-1.56	13.87	2.32	13.95	96.43	0.36
1200.00	0.53	31.98	1199.90	-1.01	14.55	1.81	14.58	93.97	0.34
1300.00	0.56	22.10	1299.89	-0.16	14.98	0.98	14.98	90.61	0.10
1400.00	0.87	37.16	1399.88	0.90	15.62	-0.04	15.65	86.71	0.36
1500.00	1.39	57.78	1499.86	2.15	17.11	-1.21	17.24	82.84	0.65
1600.00	1.39	61.29	1599.83	3.38	19.20	-2.32	19.49	80.01	0.09
1700.00	2.03	66.71	1699.79	4.66	21.89	-3.45	22.38	77.97	0.65
1800.00	2.88	75.60	1799.70	5.99	25.95	-4.55	26.63	77.00	0.93

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	2.98	76.80	1899.57	7.21	30.91	-5.50	31.74	76.88	0.11
2000.00	2.67	79.16	1999.44	8.24	35.72	-6.26	36.66	77.02	0.32
2100.00	2.50	82.54	2099.34	8.96	40.18	-6.74	41.16	77.43	0.23
2200.00	2.32	82.02	2199.25	9.52	44.34	-7.07	45.35	77.88	0.18
2300.00	2.07	84.38	2299.18	9.98	48.14	-7.32	49.16	78.29	0.27
2400.00	1.54	86.07	2399.13	10.25	51.27	-7.42	52.28	78.70	0.53
2500.00	1.58	88.48	2499.09	10.38	53.98	-7.39	54.97	79.12	0.08
2600.00	1.25	95.72	2599.06	10.30	56.44	-7.19	57.38	79.65	0.38
2700.00	1.11	98.06	2699.04	10.06	58.48	-6.83	59.34	80.24	0.15
2800.00	1.03	103.17	2799.03	9.72	60.31	-6.39	61.09	80.84	0.12
2900.00	0.60	105.06	2899.02	9.38	61.69	-5.98	62.40	81.35	0.43
3000.00	0.45	113.85	2999.01	9.09	62.56	-5.63	63.21	81.74	0.17
3100.00	0.44	134.20	3099.01	8.66	63.19	-5.17	63.78	82.20	0.16
3200.00	0.36	131.02	3199.01	8.19	63.70	-4.67	64.23	82.68	0.08
3300.00	0.37	127.71	3299.00	7.78	64.20	-4.24	64.67	83.09	0.02
3400.00	0.43	130.09	3399.00	7.34	64.74	-3.77	65.15	83.53	0.06
3500.00	0.35	175.12	3499.00	6.80	65.05	-3.21	65.41	84.03	0.31
3600.00	0.56	189.13	3599.00	6.01	65.00	-2.43	65.28	84.71	0.24
3700.00	0.51	193.80	3698.99	5.09	64.81	-1.52	65.01	85.51	0.06
3800.00	0.48	211.01	3798.99	4.30	64.49	-0.75	64.64	86.18	0.15
3900.00	0.49	213.56	3898.98	3.59	64.04	-0.07	64.14	86.79	0.03
4000.00	0.40	234.65	3998.98	3.03	63.52	0.47	63.59	87.27	0.18
4100.00	0.70	240.66	4098.98	2.53	62.70	0.92	62.75	87.69	0.30
4200.00	0.78	232.43	4198.97	1.81	61.63	1.58	61.66	88.32	0.14
4300.00	0.60	235.72	4298.96	1.10	60.66	2.23	60.67	88.96	0.19
4400.00	0.66	240.10	4398.96	0.52	59.73	2.76	59.73	89.50	0.08
4500.00	0.58	218.86	4498.95	-0.16	58.91	3.40	58.91	90.16	0.24
4600.00	0.52	196.67	4598.94	-0.99	58.46	4.20	58.47	90.97	0.22
4700.00	0.47	174.03	4698.94	-1.84	58.37	5.04	58.40	91.80	0.20
4800.00	0.52	157.61	4798.94	-2.66	58.59	5.88	58.65	92.60	0.15
4900.00	0.64	162.65	4898.93	-3.61	58.93	6.84	59.04	93.51	0.13
5000.00	0.80	168.28	4998.92	-4.83	59.23	8.07	59.43	94.66	0.18
5100.00	0.89	157.34	5098.91	-6.23	59.68	9.50	60.00	95.96	0.19
5200.00	0.87	167.14	5198.90	-7.69	60.15	10.99	60.64	97.29	0.15
5300.00	0.97	170.63	5298.89	-9.27	60.45	12.57	61.16	98.71	0.11
5400.00	1.04	172.57	5398.87	-11.00	60.71	14.32	61.69	100.27	0.08
5500.00	1.18	180.40	5498.85	-12.92	60.82	16.24	62.17	101.99	0.20
5600.00	1.25	177.33	5598.83	-15.03	60.86	18.35	62.69	103.87	0.10
5700.00	0.97	164.23	5698.81	-16.94	61.14	20.27	63.44	105.48	0.37

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	1.07	155.42	5798.80	-18.60	61.76	21.97	64.50	106.76	0.18
5900.00	1.08	149.19	5898.78	-20.26	62.63	23.67	65.83	107.92	0.12
6000.00	1.04	166.04	5998.76	-21.95	63.33	25.40	67.03	109.12	0.31
6100.00	1.83	164.32	6098.73	-24.38	63.99	27.85	68.47	110.85	0.79
6200.00	2.80	166.69	6198.65	-28.29	64.98	31.82	70.87	113.53	0.97
6300.00	2.86	168.03	6298.53	-33.11	66.06	36.69	73.89	116.62	0.09
6400.00	2.56	171.81	6398.41	-37.77	66.90	41.39	76.82	119.45	0.35
6500.00	2.20	177.31	6498.33	-41.90	67.30	45.54	79.28	121.90	0.42
6600.00	1.88	183.15	6598.26	-45.46	67.30	49.09	81.22	124.04	0.38
6700.00	1.68	183.57	6698.22	-48.56	67.12	52.18	82.85	125.88	0.21
6800.00	1.64	180.12	6798.17	-51.45	67.03	55.06	84.50	127.51	0.11
6900.00	1.30	164.77	6898.14	-53.97	67.32	57.59	86.29	128.72	0.52
7000.00	2.07	143.71	6998.10	-56.52	68.69	60.21	88.95	129.45	0.98
7100.00	2.00	143.08	7098.04	-59.37	70.81	63.17	92.40	129.98	0.08
7200.00	2.39	151.71	7197.96	-62.60	72.84	66.51	96.04	130.68	0.51
7300.00	2.35	151.29	7297.88	-66.23	74.81	70.24	99.92	131.52	0.05
7400.00	1.80	162.95	7397.81	-69.53	76.26	73.61	103.20	132.36	0.68
7500.00	2.04	165.56	7497.76	-72.76	77.16	76.89	106.05	133.32	0.25
7600.00	2.06	168.80	7597.69	-76.24	77.95	80.41	109.04	134.36	0.12
7700.00	1.78	169.46	7697.63	-79.54	78.59	83.74	111.82	135.34	0.28
7800.00	1.37	153.97	7797.60	-82.15	79.40	86.38	114.25	135.97	0.59
7900.00	1.28	138.71	7897.57	-84.07	80.67	88.37	116.51	136.18	0.36
8000.00	1.07	159.10	7997.55	-85.78	81.74	90.14	118.49	136.38	0.47
8100.00	0.87	165.02	8097.54	-87.39	82.27	91.78	120.02	136.73	0.23
8200.00	0.37	182.72	8197.53	-88.45	82.45	92.85	120.92	137.01	0.53
8300.00	0.39	210.90	8297.53	-89.06	82.26	93.45	121.24	137.27	0.19
8400.00	0.66	203.86	8397.52	-89.88	81.85	94.25	121.57	137.68	0.28
8500.00	0.65	211.35	8497.52	-90.90	81.32	95.23	121.97	138.18	0.09
8600.00	0.58	220.34	8597.51	-91.77	80.70	96.06	122.21	138.67	0.12
8700.00	0.57	229.27	8697.51	-92.47	80.00	96.73	122.28	139.14	0.09
8802.00	0.24	242.51	8799.50	-92.90	79.43	97.12	122.23	139.47	0.34

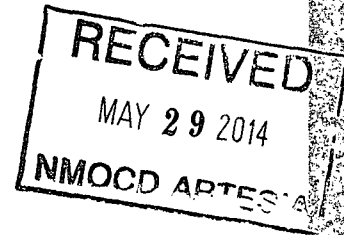


VES Survey International  
Woodward, OK  
580-254-5000  
Surveyor: Charles Everett  
Jack Federal No. 004H / API 30-015-42134



V.E.S. Survey Date: 03/27/2014





## **COG Operating LLC**

**Eddy County, NM**

**Jack Federal #4H**

**Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B**

**BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O**

**Survey: MWD #1**

## **Standard Survey Report**

**05 April, 2014**



**Wellplanning  
Survey Report**

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	WELL @ 3278.9usft (Original Well Elev)
<b>Site:</b>	Jack Federal #4H	<b>MD Reference:</b>	WELL @ 3278.9usft (Original Well Elev)
<b>Well:</b>	Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Survey	<b>Database:</b>	EDM 5000.1 Single User Db

<b>Project:</b>	Eddy County, NM		
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	New Mexico East 3001		

<b>Site:</b>	Jack Federal #4H		
<b>Site Position:</b>	<b>Northing:</b>	397,548.70 usft	<b>Latitude:</b> 32° 5' 34.560 N
<b>From:</b> Map	<b>Easting:</b>	532,716.60 usft	<b>Longitude:</b> 104° 13' 39.675 W
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b> 13-3/16 "	<b>Grid Convergence:</b> 0.06 °

<b>Well:</b>	Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B			
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b> 397,548.70 usft	<b>Latitude:</b> 32° 5' 34.560 N
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b> 532,716.60 usft	<b>Longitude:</b> 104° 13' 39.675 W
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b>	usft	<b>Ground Level:</b> 3,261.9 usft

<b>Wellbore:</b>	BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O		
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/24/2014	7.56	59.89	48,206

<b>Design:</b>	Survey			
<b>Audit Notes:</b>				
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b> 0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.0	0.0	0.0	176.85

<b>Survey Program</b>	<b>Date</b>	4/5/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	6,800.0	GYRO (BHL: 330' FSL, 1980' FEL, Sec 31	MWD	MWD - Standard	
6,827.0	11,859.0	MWD #1 (BHL: 330' FSL, 1980' FEL, Sec	MWD	MWD - Standard	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,800.0	1.64	180.12	6,798.2	-51.4	67.1	55.1	0.00	0.00	0.00
6,827.0	1.00	168.20	6,825.2	-52.1	67.1	55.7	2.57	-2.37	-44.15
6,859.0	2.00	161.50	6,857.2	-52.9	67.4	56.5	3.17	3.13	-20.94
6,891.0	7.00	165.40	6,889.0	-55.3	68.0	58.9	15.65	15.63	12.19
6,923.0	13.30	167.80	6,920.5	-60.8	69.3	64.5	19.73	19.69	7.50
6,955.0	17.90	168.50	6,951.3	-69.2	71.1	73.0	14.39	14.38	2.19
6,987.0	21.70	168.70	6,981.4	-79.8	73.2	83.7	11.88	11.88	0.63



Wellplanning  
Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	WELL @ 3278.9usft (Original Well Elev)
<b>Site:</b>	Jack Federal #4H	<b>MD Reference:</b>	WELL @ 3278.9usft (Original Well Elev)
<b>Well:</b>	Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Survey	<b>Database:</b>	EDM 5000.1 Single User Db

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)
7,019.0	24.30	170.30	7,010.9	-92.1	75.5	96.1	8.36	8.13	5.00
7,051.0	26.60	172.40	7,039.8	-105.7	77.5	109.8	7.72	7.19	6.56
7,083.0	29.50	174.50	7,068.0	-120.7	79.2	124.8	9.57	9.06	6.56
7,115.0	33.20	176.40	7,095.4	-137.2	80.5	141.5	11.97	11.56	5.94
7,147.0	36.20	178.20	7,121.7	-155.4	81.4	159.7	9.91	9.38	5.63
7,179.0	38.50	178.70	7,147.1	-174.8	81.9	179.1	7.25	7.19	1.56
7,211.0	40.20	178.90	7,171.8	-195.1	82.3	199.4	5.33	5.31	0.63
7,243.0	42.50	178.90	7,195.9	-216.3	82.7	220.5	7.19	7.19	0.00
7,274.0	46.00	178.50	7,218.1	-237.9	83.2	242.1	11.33	11.29	-1.29
7,306.0	49.20	178.40	7,239.6	-261.5	83.9	265.7	10.00	10.00	-0.31
7,338.0	51.50	178.00	7,260.1	-286.1	84.6	290.4	7.25	7.19	-1.25
7,370.0	54.10	178.00	7,279.4	-311.6	85.5	315.8	8.13	8.13	0.00
7,402.0	56.60	178.00	7,297.6	-337.9	86.4	342.2	7.81	7.81	0.00
7,434.0	58.70	178.20	7,314.7	-364.9	87.3	369.2	6.58	6.56	0.63
7,466.0	60.60	178.40	7,330.9	-392.5	88.2	396.8	5.96	5.94	0.63
7,498.0	62.90	178.00	7,346.0	-420.7	89.0	425.0	7.27	7.19	-1.25
7,530.0	64.70	178.00	7,360.2	-449.4	90.1	453.7	5.63	5.63	0.00
7,562.0	66.00	178.00	7,373.5	-478.5	91.1	482.7	4.06	4.06	0.00
7,594.0	67.70	178.20	7,386.1	-507.9	92.0	512.2	5.34	5.31	0.63
7,626.0	69.30	178.00	7,397.8	-537.6	93.0	541.9	5.03	5.00	-0.63
7,652.0	70.90	178.40	7,406.7	-562.1	93.8	566.4	6.32	6.15	1.54
7,684.0	72.10	178.40	7,416.8	-592.4	94.6	596.7	3.75	3.75	0.00
7,717.0	73.00	178.50	7,426.7	-623.9	95.5	628.2	2.74	2.73	0.30
7,749.0	75.60	178.40	7,435.4	-654.7	96.3	659.0	8.13	8.13	-0.31
7,781.0	77.60	178.00	7,442.8	-685.8	97.3	690.1	6.37	6.25	-1.25
7,813.0	79.60	177.30	7,449.1	-717.1	98.6	721.4	6.61	6.25	-2.19
7,844.0	81.40	177.30	7,454.2	-747.6	100.0	752.0	5.81	5.81	0.00
7,877.0	83.00	177.70	7,458.7	-780.3	101.5	784.7	4.99	4.85	1.21
7,909.0	85.10	177.80	7,462.0	-812.1	102.7	816.5	6.57	6.56	0.31
7,941.0	87.20	177.30	7,464.2	-844.0	104.1	848.4	6.75	6.56	-1.56
7,973.0	88.20	176.80	7,465.5	-875.9	105.7	880.4	3.49	3.13	-1.56
8,068.0	88.90	177.50	7,467.9	-970.8	110.4	975.4	1.04	0.74	0.74
8,164.0	89.00	177.30	7,469.6	-1,066.7	114.8	1,071.4	0.23	0.10	-0.21
8,260.0	89.20	177.10	7,471.1	-1,162.5	119.5	1,167.4	0.29	0.21	-0.21
8,356.0	89.70	177.00	7,472.0	-1,258.4	124.4	1,263.4	0.53	0.52	-0.10
8,452.0	89.60	177.30	7,472.6	-1,354.3	129.2	1,359.3	0.33	-0.10	0.31
8,548.0	89.90	177.10	7,473.1	-1,450.2	133.9	1,455.3	0.38	0.31	-0.21
8,644.0	90.00	176.80	7,473.1	-1,546.0	139.0	1,551.3	0.33	0.10	-0.31
8,740.0	88.90	178.70	7,474.1	-1,642.0	142.8	1,647.3	2.29	-1.15	1.98
8,836.0	88.70	178.70	7,476.1	-1,737.9	144.9	1,743.3	0.21	-0.21	0.00
8,930.0	89.10	178.70	7,477.9	-1,831.9	147.1	1,837.2	0.43	0.43	0.00
9,023.0	89.30	178.70	7,479.2	-1,924.8	149.2	1,930.1	0.22	0.22	0.00



Wellplanning  
Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	WELL @ 3278.9usft (Original Well Elev)
<b>Site:</b>	Jack Federal #4H	<b>MD Reference:</b>	WELL @ 3278.9usft (Original Well Elev)
<b>Well:</b>	Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Survey	<b>Database:</b>	EDM 5000.1 Single User Db

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)
9,118.0	89.80	178.20	7,479.9	-2,019.8	151.8	2,025.1	0.74	0.53	-0.53
9,211.0	90.40	177.80	7,479.8	-2,112.7	155.0	2,118.1	0.78	0.65	-0.43
9,304.0	90.00	178.50	7,479.4	-2,205.7	158.0	2,211.0	0.87	-0.43	0.75
9,398.0	88.60	179.10	7,480.6	-2,299.7	160.0	2,305.0	1.62	-1.49	0.64
9,492.0	89.30	179.40	7,482.3	-2,393.6	161.2	2,398.9	0.81	0.74	0.32
9,585.0	90.40	179.60	7,482.5	-2,486.6	162.0	2,491.8	1.20	1.18	0.22
9,679.0	89.80	178.70	7,482.4	-2,580.6	163.4	2,585.7	1.15	-0.64	-0.96
9,773.0	89.00	177.80	7,483.4	-2,674.6	166.3	2,679.7	1.28	-0.85	-0.96
9,867.0	89.80	177.80	7,484.3	-2,768.5	169.9	2,773.6	0.85	0.85	0.00
9,960.0	90.50	177.70	7,484.1	-2,861.4	173.5	2,866.6	0.76	0.75	-0.11
10,054.0	89.60	177.80	7,484.0	-2,955.3	177.2	2,960.6	0.96	-0.96	0.11
10,147.0	89.30	177.70	7,484.9	-3,048.3	180.9	3,053.6	0.34	-0.32	-0.11
10,240.0	88.90	177.70	7,486.4	-3,141.2	184.6	3,146.6	0.43	-0.43	0.00
10,334.0	89.30	177.80	7,487.9	-3,235.1	188.3	3,240.6	0.44	0.43	0.11
10,428.0	89.70	177.10	7,488.7	-3,329.0	192.5	3,334.5	0.86	0.43	-0.74
10,522.0	90.00	177.10	7,488.9	-3,422.9	197.2	3,428.5	0.32	0.32	0.00
10,615.0	87.80	177.70	7,490.7	-3,515.8	201.5	3,521.5	2.45	-2.37	0.65
10,709.0	87.70	177.70	7,494.4	-3,609.6	205.2	3,615.4	0.11	-0.11	0.00
10,804.0	89.30	177.30	7,496.9	-3,704.5	209.4	3,710.4	1.74	1.68	-0.42
10,897.0	90.20	176.80	7,497.3	-3,797.4	214.2	3,803.4	1.11	0.97	-0.54
10,991.0	90.70	176.80	7,496.6	-3,891.2	219.4	3,897.4	0.53	0.53	0.00
11,085.0	89.40	177.30	7,496.5	-3,985.1	224.2	3,991.4	1.48	-1.38	0.53
11,179.0	90.00	177.70	7,497.0	-4,079.0	228.3	4,085.4	0.77	0.64	0.43
11,273.0	91.30	177.30	7,495.9	-4,172.9	232.4	4,179.4	1.45	1.38	-0.43
11,366.0	90.90	176.80	7,494.1	-4,265.8	237.2	4,272.3	0.69	-0.43	-0.54
11,460.0	90.40	176.60	7,493.0	-4,359.6	242.6	4,366.3	0.57	-0.53	-0.21
11,554.0	89.90	177.10	7,492.8	-4,453.5	247.8	4,460.3	0.75	-0.53	0.53
11,647.0	88.20	177.00	7,494.3	-4,546.3	252.6	4,553.3	1.83	-1.83	-0.11
11,741.0	88.60	176.60	7,497.0	-4,640.1	257.8	4,647.3	0.60	0.43	-0.43
11,809.0	88.80	176.40	7,498.5	-4,708.0	262.0	4,715.3	0.42	0.29	-0.29
11,859.0	88.80	176.40	7,499.6	-4,757.9	265.1	4,765.3	0.00	0.00	0.00

PBHL(JF#4H)

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_



Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	
1	6900.0	1.30	164.77	6898.1	-54.0	67.4	0.00	0.00	57.6	
2	6957.5	1.30	164.77	6955.6	-55.2	67.7	0.00	0.00	58.9	
3	7759.9	89.52	177.66	7465.0	-571.1	91.4	11.00	12.90	575.3	
4	11970.9	89.52	177.66	7500.3	-4778.5	263.3	0.00	0.00	4785.7	PBHL(JF#4H)

COG Operating LLC  
 Project: Eddy County, NM  
 Site: Jack Federal #4H

Well: Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B  
 Wellbore: BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O

Plan: Plan #2 (Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B/BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O)

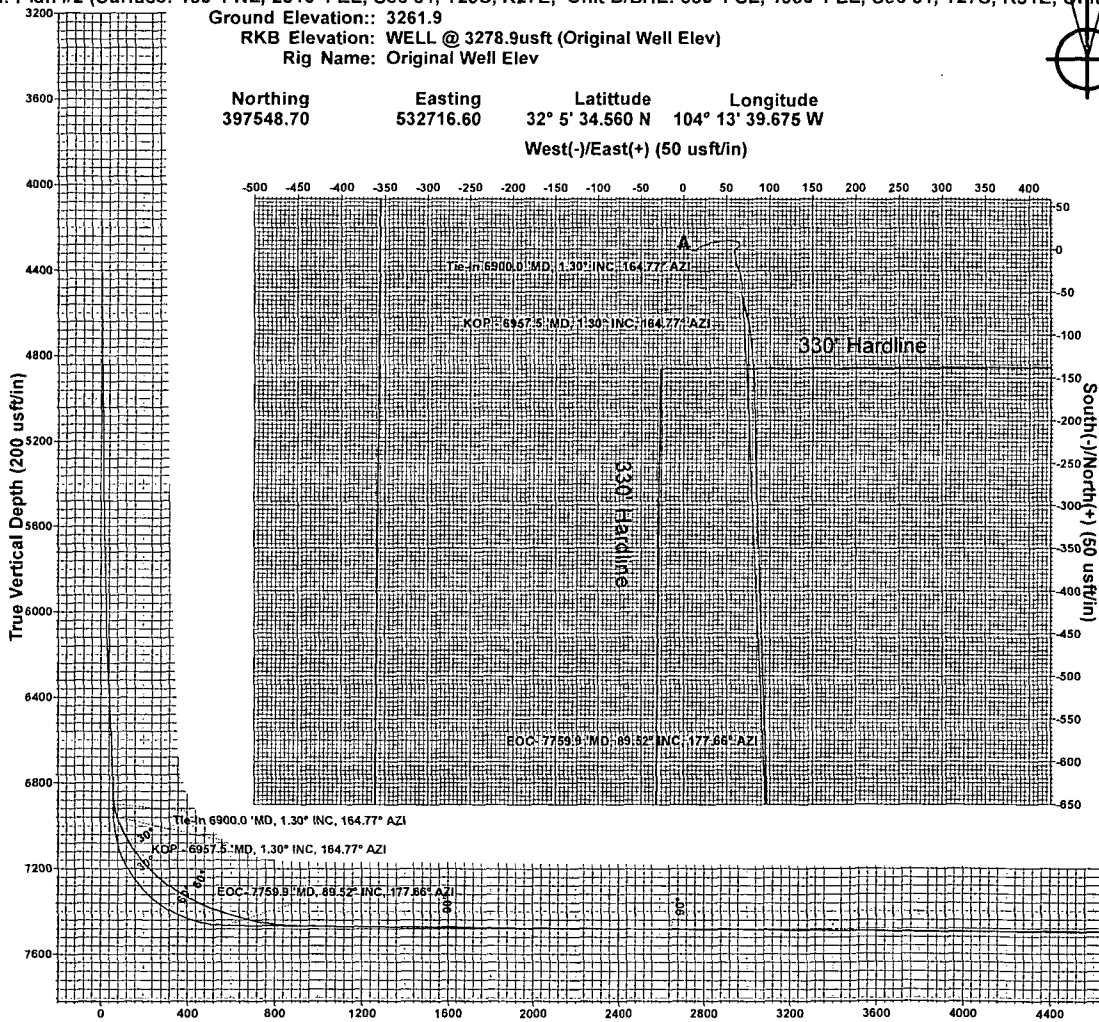
Ground Elevation:: 3261.9  
 RKB Elevation: WELL @ 3278.9usft (Original Well Elev)  
 Rig Name: ORIGINAL Well Elev

Northing 397548.70      Easting 532716.60      Latitude 32° 5' 34.560 N      Longitude 104° 13' 39.675 W  
 West(-)/East(+) (50 usft/in)



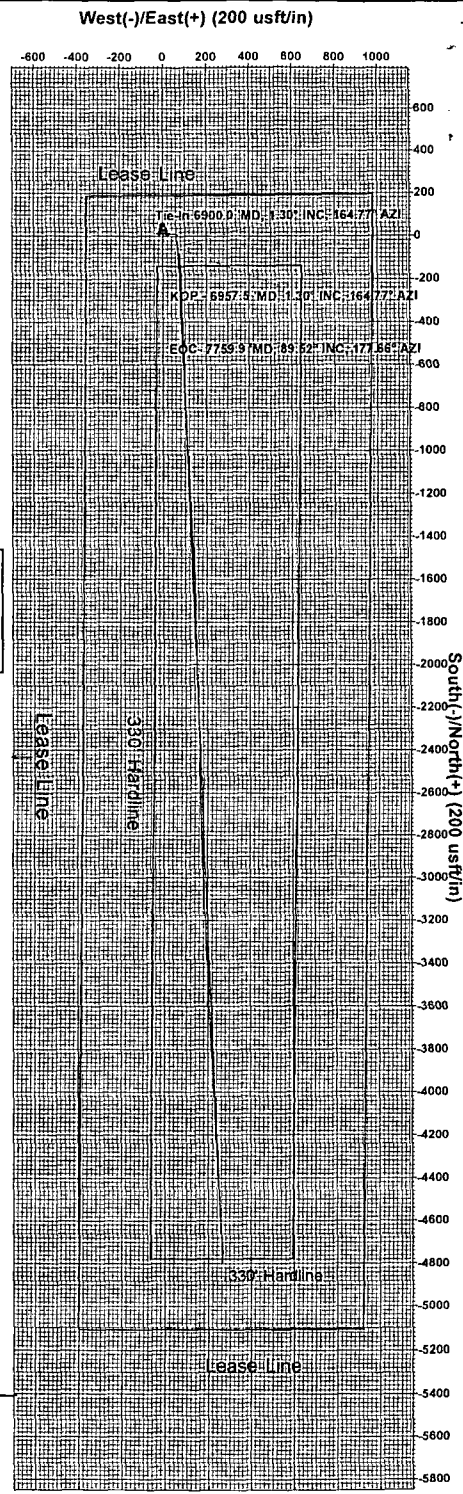
Azimuths to Grid North  
 True North: -0.06°  
 Magnetic North: 7.50°

Magnetic Field  
 Strength: 48205.5snT  
 Dip Angle: 59.89°  
 Date: 1/24/2014  
 Model: IGRF2010



Vertical Section at 176.85° (200 usft/in)

PROJECT DETAILS: Eddy County, NM  
 Geodetic System: US State Plane 1927 (Exact solution)  
 Datum: NAD 1927 (NADCON CONUS)  
 Ellipsoid: Clarke 1866  
 Zone: New Mexico East 3001  
 System Datum: Mean Sea Level  
 Local North: Grid



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