



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

30-015-40797

November 19, 2012

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

RE: Blackbart 15 Federal #2H
190' FSL & 1800' FEL
Sec. 15, T25S, R29E
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 19th day of November, 2012.


Regina L. Garner
Notary Public



Pason DataHub Deviation Survey

Well Dossier 1351684742 - BLACKBART 15 FED 2H

# Date	Depth	Deviation	Direction	TVD	Horiz
10/31/2012	117	0.10	0.00	0.00	0.00
10/31/2012	506	0.90	0.00	0.00	0.00
11/2/2012	776	2.20	5.70	775.00	14.64
11/2/2012	871	2.30	8.70	870.00	18.29
11/2/2012	966	2.30	10.20	965.00	21.98
11/3/2012	1157	1.50	296.20	1156.63	28.31
11/3/2012	1348	1.20	260.10	1347.47	29.70
11/3/2012	1443	1.80	201.40	1442.44	28.27
11/3/2012	1634	3.40	147.50	1633.00	20.31
11/3/2012	1729	1.40	136.50	1728.00	16.90
11/3/2012	1825	1.50	128.20	1824.00	15.13
11/3/2012	2015	1.60	133.20	2014.05	11.03
11/4/2012	2111	1.40	132.10	2110.02	9.18
11/4/2012	2206	1.20	132.60	2205.00	7.59
11/4/2012	2302	1.30	119.10	2300.70	6.24
11/4/2012	2493	1.70	102.60	2491.00	4.42
11/4/2012	2683	2.00	111.50	2681.00	1.70
11/4/2012	2779	2.60	114.70	2777.00	0.12
11/4/2012	2874	1.30	125.40	2872.00	1.88
11/4/2012	2970	1.80	121.70	2968.00	3.49
11/6/2012	3141	0.90	0.00	0.00	0.00
11/8/2012	3636	1.30	0.00	0.00	0.00
11/8/2012	4113	1.10	0.00	0.00	0.00
11/8/2012	4590	1.00	0.00	0.00	0.00
11/9/2012	5068	0.60	0.00	5147.00	0.00
11/9/2012	5545	0.10	0.00	5624.00	0.00
11/9/2012	5958	0.20	0.00	0.00	0.00
11/9/2012	6458	0.30	0.00	0.00	0.00
11/9/2012	6942	0.40	0.00	0.00	0.00
11/11/2012	7101	1.10	186.60	7098.93	8.27
11/11/2012	7213	0.90	272.00	7210.92	10.10
11/11/2012	7277	12.00	356.40	7274.42	3.18
11/11/2012	7340	19.80	357.40	7334.00	14.18
11/11/2012	7481	26.10	358.60	7423.00	52.29
11/11/2012	7563	36.00	348.30	7534.00	112.76
11/11/2012	7594	39.20	346.30	7558.00	131.53
11/11/2012	7626	43.10	346.50	7582.00	152.30
11/11/2012	7658	40.90	346.00	7606.00	177.79
11/12/2012	7690	40.70	346.70	7630.00	194.12
11/12/2012	7785	54.90	344.80	7694.00	263.25
11/12/2012	7849	65.20	346.00	7726.00	317.77
11/12/2012	7881	70.60	347.20	7739.00	347.09

#	Date	Depth	Deviation	Direction	TVD	Horiz
	11/13/2012	7943	82.00	348.60	7753.44	406.80
	11/13/2012	8006	88.90	351.00	7758.00	469.00
	11/13/2012	8262	91.10	350.60	7753.00	724.00
	11/13/2012	8548	91.20	351.70	7745.00	1009.00
	11/13/2012	8644	91.50	351.40	7743.00	1105.40
	11/13/2012	8739	91.60	350.60	7740.00	1200.12
	11/13/2012	8930	90.00	354.40	7734.00	1390.83
	11/13/2012	9026	89.30	354.20	7735.00	1486.81
	11/14/2012	7216	89.90	356.80	7736.00	1676.78
	11/14/2012	9408	90.20	356.40	7736.00	1868.72
	11/14/2012	9599	90.60	357.30	7737.00	2059.68
	11/14/2012	9790	88.90	355.90	7738.00	2250.00
	11/14/2012	9981	90.20	353.90	7738.00	2441.00
	11/14/2012	10172	91.30	353.90	7735.00	2632.00
	11/14/2012	10363	88.90	354.30	7736	2823.50
	11/14/2012	10458	88.80	354.40	7738.00	2918.47
	11/14/2012	10553	88.20	354.20	7741.00	3013.43
	11/15/2012	10649	90.10	356.40	7742.00	3109.41
	11/15/2012	10744	92.60	357.90	7740.00	3204.31
	11/15/2012	10839	92.80	357.70	7736.00	3300.10
	11/15/2012	10934	93.50	357.60	7730.00	3393.86
	11/15/2012	11030	90.90	359.70	7727.00	3489.60
	11/15/2012	11125	90.20	358.90	7726.00	3584.00
	11/15/2012	11316	92.10	358.60	7723.00	3775.00
	11/15/2012	11506	92.00	360.00	7717.00	3964.42
	11/15/2012	11602	90.80	358.30	7715.00	4060.15
	11/15/2012	11792	90.00	355.50	7715.00	4250.05
	11/16/2012	11893	90.00	356.20	7714.00	4351.04
	11/16/2012	11983	91.40	356.00	7712.00	4441.01
	11/16/2012	12079	89.60	354.80	7711.00	4537.00
	11/16/2012	12174	90.00	353.20	7712.00	4616.80
	11/16/2012	12270	89.40	353.40	7713.00	4727.00
	11/16/2012	12283	89.80	353.10	7714.00	4740.00

EOF



A GYRO TECHNOLOGIES INC. COMPANY

PO Box 261021
Corpus Christi, Texas 78426

(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

November 20, 2012

COG Operating LLC (Concho)
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanica Castillo

RE: Black Bart 15 Federal No. 002H

Please find enclosed a copy of the survey from 0.00' to 7122.00' ran on the above referenced well.

If I can be of any further service please do not hesitate to call me at 800-606-4976.

Sincerely,

Keith Havelka
Operations

Company: COG Operating, LLC (Concho)
 Lease/Well: Black Bart 15 Federal / No. 002H
 Location: S15 T25s R29e
 Rig Name: Silver Oak #7
 State/County: New Mexico / Eddy
 Latitude: 32.12; Longitude: -103.97
 GRID North is 0.19 Degrees East of True North
 VS-Azi: 0.00 Degrees



RKB: 20'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...art 15 fed #2h gyro survey.ut

Minimum Curvature Method

Report Date/Time: 11/20/2012 / 08:05

Vaughn Energy Services

Gardendale, Texas

432-563-5444

Surveyor: Dustin Wedel

Black Bart 15 Federal No. 002H / API 30-015-40797

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	0.31	61.51	100:00	0.13	0.23	0.13	0.27	61.51	0.31
200:00	0.27	348.12	200:00	0.49	0.42	0.49	0.64	40:84	0.35
300:00	0.54	34.85	300:00	1.10	0.64	1.10	1.27	30:11	0.40
400:00	0.60	40.74	399:99	1.88	1.25	1.88	2.26	33:54	0.09
500:00	1.32	356.25	499:98	3.43	1.51	3.43	3.75	23:81	0.99
600:00	1.35	1.26	599:95	5.76	1.46	5.76	5.95	14:25	0.12
700:00	1.99	3.75	699:91	8.68	1.60	8.68	8.83	10:47	0.64
800:00	2.25	354.45	799:84	12.37	1.53	12.37	12.46	7:04	0.43
900:00	2.16	9.31	899:77	16.18	1.64	16.18	16.26	5.80	0.58
1000:00	2.33	5.48	999:69	20.07	2.14	20.07	20.18	6.09	0.22
1100:00	2.47	326.71	1099:61	23.89	1.16	23.89	23.92	2.77	1.60
1200:00	1.22	281.31	1199:56	25.90	-1.07	25.90	25.92	357.64	1.83
1300:00	1.42	285.89	1299:53	26.44	-3.30	26.44	26.65	352.89	0.22
1400:00	1.56	230.79	1399:50	25.92	-5.54	25.92	26.51	347.93	1.38
1500:00	2.48	177.13	1499:45	22.90	-6.49	22.90	23.80	344.17	2.00
1600:00	3.32	149.03	1599:32	18.25	-4.89	18:25	18.89	344.99	1.63
1700:00	2.26	134.62	1699:20	14.37	-1.99	14:37	14:51	352.10	1.26
1800:00	1.50	121.42	1799:15	12.30	0.53	12:30	12:31	2.48	0.87

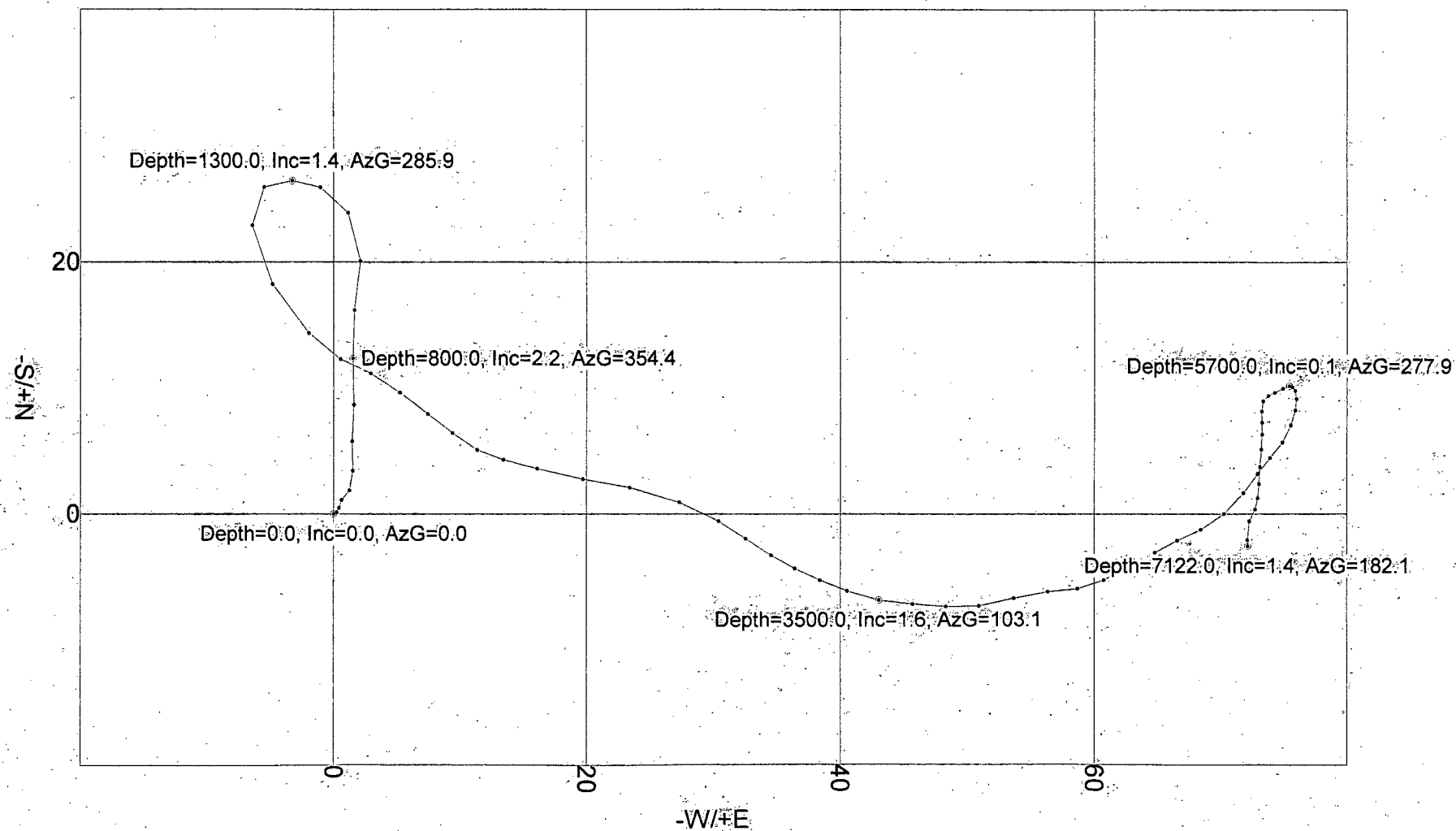
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	1.59	108.94	1899.11	11.17	2.97	11.17	11.55	14.89	0.35
2000.00	1.73	134.64	1999.07	9.65	5.36	9.65	11.04	29.03	0.75
2100.00	1.44	121.00	2099.03	7.94	7.51	7.94	10.93	43.40	0.47
2200.00	1.40	135.17	2199.00	6.43	9.45	6.43	11.43	55.77	0.35
2300.00	1.36	114.63	2298.98	5.07	11.39	5.07	12.47	66.00	0.49
2400.00	1.17	105.45	2398.95	4.30	13.45	4.30	14.12	72.26	0.28
2500.00	1.98	105.07	2498.91	3.58	16.11	3.58	16.50	77.46	0.81
2600.00	2.26	100.72	2598.84	2.77	19.71	2.77	19.91	82.02	0.33
2700.00	2.07	99.84	2698.77	2.09	23.43	2.09	23.53	84.91	0.20
2800.00	2.62	112.48	2798.69	0.91	27.32	0.91	27.34	88.10	0.75
2900.00	1.36	121.46	2898.63	-0.59	30.45	-0.59	30.45	91.10	1.30
3000.00	1.56	124.73	2998.60	-1.98	32.57	-1.98	32.63	93.47	0.22
3100.00	1.19	122.15	3098.57	-3.30	34.57	-3.30	34.73	95.46	0.37
3200.00	1.25	117.20	3198.54	-4.35	36.41	-4.35	36.67	96.82	0.12
3300.00	1.26	113.49	3298.52	-5.29	38.39	-5.29	38.75	97.84	0.08
3400.00	1.40	110.54	3398.49	-6.15	40.54	-6.15	41.00	98.63	0.16
3500.00	1.56	103.13	3498.46	-6.89	43.02	-6.89	43.57	99.10	0.25
3600.00	1.57	89.88	3598.42	-7.20	45.72	-7.20	46.28	98.95	0.36
3700.00	1.46	99.21	3698.39	-7.40	48.34	-7.40	48.90	98.71	0.27
3800.00	1.57	79.78	3798.35	-7.36	50.94	-7.36	51.47	98.22	0.52
3900.00	1.64	75.24	3898.31	-6.76	53.67	-6.76	54.09	97.17	0.14
4000.00	1.49	83.13	3998.28	-6.24	56.34	-6.24	56.69	96.32	0.26
4100.00	1.21	84.91	4098.25	-5.99	58.69	-5.99	58.99	95.83	0.28
4200.00	1.36	59.12	4198.23	-5.29	60.75	-5.29	60.98	94.97	0.59
4300.00	1.35	65.59	4298.20	-4.19	62.84	-4.19	62.98	93.82	0.15
4400.00	1.22	54.51	4398.17	-3.08	64.79	-3.08	64.86	92.73	0.28
4500.00	1.08	69.72	4498.15	-2.14	66.54	-2.14	66.58	91.84	0.34
4600.00	1.28	61.41	4598.13	-1.28	68.41	-1.28	68.42	91.07	0.26
4700.00	1.29	48.97	4698.11	0.00	70.24	0.00	70.24	90.00	0.28
4800.00	1.31	37.50	4798.08	1.65	71.79	1.65	71.81	88.68	0.26
4900.00	0.90	34.80	4898.06	3.20	72.93	3.20	73.00	87.49	0.42
5000.00	0.92	40.95	4998.05	4.45	73.90	4.45	74.04	86.56	0.10
5100.00	0.89	35.04	5098.04	5.69	74.88	5.69	75.09	85.66	0.10
5200.00	0.86	18.28	5198.03	7.03	75.56	7.03	75.88	84.68	0.26
5300.00	0.58	13.97	5298.02	8.24	75.91	8.24	76.36	83.81	0.29
5400.00	0.48	357.96	5398.01	9.14	76.02	9.14	76.57	83.14	0.18
5500.00	0.29	338.24	5498.01	9.79	75.91	9.79	76.54	82.65	0.23
5600.00	0.17	296.84	5598.01	10.09	75.69	10.09	76.36	82.40	0.20
5700.00	0.13	277.89	5698.01	10.18	75.44	10.18	76.12	82.32	0.06

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	0.55	241.20	5798.01	9.96	74.91	9.96	75.57	82.42	0.45
5900.00	0.27	243.05	5898.00	9.62	74.27	9.62	74.89	82.62	0.28
6000.00	0.38	247.94	5998.00	9.39	73.75	9.39	74.35	82.74	0.11
6100.00	0.37	198.57	6098.00	8.96	73.35	8.96	73.89	83.04	0.31
6200.00	0.56	179.27	6198.00	8.16	73.25	8.16	73.70	83.65	0.24
6300.00	0.48	179.03	6297.99	7.25	73.26	7.25	73.62	84.35	0.08
6400.00	0.59	178.86	6397.99	6.32	73.28	6.32	73.55	85.07	0.11
6500.00	0.78	186.90	6497.98	5.13	73.21	5.13	73.39	85.99	0.21
6600.00	0.81	182.69	6597.97	3.74	73.09	3.74	73.19	87.07	0.07
6700.00	0.73	182.92	6697.96	2.39	73.03	2.39	73.07	88.12	0.08
6800.00	0.58	186.96	6797.96	1.25	72.93	1.25	72.94	89.02	0.16
6900.00	0.49	200.62	6897.95	0.35	72.72	0.35	72.72	89.72	0.16
7000.00	0.74	210.80	6997.95	-0.60	72.24	-0.60	72.24	90.48	0.27
7100.00	1.11	169.27	7097.93	-2.11	72.09	-2.11	72.12	91.68	0.74
7122.00	1.37	182.12	7119.93	-2.58	72.12	-2.58	72.17	92.05	1.72



Vaughn Energy Services
Gardendale, Texas
432-563-5444

Surveyor: Dustin Wedel
Black Bart 15 Federal No. 002H // API 30-015-40797





COG Operating LLC

Eddy County, NM (NAD 83)

Blackbart 15 Fed

#2H

OH

Design: OH

Standard Survey Report

19 November, 2012



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County, NM (NAD 83)	TVD Reference:	WELL @ 3103'5usft (Silver Oak #7 - 17.5' KB)
Site:	Blackbart 15 Fed	MD Reference:	WELL @ 3103'5usft (Silver Oak #7 - 17.5' KB)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Houston R5000 Database

Project:	Eddy County, NM (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site: Blackbart 15 Fed					
Site Position:		Northing: 408,253.04 usft		Latitude: 32° 7' 18.589 N	
From: Map		Easting: 655,419.99 usft		Longitude: 103° 57' 53.367 W	
Position Uncertainty: 0.0 usft		Slot Radius: 13-3/16 "		Grid Convergence: 0.20 °	

Well:	#2H					
Well Position	+N/-S	0.0 usft	Northing:	408,783.96 usft	Latitude:	32° 7' 23.893 N
	+E/-W	0.0 usft	Easting:	653,948.84 usft	Longitude:	103° 58' 10.453 W
Position Uncertainty		2.0 usft	Wellhead Elevation:	usft	Ground Level:	3,086.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF200510	7/11/2012	7.62	60.02	48,449

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	92.02

Survey Program		Date	11/19/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	7,122.0	Survey #1 - VES1 (OH)	CB-GYRO-MS	Camera based gyro multishot	
7,181.0	12,283.0	Survey #2 - Crescent1 (OH)	MWD	MWD - Standard	
12,330.0	12,330.0	Survey #3 - PTB (OH)	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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.31	61.51	100.0	0.1	0.2	0.2	0.31	0.31	0.00
200.0	0.27	348.12	200.0	0.5	0.4	0.4	0.35	-0.04	-73.39
300.0	0.54	34.85	300.0	1.1	0.6	0.6	0.41	0.27	46.73
400.0	0.60	40.74	400.0	1.9	1.3	1.2	0.08	0.06	5.89
500.0	1.32	356.25	500.0	3.4	1.5	1.4	0.99	0.72	-44.49
600.0	1.35	1.26	600.0	5.8	1.5	1.3	0.12	0.03	5.01
700.0	1.99	3.75	699.9	8.7	1.6	1.3	0.64	0.64	2.49
800.0	2.25	354.45	799.8	12.4	1.5	1.1	0.43	0.26	-9.30

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County, NM (NAD 83)	TVD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Site:	Blackbart 15 Fed	MD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Houston R5000 Database

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)
900.0	2.16	9.31	899.8	16.2	1.7	1.1	0.58	-0.09	14.86
1,000.0	2.33	5.48	999.7	20.1	2.2	1.4	0.23	0.17	-3.83
1,100.0	2.47	326.71	1,099.6	23.9	1.2	0.3	1.60	0.14	-38.77
1,200.0	1.22	281.31	1,199.6	25.9	-1.1	-2.0	1.83	-1.25	-45.40
1,300.0	1.42	285.89	1,299.5	26.4	-3.3	-4.2	0.23	0.20	4.58
1,400.0	1.56	230.79	1,399.5	25.9	-5.5	-6.5	1.38	0.14	-55.10
1,500.0	2.48	177.13	1,499.4	22.9	-6.5	-7.3	2.00	0.92	-53.66
1,600.0	3.32	149.03	1,599.3	18.3	-4.9	-5.5	1.63	0.84	-28.10
1,700.0	2.26	134.62	1,699.2	14.4	-2.0	-2.5	1.26	-1.06	-14.41
1,800.0	1.50	121.42	1,799.2	12.3	0.5	0.1	0.87	-0.76	-13.20
1,900.0	1.59	108.94	1,899.1	11.2	3.0	2.6	0.35	0.09	-12.48
2,000.0	1.73	134.64	1,999.1	9.7	5.3	5.0	0.75	0.14	25.70
2,100.0	1.44	121.00	2,099.0	8.0	7.5	7.2	0.47	-0.29	-13.64
2,200.0	1.40	135.17	2,199.0	6.5	9.4	9.2	0.35	-0.04	14.17
2,300.0	1.36	114.63	2,299.0	5.1	11.4	11.2	0.49	-0.04	-20.54
2,400.0	1.17	105.45	2,399.0	4.3	13.4	13.3	0.28	-0.19	-9.18
2,500.0	1.98	105.07	2,498.9	3.6	16.1	15.9	0.81	0.81	-0.38
2,600.0	2.26	100.72	2,598.8	2.8	19.7	19.6	0.32	0.28	-4.35
2,700.0	2.07	99.84	2,698.8	2.1	23.4	23.3	0.19	-0.19	-0.88
2,800.0	2.62	112.48	2,798.7	0.9	27.3	27.2	0.75	0.55	12.64
2,900.0	1.36	121.46	2,898.6	-0.6	30.4	30.4	1.29	-1.26	8.98
3,000.0	1.56	124.73	2,998.6	-2.0	32.6	32.6	0.22	-0.20	3.27
3,100.0	1.19	122.15	3,098.6	-3.3	34.5	34.6	0.38	-0.37	-2.58
3,200.0	1.25	117.20	3,198.5	-4.3	36.4	36.5	0.12	0.06	-4.95
3,300.0	1.26	113.49	3,298.5	-5.3	38.4	38.5	0.08	0.01	-3.71
3,400.0	1.40	110.54	3,398.5	-6.1	40.5	40.7	0.16	0.14	-2.95
3,500.0	1.56	103.13	3,498.5	-6.9	43.0	43.2	0.25	0.16	-7.41
3,600.0	1.57	89.88	3,598.4	-7.2	45.7	45.9	0.36	0.01	-13.25
3,700.0	1.46	99.21	3,698.4	-7.4	48.3	48.6	0.27	-0.11	9.33
3,800.0	1.57	79.78	3,798.4	-7.3	50.9	51.2	0.52	0.11	-19.43
3,900.0	1.64	75.24	3,898.3	-6.7	53.7	53.9	0.15	0.07	-4.54
4,000.0	1.49	83.13	3,998.3	-6.2	56.3	56.5	0.26	-0.15	7.89
4,100.0	1.21	84.91	4,098.3	-6.0	58.7	58.8	0.28	-0.28	1.78
4,200.0	1.36	59.12	4,198.2	-5.3	60.7	60.9	0.59	-0.15	-25.79
4,300.0	1.35	65.59	4,298.2	-4.2	62.8	62.9	0.15	-0.01	6.47
4,400.0	1.22	54.51	4,398.2	-3.1	64.8	64.8	0.28	-0.13	-11.08
4,500.0	1.08	69.72	4,498.2	-2.1	66.5	66.6	0.33	-0.14	15.21
4,600.0	1.28	61.41	4,598.1	-1.3	68.4	68.4	0.26	0.20	-8.31
4,700.0	1.29	48.97	4,698.1	0.0	70.2	70.2	0.28	0.01	-12.44
4,800.0	1.31	37.50	4,798.1	1.7	71.8	71.7	0.26	0.02	-11.47
4,900.0	0.90	34.80	4,898.1	3.2	72.9	72.8	0.41	-0.41	-2.70
5,000.0	0.92	40.95	4,998.1	4.5	73.9	73.7	0.10	0.02	6.15
5,100.0	0.89	35.04	5,098.0	5.7	74.9	74.6	0.10	-0.03	-5.91

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County, NM (NAD 83)	TVD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Site:	Blackbart 15 Fed	MD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Houston R5000 Database

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)
5,200.0	0.86	18.28	5,198.0	7.1	75.5	75.2	0.26	-0.03	-16.76
5,300.0	0.58	13.97	5,298.0	8.3	75.9	75.6	0.28	-0.28	-4.31
5,400.0	0.48	357.96	5,398.0	9.2	76.0	75.6	0.18	-0.10	-16.01
5,500.0	0.29	338.24	5,498.0	9.8	75.9	75.5	0.23	-0.19	-19.72
5,600.0	0.17	296.84	5,598.0	10.1	75.7	75.3	0.20	-0.12	-41.40
5,700.0	0.13	277.89	5,698.0	10.2	75.4	75.0	0.06	-0.04	-18.95
5,800.0	0.55	241.20	5,798.0	10.0	74.9	74.5	0.45	0.42	-36.69
5,900.0	0.27	243.05	5,898.0	9.6	74.3	73.9	0.28	-0.28	1.85
6,000.0	0.38	247.94	5,998.0	9.4	73.7	73.4	0.11	0.11	4.89
6,100.0	0.37	198.57	6,098.0	9.0	73.3	73.0	0.31	-0.01	-49.37
6,200.0	0.56	179.27	6,198.0	8.2	73.2	72.9	0.24	0.19	-19.30
6,300.0	0.48	179.03	6,298.0	7.3	73.2	72.9	0.08	-0.08	-0.24
6,400.0	0.59	178.86	6,398.0	6.4	73.3	73.0	0.11	0.11	-0.17
6,500.0	0.78	186.90	6,498.0	5.2	73.2	73.0	0.21	0.19	8.04
6,600.0	0.81	182.69	6,598.0	3.8	73.1	72.9	0.07	0.03	-4.21
6,700.0	0.73	182.92	6,698.0	2.4	73.0	72.9	0.08	-0.08	0.23
6,800.0	0.58	186.96	6,798.0	1.3	72.9	72.8	0.16	-0.15	4.04
6,900.0	0.49	200.62	6,898.0	0.4	72.7	72.6	0.16	-0.09	13.66
7,000.0	0.74	210.80	6,997.9	-0.6	72.2	72.2	0.27	0.25	10.18
7,100.0	1.11	169.27	7,097.9	-2.1	72.1	72.1	0.74	0.37	-41.53
7,122.0	1.37	182.12	7,119.9	-2.5	72.1	72.2	1.72	1.18	58.41
Tie into Gyro @ 7,122' MD									
7,181.0	0.90	172.50	7,178.9	-3.7	72.1	72.2	0.86	-0.80	-16.31
7,213.0	0.90	272.00	7,210.9	-3.9	71.9	72.0	4.29	0.00	310.94
KOP: 7213.0' MD, 7210.9' TVD, 0.90° INC, 272.00° AZI, 72.0° VS									
7,245.0	6.40	358.50	7,242.8	-2.1	71.6	71.7	20.03	17.19	270.31
7,277.0	12.00	356.40	7,274.4	3.0	71.4	71.2	17.53	17.50	-6.56
7,308.0	16.10	359.20	7,304.5	10.5	71.1	70.7	13.40	13.23	9.03
7,340.0	19.80	357.40	7,334.9	20.3	70.8	70.0	11.69	11.56	-5.63
7,372.0	24.00	353.20	7,364.6	32.2	69.8	68.6	14.00	13.13	-13.13
7,404.0	23.30	355.10	7,393.9	45.0	68.5	66.8	3.23	-2.19	5.94
7,436.0	26.10	358.60	7,423.0	58.3	67.8	65.7	9.87	8.75	10.94
7,467.0	24.40	346.30	7,451.1	71.4	66.1	63.5	17.76	-5.48	-39.68
7,499.0	26.80	351.60	7,479.9	84.9	63.5	60.4	10.36	7.50	16.56
7,531.0	32.30	349.70	7,507.7	100.5	60.9	57.3	17.43	17.19	-5.94
7,563.0	36.00	348.30	7,534.2	118.1	57.4	53.2	11.82	11.56	-4.38
7,594.0	39.20	346.30	7,558.8	136.6	53.3	48.4	11.05	10.32	-6.45
7,598.7	39.77	346.33	7,562.4	139.5	52.6	47.6	12.19	12.19	0.67
PP: 7598.7' MD, 7562.4' TVD, 39.77° INC, 47.6° VS									
7,626.0	43.10	346.50	7,582.9	157.0	48.3	42.8	12.19	12.19	0.62
7,658.0	40.90	346.00	7,606.6	177.8	43.2	36.9	6.95	-6.88	-1.56
7,690.0	40.70	346.70	7,630.9	198.1	38.3	31.3	1.56	-0.63	2.19
7,721.0	44.80	347.40	7,653.6	218.7	33.6	25.9	13.31	13.23	2.26
7,753.0	50.00	346.20	7,675.3	241.6	28.2	19.7	16.48	16.25	-3.75

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County, NM (NAD 83)	TVD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Site:	Blackbart 15 Fed	MD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Houston IR5000 Database

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)
7,785.0	54.90	344.80	7,694.8	266.1	21.8	12.5	15.70	15.31	-4.38
7,817.0	59.70	345.80	7,712.1	292.2	15.0	4.7	15.23	15.00	3.13
7,849.0	65.20	346.00	7,726.9	319.7	8.1	-3.1	17.20	17.19	0.63
7,881.0	70.60	347.20	7,738.9	348.5	1.2	-11.0	17.23	16.88	3.75
7,913.0	76.70	348.30	7,747.9	378.5	-5.3	-18.6	19.35	19.06	3.44
7,943.0	82.00	348.60	7,753.4	407.4	-11.2	-25.5	17.69	17.67	1.00
7,975.0	85.60	350.60	7,756.9	438.7	-16.9	-32.3	12.85	11.25	6.25
8,006.0	88.90	351.00	7,758.4	469.2	-21.9	-38.3	10.72	10.65	1.29
8,038.0	90.10	350.70	7,758.7	500.8	-26.9	-44.5	3.87	3.75	-0.94
8,050.0	90.66	351.00	7,758.6	512.7	-28.9	-46.9	5.31	4.69	2.50
EOC: 8050.0 MD: 7758.6 TVD: 90.66 INC: 351.00 AZI: 46.9 VS									
8,070.0	91.60	351.50	7,758.2	532.4	-31.9	-50.6	5.31	4.69	2.50
8,166.0	91.70	351.30	7,755.4	627.3	-46.2	-68.3	0.23	0.10	-0.21
8,262.0	91.10	350.60	7,753.1	722.1	-61.3	-86.7	0.96	-0.63	-0.73
8,357.0	91.30	350.70	7,751.1	815.8	-76.8	-105.4	0.24	0.21	0.11
8,453.0	92.00	349.70	7,748.3	910.4	-93.1	-125.1	1.27	0.73	-1.04
8,548.0	91.20	351.70	7,745.7	1,004.1	-108.4	-143.7	2.27	-0.84	2.11
8,644.0	91.50	351.40	7,743.4	1,099.0	-122.6	-161.1	0.44	0.31	-0.31
8,739.0	92.40	350.80	7,740.2	1,192.8	-137.2	-179.1	1.14	0.95	-0.63
8,834.0	92.10	353.00	7,736.4	1,286.8	-150.6	-195.8	2.34	-0.32	2.32
8,930.0	90.00	354.40	7,734.7	1,382.2	-161.1	-209.7	2.63	-2.19	1.46
9,026.0	89.30	354.20	7,735.3	1,477.7	-170.7	-222.5	0.76	-0.73	-0.21
9,121.0	89.50	354.00	7,736.3	1,572.2	-180.4	-235.6	0.30	0.21	-0.21
9,216.0	89.90	356.80	7,736.8	1,666.9	-188.1	-246.6	2.98	0.42	2.95
9,312.0	89.90	356.40	7,736.9	1,762.7	-193.8	-255.6	0.42	0.00	-0.42
9,408.0	90.20	356.40	7,736.9	1,858.5	-199.8	-265.0	0.31	0.31	0.00
9,504.0	89.30	355.30	7,737.3	1,954.2	-206.7	-275.3	1.48	-0.94	-1.15
9,599.0	90.60	357.30	7,737.4	2,049.0	-212.9	-284.8	2.51	1.37	2.11
9,694.0	89.50	356.20	7,737.3	2,143.9	-218.2	-293.5	1.64	-1.16	-1.16
9,790.0	88.90	355.90	7,738.6	2,239.6	-224.9	-303.5	0.70	-0.63	-0.31
9,885.0	90.80	354.50	7,738.9	2,334.3	-232.8	-314.7	2.48	2.00	-1.47
9,981.0	90.20	353.90	7,738.0	2,429.8	-242.5	-327.8	0.88	-0.63	-0.63
10,077.0	90.60	353.90	7,737.4	2,525.3	-252.7	-341.4	0.42	0.42	0.00
10,172.0	91.30	353.90	7,735.8	2,619.7	-262.8	-354.8	0.74	0.74	0.00
10,267.0	89.20	354.90	7,735.4	2,714.3	-272.1	-367.4	2.45	-2.21	1.05
10,363.0	88.90	354.30	7,737.0	2,809.8	-281.1	-379.7	0.70	-0.31	-0.63
10,458.0	88.80	354.40	7,738.9	2,904.3	-290.5	-392.4	0.15	-0.11	0.11
10,553.0	88.20	354.20	7,741.3	2,998.8	-299.9	-405.2	0.67	-0.63	-0.21
10,649.0	90.10	356.40	7,742.8	3,094.5	-307.8	-416.4	3.03	1.98	2.29
10,744.0	92.60	357.90	7,740.5	3,189.3	-312.5	-424.4	3.07	2.63	1.58
10,840.0	92.80	357.70	7,736.0	3,285.2	-316.2	-431.5	0.29	0.21	-0.21
10,934.0	93.50	357.60	7,730.8	3,378.9	-320.0	-438.6	0.75	0.74	-0.11
11,030.0	90.90	359.60	7,727.2	3,474.8	-322.3	-444.3	3.42	-2.71	2.08

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County, NM (NAD83)	TVD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Site:	Blackbart 15 Fed	MD Reference:	WELL @ 3103.5usft (Silver Oak #7 - 17.5 KB)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Houston R5000 Database

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)
11,125.0	90.20	358.90	7,726.2	3,569.8	-323.6	-448.9	1.04	-0.74	-0.74
11,221.0	90.30	357.30	7,725.8	3,665.8	-326.8	-455.5	1.67	-0.10	-1.67
11,316.0	92.10	358.60	7,723.8	3,760.7	-330.2	-462.2	2.34	1.89	1.37
11,411.0	91.50	359.70	7,720.9	3,855.6	-331.6	-467.0	1.32	-0.63	1.16
11,506.0	92.00	0.00	7,718.0	3,950.6	-331.8	-470.5	0.61	0.53	0.32
11,602.0	90.80	358.30	7,715.6	4,046.5	-333.3	-475.3	2.17	-1.25	-1.77
11,697.0	89.70	356.60	7,715.2	4,141.4	-337.5	-482.9	2.13	-1.16	-1.79
11,792.0	90.00	355.50	7,715.4	4,236.2	-344.0	-492.8	1.20	0.32	-1.16
11,888.0	90.90	356.20	7,714.7	4,331.9	-351.0	-503.1	1.19	0.94	0.73
11,983.0	91.40	356.00	7,712.8	4,426.7	-357.4	-512.9	0.57	0.53	-0.21
12,079.0	89.60	354.80	7,711.9	4,522.4	-365.1	-523.9	2.25	-1.88	-1.25
12,174.0	89.30	353.20	7,712.9	4,616.8	-375.1	-537.2	1.71	-0.32	-1.68
12,270.0	89.40	353.40	7,713.9	4,712.2	-386.3	-551.7	0.23	0.10	0.21
12,283.0	89.80	353.10	7,714.0	4,725.1	-387.8	-553.7	3.85	3.08	-2.31
12,330.0	89.80	353.10	7,714.2	4,771.8	-393.4	-561.0	0.00	0.00	0.00
BHL - 12330.0' MD, 7714.2' TVD, 89.80° INC, 353.10° AZI, 4771.8' N, -393.4' E, -561.0' VS									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates	Comment
7,122.0	7,119.9	-2.5	72.1 Tie into Gyro @ 7122' MD
7,213.0	7,210.9	-3.9	71.9 KOP - 7213.0' MD, 7210.9' TVD, 0.90° INC, 272.00° AZI, 72.0' VS
7,598.7	7,562.4	139.5	52.6 PP - 7598.7' MD, 7562.4' TVD, 39.77° INC, 47.6' VS
8,050.0	7,758.6	512.7	-28.9 EOC - 8050.0' MD, 7758.6' TVD, 90.66° INC, 351.00° AZI, -46.9' VS
12,330.0	7,714.2	4,771.8	-393.4 BHL - 12330.0' MD, 7714.2' TVD, 89.80° INC, 353.10° AZI, 4771.8' N, -393.4' E

Checked By: _____ Approved By: _____ Date: _____



COG Operating LLC
Project: Eddy County, NM (NAD 83)
Site: Blackbart 15 Fed
Well: #2H
Wellbore: OH
Plan: Plan #3 (#2H/OH)

WELL DETAILS: #2H

Ground Elevation: 3088.0
RKB Elevation: WELL @ 3103.5usft (Silver Oak #7 - 17.5' KB)
Rig Name: Silver Oak #7 - 17.5' KB

Surface Hole Location
Easting 653948.84 Latitude 32° 7' 23.893 N Longitude 103° 58' 10.453 W



Azimuths to Grid North
True North: -0.19°
Magnetic North: 7.43°

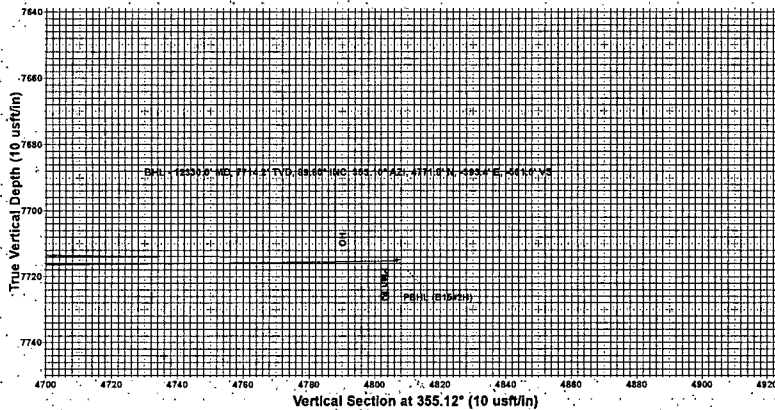
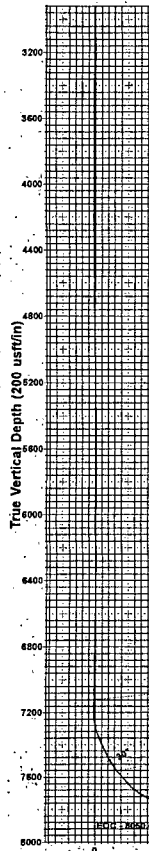
Magnetic Field
Strength: 48448.7nT
Dip Angle: 60.02°
Date: 7/11/2012
Model: IGRF200510

Section Details

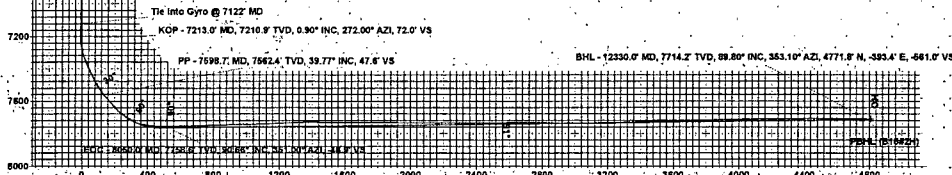
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dipg	TFace	Vsect	Target
1	7785.0	54.90	344.80	7694.8	266.1	21.8	0.00	0.00	263.3	
2	7830.0	61.79	345.00	7718.4	303.1	11.9	15.32	1.47	301.0	
3	8027.4	90.66	354.83	7765.0	489.8	-20.3	15.39	19.73	489.7	
4	12344.7	90.66	354.83	7715.3	4789.3	-409.3	0.00	0.00	4806.7	PBHL (B15#2H)

DESIGN TARGET DETAILS

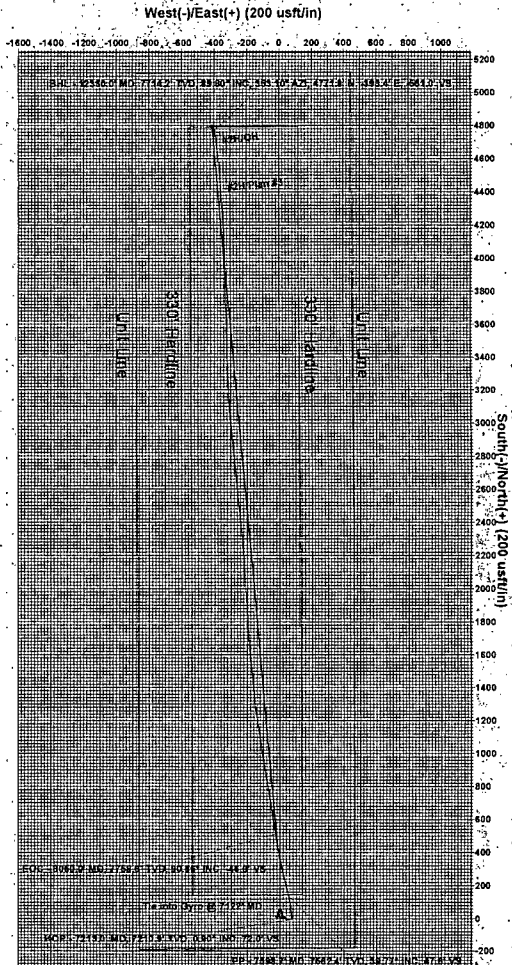
Name	TVD	+N/-S	+E/-W	Northing	Easting
PBHL (B15#2H)	7715.0	4789.3	-409.4	413573.22	653539.49



Vertical Section at 355.12° (10 usft/in)



Vertical Section at 355.12° (200 usft/in)



PROJECT DETAILS: Eddy County, NM (NAD 83)
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level
Local North: Grid



Crescent Directional Drilling
7715 West Industrial Ave. Midland, Tx 79706
Phone: 432-618-1135

Plan: Plan #3 (#2H/OH)
Created By: Matt Higgins Date: 11:42, November 19 2012