

15-40093

COG Operating LLC

Eddy County(NM27E)

Sec 14-T17S-R31E

Skelly Unit #673

Wellbore #1

Design: Wellbore #1

Standard Survey Report

16 June, 2012

Archer



Archer Directional Drilling Services
Survey Report

Archer

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Skelly Unit #673
Project:	Eddy County(NM27E)	TVD Reference:	WELL @ 3900.0usft (Original Well Elev)
Site:	Sec 14-T17S-R31E	MD Reference:	WELL @ 3900.0usft (Original Well Elev)
Well:	Skelly Unit #673	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Eddy County(NM27E)		
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	Sec 14-T17S-R31E		
Site Position:		Northing:	666,634.90 usft
From:	Map	Easting:	650,096.70 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 49' 54.162 N
		Longitude:	103° 50' 40.857 W
		Grid Convergence:	0.26 °

Well	Skelly Unit #673		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 49' 54.162 N
		Longitude:	103° 50' 40.857 W
		Ground Level:	3,900.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	2012/05/03	7.65
			Dip Angle
			(°)
			Field Strength
			(nT)
			48,860

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD):	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			85.36

Survey Program	Date 2012/06/16		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	1,945.0	VES Gyro (Wellbore #1)	GYD_DP_MS
2,046.0	6,825.0	Archer MWD (Wellbore #1)	MWD
			Description
			Gyrodata gyro-compassing and drop
			MWD - Standard

Survey	Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
	100.0	0.83	145.35	100.0	-0.6	0.4	0.4	0.83	0.83	0.00
	200.0	1.41	141.03	200.0	-2.1	1.6	1.4	0.59	0.58	-4.32
	300.0	2.16	134.94	299.9	-4.4	3.7	3.3	0.77	0.75	-6.09
	400.0	2.73	120.10	399.8	-7.0	7.1	6.5	0.85	0.57	-14.84
	500.0	3.11	118.18	499.7	-9.4	11.6	10.7	0.39	0.38	-1.92
	600.0	3.23	111.76	599.6	-11.8	16.6	15.6	0.37	0.12	-6.42
	700.0	2.85	110.24	699.4	-13.7	21.5	20.3	0.39	-0.38	-1.52
	800.0	2.46	112.13	799.3	-15.3	25.8	24.5	0.40	-0.39	1.89
	900.0	1.85	118.85	899.2	-16.9	29.2	27.8	0.66	-0.61	6.72

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Skelly Unit #673
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Well:	Skelly Unit #673	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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)
1,000.0	1.55	123.25	999.2	-18.4	31.8	30.2	0.33	-0.30	4.40
1,100.0	1.03	129.21	1,099.2	-19.8	33.6	31.9	0.54	-0.52	5.96
1,200.0	1.12	129.82	1,199.1	-20.9	35.0	33.2	0.09	0.09	0.61
1,300.0	0.76	108.43	1,299.1	-21.8	36.4	34.5	0.50	-0.36	-21.39
1,400.0	0.97	80.28	1,399.1	-21.8	37.9	36.0	0.47	0.21	-28.15
1,500.0	0.78	78.31	1,499.1	-21.6	39.4	37.5	0.19	-0.19	-1.97
1,600.0	0.89	77.01	1,599.1	-21.3	40.8	39.0	0.11	0.11	-1.30
1,700.0	1.00	77.43	1,699.1	-20.9	42.4	40.6	0.11	0.11	0.42
1,800.0	0.84	79.98	1,799.1	-20.6	44.0	42.2	0.17	-0.16	2.55
1,900.0	0.61	94.07	1,899.1	-20.5	45.3	43.4	0.29	-0.23	14.09
1,945.0	0.53	106.25	1,944.1	-20.6	45.7	43.9	0.32	-0.18	27.07
Last VES Gyro - Last VES Gyro									
2,046.0	0.40	92.30	2,045.1	-20.7	46.5	44.7	0.17	-0.13	-13.81
2,109.0	1.20	110.70	2,108.1	-20.9	47.3	45.5	1.32	1.27	29.21
2,173.0	2.40	102.20	2,172.0	-21.5	49.3	47.4	1.92	1.88	-13.28
2,236.0	3.60	95.70	2,234.9	-21.9	52.5	50.6	1.98	1.90	-10.32
2,299.0	4.20	90.60	2,297.8	-22.2	56.8	54.8	1.10	0.95	-8.10
2,363.0	5.30	93.20	2,361.6	-22.4	62.1	60.1	1.75	1.72	4.06
2,426.0	5.80	87.30	2,424.3	-22.4	68.2	66.1	1.20	0.79	-9.37
2,489.0	6.40	84.00	2,486.9	-21.8	74.8	72.8	1.10	0.95	-5.24
2,552.0	6.10	81.00	2,549.5	-21.0	81.6	79.7	0.70	-0.48	-4.76
2,615.0	6.10	81.30	2,612.2	-19.9	88.3	86.4	0.05	0.00	0.48
2,678.0	6.50	81.60	2,674.8	-18.9	95.1	93.3	0.64	0.63	0.48
2,741.0	6.50	80.80	2,737.4	-17.8	102.1	100.4	0.14	0.00	-1.27
2,836.0	5.80	78.90	2,831.9	-16.0	112.2	110.5	0.77	-0.74	-2.00
2,929.0	6.50	88.60	2,924.3	-15.0	122.0	120.4	1.34	0.75	10.43
3,024.0	6.10	87.80	3,018.7	-14.7	132.5	130.8	0.43	-0.42	-0.84
3,119.0	5.80	87.10	3,113.2	-14.2	142.3	140.7	0.32	-0.32	-0.74
3,189.0	5.50	87.70	3,182.9	-13.9	149.2	147.6	0.44	-0.43	0.86
3,253.0	6.10	85.40	3,246.6	-13.5	155.6	154.0	1.01	0.94	-3.59
3,316.0	6.80	83.20	3,309.2	-12.8	162.7	161.1	1.18	1.11	-3.49
3,379.0	6.90	82.00	3,371.7	-11.8	170.1	168.6	0.28	0.16	-1.90
3,474.0	7.10	83.90	3,466.0	-10.4	181.6	180.2	0.32	0.21	2.00
3,538.0	7.30	81.70	3,529.5	-9.4	189.6	188.2	0.53	0.31	-3.44
3,633.0	6.90	80.00	3,623.8	-7.6	201.2	199.9	0.48	-0.42	-1.79
3,823.0	6.20	77.90	3,812.5	-3.4	222.4	221.4	0.39	-0.37	-1.11
3,918.0	6.10	75.90	3,907.0	-1.1	232.3	231.5	0.25	-0.11	-2.11
4,012.0	6.50	76.40	4,000.4	1.4	242.4	241.7	0.43	0.43	0.53
4,107.0	6.50	74.40	4,094.8	4.1	252.8	252.3	0.24	0.00	-2.11
4,201.0	6.70	76.20	4,188.2	6.8	263.2	262.9	0.31	0.21	1.91
4,264.0	6.10	82.80	4,250.8	8.1	270.1	269.9	1.51	-0.95	10.48
4,358.0	5.80	81.90	4,344.3	9.4	279.8	279.6	0.33	-0.32	-0.96
4,454.0	5.80	83.10	4,439.8	10.7	289.4	289.3	0.13	0.00	1.25

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Site:	Sec 14-T17S-R31E	MD Reference:	WELL @.3900 0usft (Original Well Elev)
Well:	Skelly Unit #673	North Reference:	Grnd
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

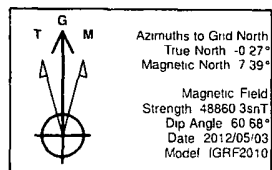
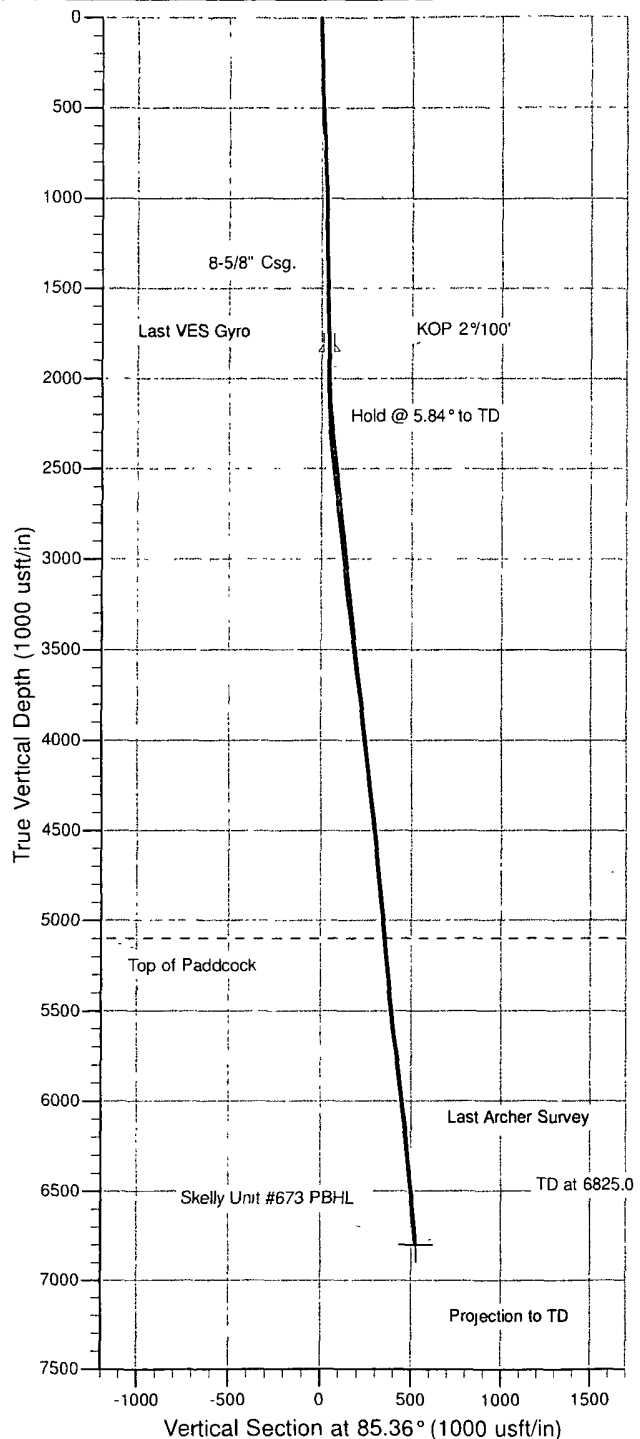
Survey

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)
4,549.0	5.60	81 80	4,534.3	11.9	298.7	298.7	0.25	-0.21	-1.37
4,642.0	5.60	80 90	4,626.9	13.3	307.7	307.8	0.09	0.00	-0.97
4,736.0	5.50	80 80	4,720.4	14.7	316.7	316.8	0.11	-0.11	-0.11
4,831.0	5.40	81 30	4,815.0	16.1	325.6	325.8	0.12	-0.11	0.53
4,925.0	5.30	79 50	4,908.6	17.6	334.2	334.6	0.21	-0.11	-1.91
5,019.0	5.20	79 70	5,002.2	19.1	342.7	343.1	0.11	-0.11	0.21
5,113.0	5.10	79.70	5,095.8	20.6	351.0	351.5	0.11	-0.11	0.00
5,208.0	5.10	80 30	5,190.5	22.1	359.3	359.9	0.06	0.00	0.63
5,302.0	5.40	78.80	5,284.1	23.7	367.8	368.5	0.35	0.32	-1.60
5,395.0	5.30	80.70	5,376.7	25.2	376.3	377.1	0.22	-0.11	2.04
5,490.0	5.10	79.80	5,471.3	26.7	384.8	385.7	0.23	-0.21	-0.95
5,552.0	5.50	80.20	5,533.0	27.7	390.4	391.4	0.65	0.65	0.65
5,648.0	7.50	82 80	5,628.4	29.2	401.2	402.2	2.11	2.08	2.71
5,743.0	7.40	81.80	5,722.6	30.9	413.4	414.5	0.17	-0.11	-1.05
5,837.0	7.30	81 20	5,815.8	32.7	425.3	426.5	0.13	-0.11	-0.64
5,932.0	7.20	81 20	5,910.0	34.5	437.1	438.5	0.11	-0.11	0.00
5,994.0	6.60	89.60	5,971.6	35.1	444.5	445.9	1.89	-0.97	13.55
6,057.0	6.30	89.70	6,034.2	35.1	451.6	453.0	0.48	-0.48	0.16
6,152.0	6.50	89.00	6,128.6	35.3	462.2	463.5	0.23	0.21	-0.74
6,247.0	5.40	86.40	6,223.1	35.6	472.0	473.4	1.19	-1.16	-2.74
6,342.0	5.30	87.20	6,317.7	36.1	480.9	482.2	0.13	-0.11	0.84
6,436.0	5.30	91 10	6,411.3	36.3	489.6	490.9	0.38	0.00	4.15
6,531.0	5.40	92 90	6,505.9	36.0	498.4	499.7	0.21	0.11	1.89
6,594.0	4.90	82 40	6,568.6	36.2	504.0	505.3	1.69	-0.79	-16.67
6,657.0	4.70	78 30	6,631.4	37.0	509.2	510.6	0.63	-0.32	-6.51
6,753.0	4.50	77 10	6,727.1	38.7	516.7	518.2	0.23	-0.21	-1.25
6,780.0	4.20	74 80	6,754.0	39.2	518.7	520.2	1.29	-1.11	-8.52
Last Archer Survey									
6,825.0	4.20	74.80	6,798.9	40.0	521.9	523.4	0.00	0.00	0.00
Projection to TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,945.0	1,944.1	-20.6	45.7	Last VES Gyro
1,945.0	1,944.1	-20.6	45.7	Last VES Gyro
6,780.0	6,754.0	39.2	518.7	Last Archer Survey
6,825.0	6,798.9	40.0	521.9	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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Project Eddy County(NM27E)
 Site Sec 14-T17S-R31E
 Well Skelly Unit #673
 Wellbore Wellbore #1
 Design Skelly Unit #673 Plan A1 6-11-12

WELL DETAILS Skelly Unit #673

Ground Level 3900.0
 Northing 666634.90 Easting 650096.70 Latitude 32° 49' 54.162 N Longitude 103° 50' 40.857 W

SECTION DETAILS

MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSec	Target
1945.0	0.53	106.25	1944.1	-20.6	45.7	0.00	0.00	43.9	
2213.0	5.84	82.43	2211.5	-19.1	60.4	2.00	-26.10	58.7	Skelly Unit #673 PBHL
6825.0	5.84	82.43	6799.7	42.7	525.6	0.00	0.00	527.3	Skelly Unit #673 PBHL

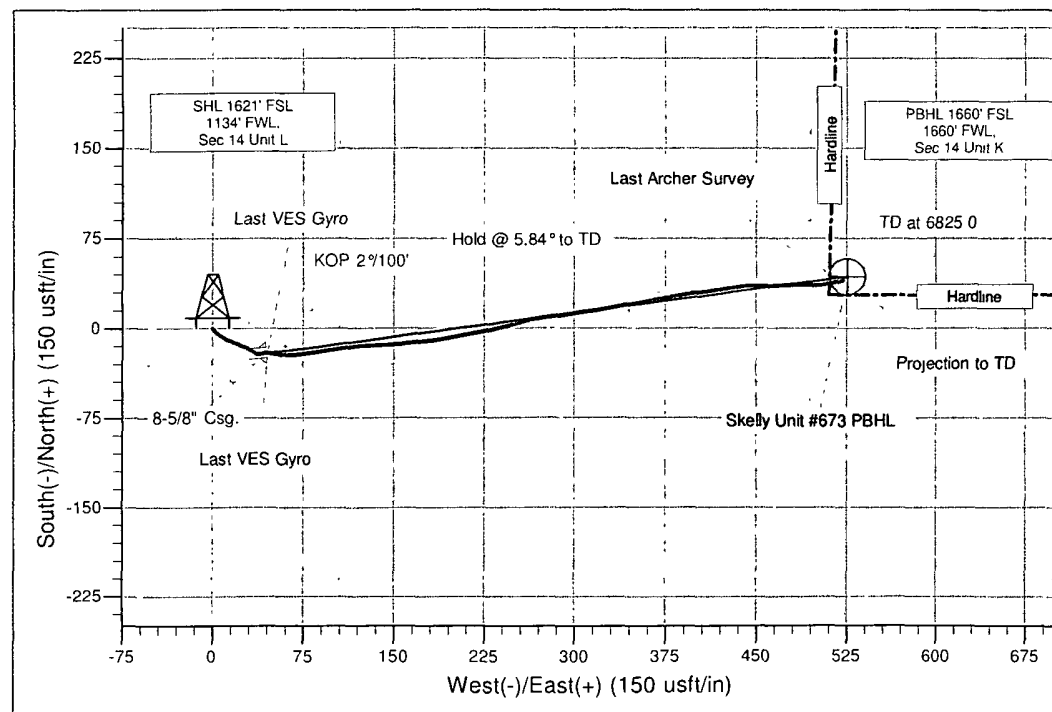
ANNOTATIONS

TVD	MD	Inc	Azi	+N-S	+E-W	VSec	Departure	Annotation
1944.1	1945.0	0.53	106.25	-20.6	45.7	43.9	0.0	KOP 2°/100'
2211.6	2213.0	5.84	82.43	-19.1	60.4	58.7	14.6	Hold @ 5.84° to TD
6799.6	6825.0	5.84	82.43	42.7	525.6	527.3	484.1	TD at 6825.0



Archer

Surveys must be provided 3 times per day (6-7am) (3-4pm) (8-9pm). Halt drilling and call to discuss on ANY substantial doglegs greater than the 2°/100 MAX. Never exceed an inclination of 9.5°. Follow plan inclinations. 60' to 90' survey course lengths (unless otherwise requested)





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

June 18, 2012

COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

RE: Skelly Unit #673
1621' FSL & 1134' FWL
Sec. 14, T17S, R31E
Eddy County, New Mexico

Dear Sir,

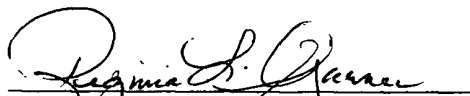
The attached is the Deviation Survey for the above captioned well.

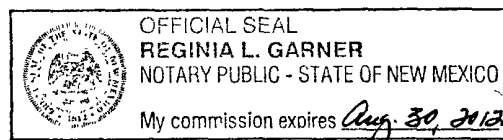
Very truly yours,


Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 18th day of June, 2012.


Notary Public



Skelly Unit #673

Date	Depth	Deviation	Direction	TVD
6/6/2012	142	1.50		
6/6/2012	239	2.00		
6/6/2012	302	1.80		
6/6/2012	391	2.40		
6/6/2012	451	2.60		
6/6/2012	511	2.80		
6/8/2012	671	4.00		
6/8/2012	758	3.40		
6/8/2012	821	2.80		
6/8/2012	915	1.30		
6/9/2012	1043	1.90		
6/9/2012	1168	0.90		
6/9/2012	1380	1.00		
6/9/2012	1514	0.60		
6/9/2012	1704	1.20		
6/11/2012	2046	0.40	92.3	
6/11/2012	2109	1.20	110.7	
6/11/2012	2173	2.40	102.2	
6/11/2012	2236	3.60	95.7	
6/11/2012	2299	4.20	90.6	
6/11/2012	2363	5.30	93.2	
6/11/2012	2426	5.80	87.3	
6/11/2012	2489	6.40	84	
6/11/2012	2552	6.10	81	
6/11/2012	2615	6.10	81.3	
6/11/2012	2678	6.50	81.6	
6/12/2012	236	5.80	78.90	
6/12/2012	2930	6.50	89.00	
6/12/2012	3024	6.10	87.80	
6/12/2012	3119	5.80	87.10	
6/12/2012	3189	5.50	87.10	
6/12/2012	3253	6.10	85.40	
6/12/2012	3316	6.80	83.20	
6/12/2012	3379	6.90	82.00	
6/12/2012	2474	7.10	83.90	
6/12/2012	3538	7.30	81.70	
6/12/2012	3633	6.90	80.00	
6/12/2012	3729	7.10	78.70	
6/12/2012	3823	6.20	77.90	
6/12/2012	3918	6.10	75.90	
6/13/2012	4012	6.50	76.40	
6/13/2012	4107	6.50	74.40	
6/13/2012	7201	6.70	76.20	

Date	Depth	Deviation	Direction	TVD
6/13/2012	4264	6.10	82.80	
6/13/2012	4358	5.80	81.90	
6/13/2012	4454	5.80	83.10	
6/13/2012	4549	5.60	81.80	
6/13/2012	4642	5.60	80.90	
6/13/2012	4736	5.50	80.80	
6/13/2012	4831	5.40	81.30	
6/14/2012	4925	5.30	79.50	
6/14/2012	5114	5.10	79.70	
6/14/2012	5302	5.40	78.80	
6/14/2012	4019	5.20	79.70	
6/14/2012	5209	5.10	80.30	
6/14/2012	5396	5.30	80.70	
6/14/2012	5490	5.10	79.80	
6/14/2012	5552	5.50	80.20	
6/14/2012	5648	7.30	82.80	
6/14/2012	5743	7.40	81.80	
6/14/2012	5837	7.30	81.20	
6/14/2012	5932	7.20	81.20	
6/14/2012	5994	6.60	89.60	
6/14/2012	6057	6.30	89.70	
6/14/2012	6152	6.50	89.00	
6/15/2012	6247	5.40	86.40	
6/15/2012	6342	5.30	87.20	
6/15/2012	6436	5.30	91.10	
6/15/2012	6531	5.40	92.90	
6/15/2012	6594	4.90	82.40	
6/15/2012	6657	4.70	78.30	
6/15/2012	6753	4.50	77.10	
6/15/2012	6780	4.20		

Company: COG Operating, LLC (Concho)

Lease/Well: SKELLY/No. 673



Rig Name: SILVER OAK #8

State/County: NEW MEXICO/EDDY

Latitude: 32.83

GRID North is 0.26 Degrees East of True North

VS-Azi: 0.00 Degrees



Depth Reference : RKB= 17' ELEVATION= 3596'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: e-line gyro_ed.ut

Minimum Curvature Method

Report Date/Time: 6/14/2012 / 09:47

Vaughn Energy Services

Conway, Arkansas

501-730-0602

Surveyor: Andy Jackson

Skelly No. 673 / API 30-015-40093

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W 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	****
100.00	0.83	145.35	100.00	-0.59	0.41	0.72	145.35	0.83
200.00	1.41	141.03	199.98	-2.14	1.59	2.67	143.36	0.59
300.00	2.16	134.94	299.93	-4.43	3.70	5.77	140.13	0.77
400.00	2.73	120.10	399.84	-6.95	7.09	9.93	134.44	0.85
500.00	3.11	118.18	499.71	-9.43	11.54	14.90	129.24	0.40
600.00	3.23	111.76	599.55	-11.75	16.55	20.30	125.38	0.37
700.00	2.85	110.24	699.41	-13.66	21.51	25.48	122.42	0.39
800.00	2.46	112.13	799.31	-15.33	25.83	30.04	120.69	0.40
900.00	1.85	118.85	899.23	-16.92	29.24	33.78	120.06	0.66
1000.00	1.55	123.25	999.19	-18.44	31.79	36.75	120.12	0.33
1100.00	1.03	129.21	1099.16	-19.75	33.62	38.99	120.44	0.53
1200.00	1.12	129.82	1199.15	-20.95	35.07	40.85	120.86	0.09
1300.00	0.76	108.43	1299.13	-21.79	36.45	42.46	120.87	0.50
1400.00	0.97	80.28	1399.12	-21.85	37.91	43.75	119.96	0.47
1500.00	0.78	78.31	1499.11	-21.57	39.41	44.92	118.70	0.19
1600.00	0.89	77.01	1599.10	-21.26	40.83	46.03	117.51	0.11
1700.00	1.00	77.43	1699.09	-20.89	42.44	47.30	116.21	0.12
1800.00	0.84	79.98	1799.07	-20.58	44.01	48.59	115.06	0.17

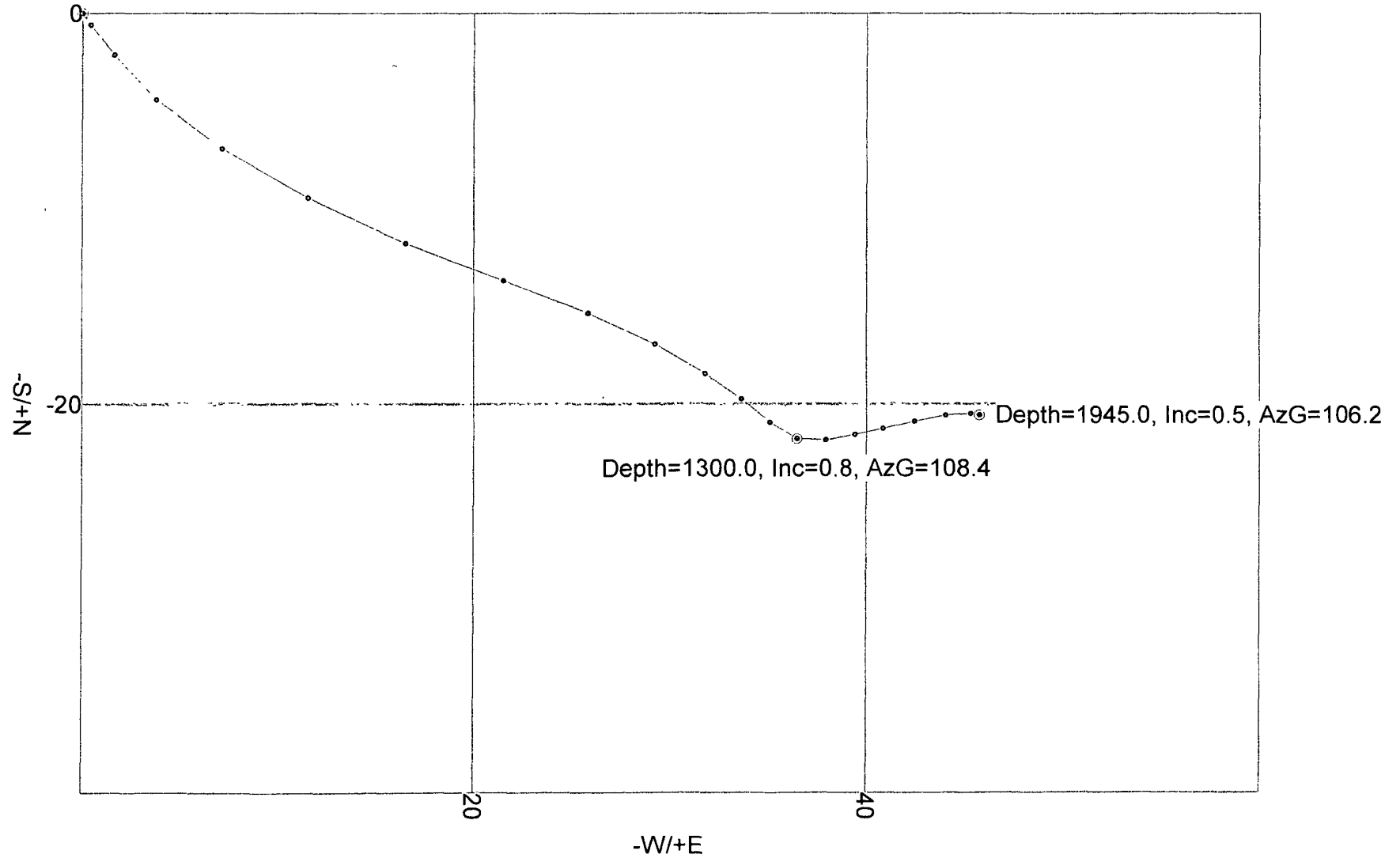
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.61	94.07	1899.07	-20.49	45.27	49.69	114.35	0.29
1945.00	0.53	106.25	1944.06	-20.56	45.71	50.12	114.22	0.33



Vaughn Energy Services
Conway, Arkansas
501-730-0602
Surveyor: Andy Jackson
Skelly No. 673 / API 30-015-40093



Depth=0.0, Inc=0.0, AzG=0.0



VES Survey Date: 06/09/2012