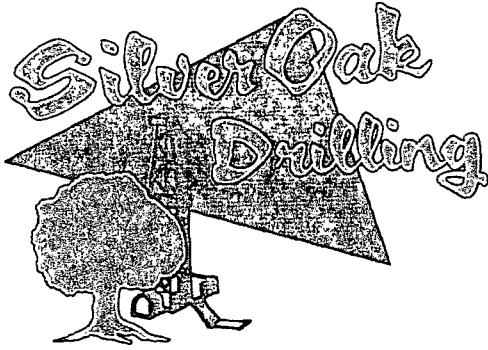
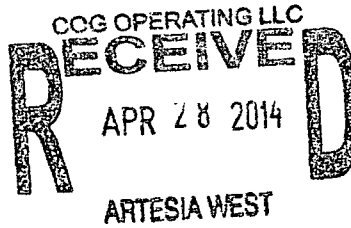




PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288



NM OIL CONSERVATION
ARTESIA DISTRICT

JUN 30 2014

April 7, 2014

30-015-42134

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

RECEIVED

RE: Jack Federal #4H
190' FNL & 2310' FEL
Sec. 31, T25S, R27E
Eddy County, New Mexico

Dear Sir,

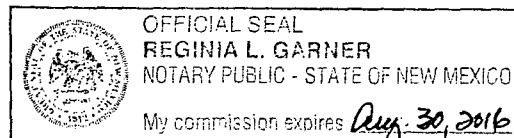
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 7th day of April, 2014.



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



A GYRO 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

NM OIL CONSERVATION
ARTESIA DISTRICT

JUN 30 2014

RECEIVED

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,

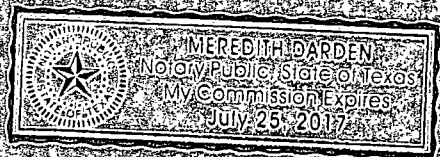

Keith Havelka
Operations

STATE OF TEXAS §

COUNTY OF NUECES §

This instrument was acknowledged before me on the 3rd 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



NM OIL CONSERVATION
 ARTESIA DISTRICT
 JUN 5 0 2014
 RECEIVED

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

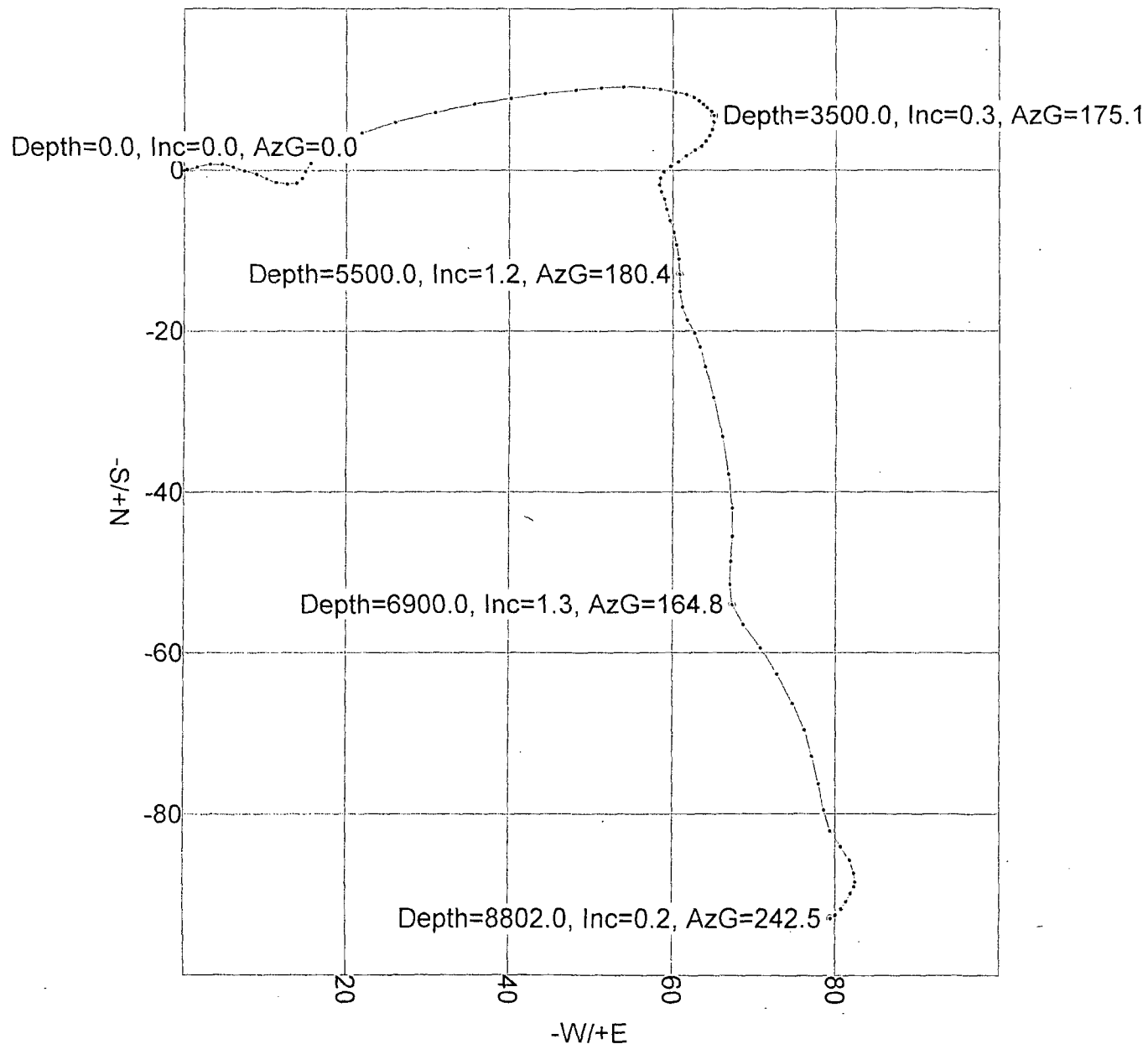
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.43	75.30	100.00	0.10	0.36	-0.08	0.38	75.30	0.43
200.00	1.00	76.20	199.99	0.40	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

Depth FT	Angle Deg	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

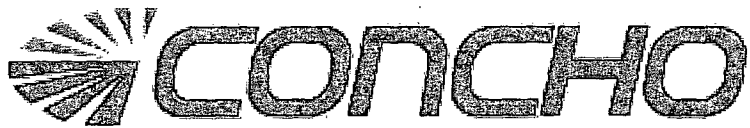
Depth FT	Angle Deg	Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	1.07	155.42	5798.80	-18.60	61.76	21.97	64.50	106.76	0.18
5900.00	1.08	149.19	5898.78	-20.26	62.63	23.67	65.83	107.92	0.12
6000.00	1.04	166.04	5998.76	-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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B
Project:	Eddy County, NM	TVD Reference:	WELL @ 3278.9usft (Original Well Elev)
Site:	Jack Federal #4H	MD Reference:	WELL @ 3278.9usft (Original Well Elev)
Well:	Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B	North Reference:	Grid
Wellbore:	BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O	Survey Calculation Method:	Minimum Curvature
Design:	Survey	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		Jack Federal #4H			
Site Position:		Northing:	397,548.70 usft	Latitude:	32° 5' 34.560 N
From:	Map	Easting:	532,716.60 usft	Longitude:	104° 13' 39.675 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.06 °

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

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

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

Survey Program		Date	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	

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)	
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

Company: 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

Design: Survey

Local Co-ordinate Reference:

TVD Reference:

MD Reference:

North Reference:

Survey Calculation Method:

Database:

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

WELL @ 3278.9usft (Original Well Elev)

WELL @ 3278.9usft (Original Well Elev)

Grid

Minimum Curvature

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)
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	7,088.0	-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

Company: 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

Design: Survey

Local Co-ordinate Reference:

TVD Reference:

MD Reference:

North Reference:

Survey Calculation Method:

Database:

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

WELL @ 3278.9usft (Original Well Elev)

WELL @ 3278.9usft (Original Well Elev)

Grid

Minimum Curvature

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)
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)

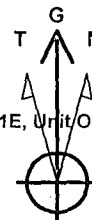
Ground Elevation:: 3261.9

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

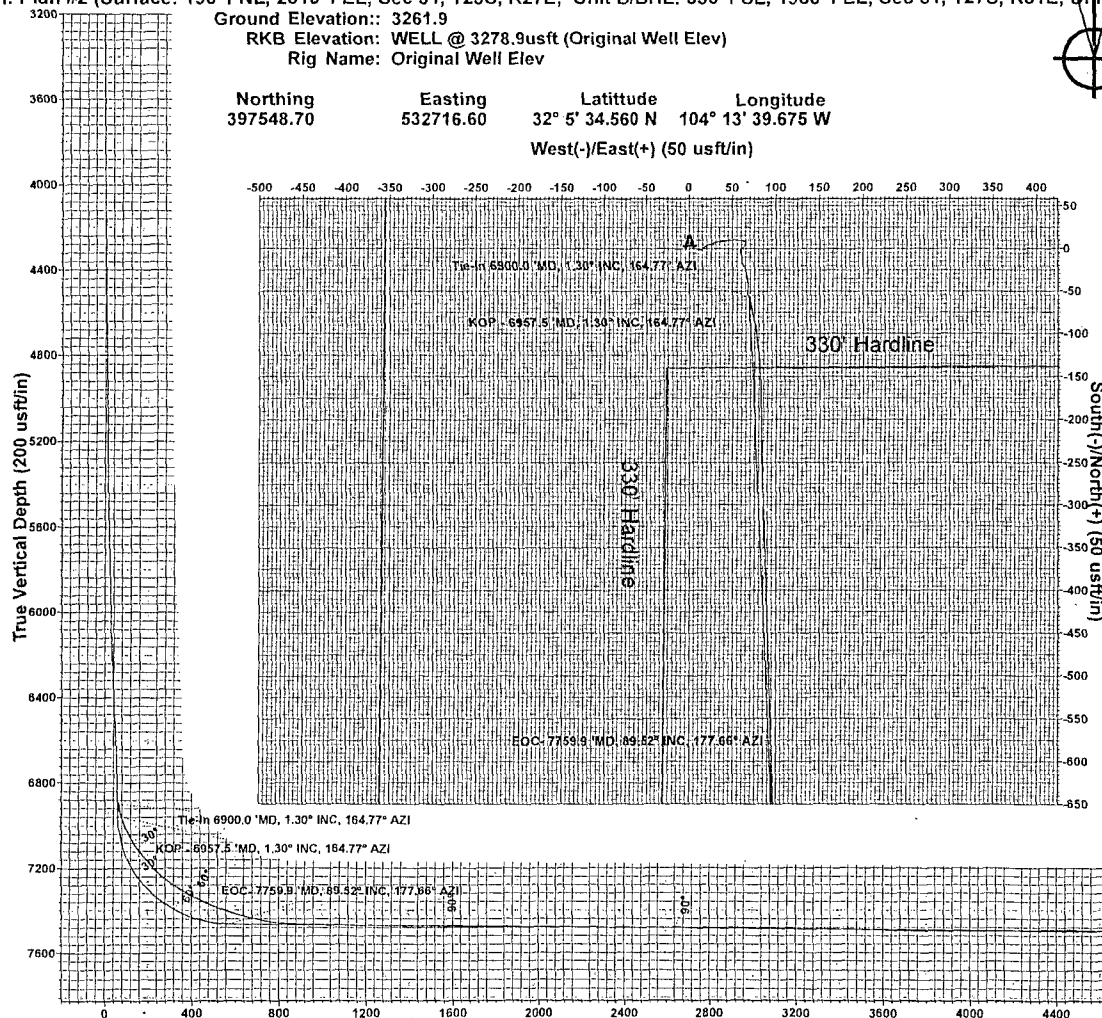
West(-)/East(+) (50 usft/in)



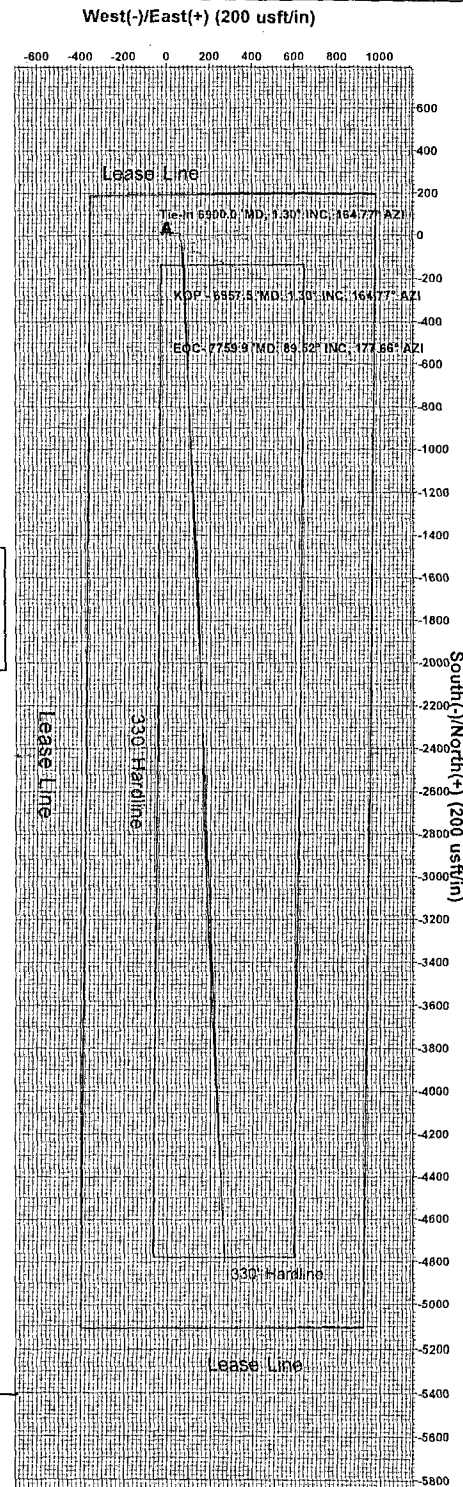
Azimuths to Grid North
True North: -0.06°
Magnetic North: 7.50°

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

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



Vertical Section at 176.85° (200 usft/in)



Terra Directional Services LLC
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