

Results of Directional Survey

API number:	30-005-27976		
OGRID:		Operator:	COG OPERATING LLC
		Property:	ANDROMEDA 14 FEDERAL COM # 2H

surface	ULSTR:	H	14	T 15S	R 31E
				1980 FNL	850 FEL

BH Loc	ULSTR:	E	14	T 15S	R 31E
12698	MD	8766.1	TVD	1986 FNL	4922 FEL

Top Perf/OH	ULSTR:	H	14	T 15S	R 31E
9132	MD	8852.2	TVD	1970 FNL	1363 FEL

Bot Perf/OH	ULSTR:	E	14	T 15S	R 31E
12362	MD	8790.5	TVD	1982 FNL	4587 FEL

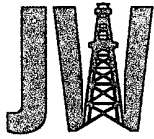
	MD	N/S	E/W	VD
	9109	12.07	-490.37	8849.57
TOP PERFS/OH	9132	10.40	-513.15	8852.24
	9141	9.75	-522.06	8853.29
	12331	-1.16	-3705.68	8791.49
BOT PERFS/OH	12362	-1.52	-3736.66	8790.49
	12362	-1.52	-3736.66	8790.49

NEXT TO LAST	12616	-4.92	-3989.99	8772.84
LAST READING	12622	-4.98	-3995.97	8772.35
TD	12698	-5.74	-4071.72	8766.14

Surface Location	1980	FN	850	FE
Projected BHL	1986	FN	4922	FE
Location of				
Top Perfs/OH	1970	FN	1363	FE
Bottom Perfs/OH	1982	FN	4587	FE

SUMMARY of Subsurface Locations

Surface Location	H-14-15S-31E	1980	FN	850	FE	Vert. Depth
Top Perfs/OH	H-14-15S-31E	1970	FN	1363	FE	8852.24
Bottom Perfs/OH	E-14-15S-31E	1982	FN	4587	FE	8790.49
Projected TD	E-14-15S-31E	1986	FN	4922	FE	8766.14



DRILLING INC. Oil Well Drilling Contractor

Post Office Box 160 Artesia, New Mexico 88211-0160 Office (575) 748-8704 Fax (575) 748-8719

October 4, 2010

COG Operating
550 W. Texas, Suite 1300
Midland, Texas 79701

Re: Andromeda Fed #2 H
Sec. 14, T-15-S, R-31-E
Chaves County, New Mexico

Attn: John Coffman

The following is a Deviation Survey on the referenced well in Chaves County, New Mexico:

257' - 0.25°	4914' - 1°
383' - 1°	5317' - 1°
656' - 1.25°	5727' - 1.25°
965' - 1°	6032' - 0.75°
1625' - 1°	6499' - 1°
1936' - 1°	6871' - 0.75°
2217' - 0.75°	6877' - 1°
2499' - 1.75°	7337' - 0.75°
2874' - 1°	7839' - 1°
3247' - 1.75°	
3589' - 1.25°	
4129' - 1°	
4418' - 1.25°	
4576' - 1°	

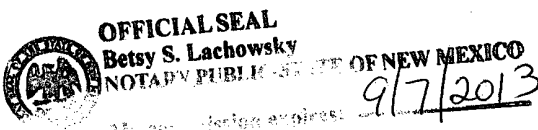
SUR @ H-14-15s-31e, 1980/N & 850/E
BHL @ E-14-15s-31e, 1986/N & 4922/E
API # 30-005-27976

Sincerely,

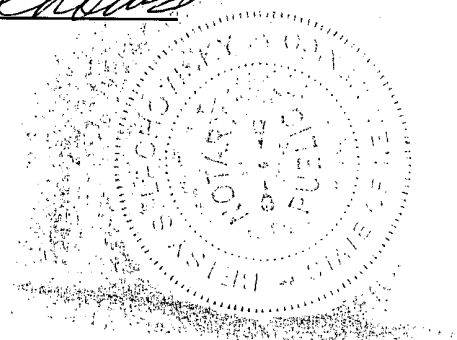
Gary W. Chappell
Contracts Manager

STATE OF NEW MEXICO)
COUNTY OF EDDY)

The foregoing was acknowledged before me this 4th day of October, 2010 by Gary W. Chappell.
MY COMMISSION EXPIRES



NOTARY PUBLIC



COG OPERATING

Wildcat

Chaves County, NM

Andromeda "14" Federal Com #2

VH - Job #32K0910733

SUR @ H-14-15s-31e, 1980/N & 850/E
BHL @ E-14-15s-31e, 1986/N & 4922/E
API # 30-005-27976

Survey: Actual

SDI Standard Survey Report

13 October, 2010

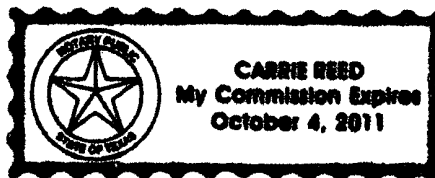
This survey is correct to the best of my knowledge and is supported by actual field data.

Richard

Notorized this date 13th of October, 2010.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING	Local Co-ordinate Reference:	Well Andromeda "14" Federal Com #2
Project:	Wildcat	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Chaves County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Andromeda "14" Federal Com #2	North Reference:	Grid
Wellbore:	VH - Job #32K0910733	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0910733	Database:	EDM-Regulatory

Project	Wildcat		
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		

Well	Andromeda "14" Federal Com #2, Directional (Pathfinder)				
Well Position	+N/-S	0.0 usft	Northing:	734,423.57 usft	Latitude: 33° 1' 4.070 N
	+E/-W	0.0 usft	Easting:	667,621.59 usft	Longitude: 103° 47' 11.350 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level: 0.0 usft

Wellbore	VH - Job #32K0910733				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2010	9/29/2009	8.02	60.94	49,316

Design	VH - Job #32K0910733				
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	269.48	

Survey Program	Date	10/13/2010			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	7,948.0	Actual (VH - Job #32K0910733)	Keeper	Keeper Gyro	

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0	
100.0	0.12	317.45	100.0	0.1	-0.1	317.45	0.1	
200.0	0.07	202.03	200.0	0.1	-0.2	300.69	0.2	
300.0	0.31	214.13	300.0	-0.2	-0.3	241.67	0.4	
400.0	0.52	242.76	400.0	-0.6	-0.9	235.51	1.1	
500.0	0.51	248.32	500.0	-1.0	-1.7	240.04	2.0	
600.0	0.60	244.07	600.0	-1.4	-2.6	242.00	2.9	
700.0	0.63	250.70	700.0	-1.8	-3.6	243.46	4.0	
800.0	0.53	249.14	800.0	-2.1	-4.5	244.78	5.0	
900.0	0.63	248.51	900.0	-2.5	-5.5	245.45	6.0	
1,000.0	0.56	256.72	1,000.0	-2.8	-6.5	246.47	7.1	
1,100.0	0.54	239.60	1,100.0	-3.2	-7.3	246.69	8.0	
1,200.0	0.53	232.15	1,200.0	-3.7	-8.1	245.57	8.9	
1,300.0	0.40	236.18	1,300.0	-4.2	-8.8	244.60	9.7	
1,400.0	0.32	227.05	1,400.0	-4.6	-9.3	243.85	10.3	
1,500.0	0.01	220.47	1,500.0	-4.7	-9.5	243.39	10.6	
1,600.0	0.14	30.64	1,600.0	-4.7	-9.4	243.73	10.5	

Scientific Drilling International, Inc.
SDI Standard Survey Report

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Project:	Wildcat	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Chaves County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Andromeda "14" Federal Com #2	North Reference:	Grid
Wellbore:	VH - Job #32K0910733	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0910733	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,700.0	0.24	22.11	1,700.0	-4.4	-9.3	244.88	10.3
1,800.0	0.38	34.15	1,799.9	-3.9	-9.0	246.70	9.8
1,900.0	0.65	31.74	1,899.9	-3.1	-8.5	249.88	9.1
2,000.0	0.93	35.87	1,999.9	-2.0	-7.8	255.64	8.0
2,100.0	1.35	51.50	2,099.9	-0.6	-6.4	264.65	6.4
2,200.0	1.92	56.99	2,199.9	1.1	-4.0	284.59	4.2
2,300.0	1.94	58.47	2,299.8	2.8	-1.2	337.36	3.1
2,400.0	1.93	49.98	2,399.8	4.8	1.5	17.78	5.1
2,500.0	1.65	45.84	2,499.7	6.9	3.9	29.26	7.9
2,600.0	1.40	45.11	2,599.7	8.8	5.8	33.33	10.5
2,700.0	1.22	46.31	2,699.7	10.4	7.4	35.53	12.7
2,800.0	0.99	48.37	2,799.6	11.7	8.8	37.06	14.6
2,900.0	0.89	48.44	2,899.6	12.8	10.0	38.20	16.2
3,000.0	0.77	51.94	2,999.6	13.7	11.2	39.16	17.7
3,100.0	0.69	48.39	3,099.6	14.5	12.1	39.91	18.9
3,200.0	0.66	38.93	3,199.6	15.4	12.9	40.13	20.1
3,300.0	0.52	39.79	3,299.6	16.2	13.6	40.09	21.1
3,400.0	0.27	26.24	3,399.6	16.7	14.0	39.94	21.8
3,500.0	0.28	22.92	3,499.6	17.1	14.2	39.61	22.3
3,600.0	0.22	36.03	3,599.6	17.5	14.4	39.40	22.7
3,700.0	0.14	3.49	3,699.6	17.8	14.5	39.19	23.0
3,800.0	0.20	352.25	3,799.6	18.1	14.5	38.70	23.2
3,900.0	0.25	318.54	3,899.6	18.4	14.3	37.87	23.4
4,000.0	0.23	317.16	3,999.6	18.7	14.1	36.86	23.4
4,100.0	0.24	336.18	4,099.6	19.1	13.8	35.93	23.6
4,200.0	0.53	327.60	4,199.6	19.7	13.5	34.47	23.9
4,300.0	0.54	325.51	4,299.6	20.4	13.0	32.42	24.2
4,400.0	0.58	333.82	4,399.6	21.3	12.5	30.41	24.7
4,500.0	0.57	328.72	4,499.6	22.2	12.0	28.45	25.2
4,600.0	0.56	325.88	4,599.6	23.0	11.5	26.53	25.7
4,700.0	0.49	312.08	4,699.6	23.7	10.9	24.69	26.1
4,800.0	0.47	301.78	4,799.6	24.2	10.2	22.91	26.3
4,900.0	0.48	295.34	4,899.5	24.6	9.5	21.12	26.4
5,000.0	0.53	296.92	4,999.5	25.0	8.7	19.22	26.5
5,100.0	0.57	300.38	5,099.5	25.4	7.9	17.18	26.6
5,200.0	0.47	297.74	5,199.5	25.9	7.1	15.28	26.8
5,300.0	0.55	292.87	5,299.5	26.3	6.3	13.42	27.0
5,400.0	0.57	295.74	5,399.5	26.7	5.4	11.40	27.2
5,500.0	0.52	300.41	5,499.5	27.1	4.5	9.50	27.5
5,600.0	0.55	298.68	5,599.5	27.6	3.7	7.70	27.8
5,700.0	0.43	313.55	5,699.5	28.1	3.0	6.17	28.2
5,800.0	0.54	307.51	5,799.5	28.6	2.4	4.77	28.7
5,900.0	0.50	312.12	5,899.5	29.2	1.7	3.31	29.2
6,000.0	0.58	310.54	5,999.5	29.8	1.0	1.88	29.8

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING	Local Co-ordinate Reference:	Well Andromeda "14" Federal Com #2
Project:	Wildcat	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Chaves County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Andromeda "14" Federal Com #2	North Reference:	Grid
Wellbore:	VH - Job #32K0910733	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0910733	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
6,100.0	0.56	306.45	6,099.5	30.4	0.2	0.38	30.4
6,200.0	0.61	308.29	6,199.5	31.0	-0.6	358.88	31.0
6,300.0	0.59	317.82	6,299.5	31.8	-1.4	357.53	31.8
6,400.0	0.64	310.16	6,399.5	32.5	-2.1	356.22	32.6
6,500.0	0.71	315.82	6,499.5	33.3	-3.0	354.85	33.4
6,600.0	0.70	312.37	6,599.5	34.2	-3.9	353.51	34.4
6,700.0	0.56	313.82	6,699.5	34.9	-4.7	352.35	35.2
6,800.0	0.59	324.86	6,799.5	35.7	-5.3	351.49	36.1
6,900.0	0.67	319.12	6,899.4	36.5	-6.0	350.64	37.0
7,000.0	0.70	316.95	6,999.4	37.4	-6.8	349.67	38.0
7,100.0	0.81	321.82	7,099.4	38.4	-7.7	348.71	39.2
7,200.0	0.66	324.47	7,199.4	39.4	-8.4	347.92	40.3
7,300.0	0.57	334.96	7,299.4	40.4	-9.0	347.45	41.3
7,400.0	0.47	325.92	7,399.4	41.2	-9.4	347.09	42.2
7,500.0	0.43	8.79	7,499.4	41.9	-9.6	347.08	42.9
7,600.0	0.40	45.16	7,599.4	42.5	-9.3	347.66	43.5
7,700.0	0.48	70.96	7,699.4	42.9	-8.7	348.59	43.7
7,800.0	0.63	81.37	7,799.4	43.1	-7.7	349.85	43.8
7,900.0	0.57	74.18	7,899.4	43.3	-6.7	351.22	43.8
7,948.0	0.66	72.19	7,947.4	43.4	-6.2	351.88	43.9



COG Operating LLC

Chaves County

Andromeda "14" Federal Com

#2H

OH

SUR @ H-14-15s-31e, 1980/N & 850/E
BHL @ E-14-15s-31e, 1986/N & 4922/E
API # 30-005-27976

Survey: MWD #1

Pathfinder X & Y Survey Report

11 November, 2010

PATHFINDER®

A Schlumberger Company



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Chaves County	TVD Reference:	RKBtoGL-19' @ 4394.00ft (Original Well Elev)
Site:	Andromeda "14" Federal Com	MD Reference:	RKBtoGL-19' @ 4394.00ft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Midland Database

Project	Chaves County		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Andromeda "14" Federal Com		
Site Position:		Northing:	734,444.600 ft
From:	Map	Easting:	708,956.800 ft
Position Uncertainty:	0.00 ft	Slot Radius:	"
		Latitude:	33° 1' 4.042 N
		Longitude:	103° 47' 11.334 W
		Grid Convergence:	0.30 °

Well	#2H		
Well Position	+N/-S	0.00 ft	Northing: 734,444.600 ft
	+E/-W	0.00 ft	Easting: 708,956.800 ft
Position Uncertainty	0.00 ft		Latitude: 33° 1' 4.042 N
		Wellhead Elevation:	ft
			Longitude: 103° 47' 11.334 W
			Ground Level: 4,375.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	09/30/10	7.82	60.92	49,167

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	269.48	



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Chaves County	TVD Reference:	RKBtoGL-19' @ 4394.00ft (Original Well Elev)
Site:	Andromeda "14" Federal Com	MD Reference:	RKBtoGL-19' @ 4394.00ft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Midland Database

Survey Program		Date 11/11/10			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	7,948.00	GYRO (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
7,991.00	12,698.00	MWD #1 (OH)	MWD	MWD - Standard	

Survey											
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)	
7,948.00	0.66	72.19	7,947.39	3,553.39	43.45	-6.20	5.80	0.00	734,488.05	708,950.60	
7,991.00	0.44	70.94	7,990.39	3,596.39	43.58	-5.81	5.41	0.51	734,488.18	708,950.99	
8,023.00	0.53	81.49	8,022.39	3,628.39	43.64	-5.54	5.15	0.40	734,488.24	708,951.26	
8,055.00	0.53	80.35	8,054.39	3,660.39	43.69	-5.25	4.86	0.03	734,488.29	708,951.55	
8,087.00	0.53	83.29	8,086.39	3,692.39	43.73	-4.96	4.56	0.08	734,488.33	708,951.84	
8,119.00	0.53	84.45	8,118.39	3,724.39	43.76	-4.66	4.27	0.03	734,488.36	708,952.14	
8,150.00	0.62	87.98	8,149.38	3,755.38	43.78	-4.35	3.96	0.31	734,488.38	708,952.45	
8,182.00	0.79	80.76	8,181.38	3,787.38	43.82	-3.96	3.57	0.60	734,488.42	708,952.84	
8,214.00	0.79	75.19	8,213.38	3,819.38	43.91	-3.53	3.13	0.24	734,488.51	708,953.27	
8,246.00	0.70	80.70	8,245.38	3,851.38	44.00	-3.13	2.73	0.36	734,488.60	708,953.67	
8,278.00	0.88	85.18	8,277.37	3,883.37	44.05	-2.69	2.29	0.59	734,488.65	708,954.11	
8,310.00	0.44	299.82	8,309.37	3,915.37	44.14	-2.55	2.15	3.96	734,488.74	708,954.25	
8,342.00	3.52	278.30	8,341.35	3,947.35	44.34	-3.63	3.23	9.73	734,488.94	708,953.17	
8,374.00	6.60	275.04	8,373.22	3,979.22	44.64	-6.43	6.03	9.66	734,489.24	708,950.37	
8,406.00	9.85	272.51	8,404.89	4,010.89	44.92	-11.00	10.59	10.22	734,489.52	708,945.80	
8,438.00	13.28	272.39	8,436.23	4,042.23	45.20	-17.41	17.00	10.72	734,489.80	708,939.39	
8,470.00	16.88	271.21	8,467.13	4,073.13	45.45	-25.73	25.32	11.29	734,490.05	708,931.07	
8,502.00	20.49	270.75	8,497.44	4,103.44	45.62	-35.98	35.56	11.29	734,490.22	708,920.82	
8,534.00	23.74	270.68	8,527.08	4,133.08	45.77	-48.02	47.61	10.16	734,490.37	708,908.78	
8,566.00	26.82	268.06	8,556.01	4,162.01	45.60	-61.68	61.27	10.24	734,490.20	708,895.12	
8,598.00	30.60	264.33	8,584.07	4,190.07	44.55	-77.01	76.60	13.07	734,489.15	708,879.79	



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Chaves County
Site: Andromeda "14" Federal Com
Well: #2H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #2H
TVD Reference: RKBtoGL-19' @ 4394.00ft (Original Well Elev)
MD Reference: RKBtoGL-19' @ 4394.00ft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Survey											
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)	
8,630.00	34.38	263.01	8,611.06	4,217.06	42.65	-94.09	93.70	12.02	734,487.25	708,862.71	
8,662.00	37.81	263.45	8,636.91	4,242.91	40.43	-112.81	112.43	10.75	734,485.03	708,843.99	
8,694.00	40.89	263.27	8,661.66	4,267.66	38.08	-132.96	132.61	9.63	734,482.68	708,823.84	
8,726.00	44.67	264.02	8,685.14	4,291.14	35.68	-154.55	154.22	11.92	734,480.28	708,802.25	
8,758.00	48.19	265.71	8,707.19	4,313.19	33.62	-177.64	177.33	11.65	734,478.22	708,779.16	
8,790.00	51.09	266.84	8,727.91	4,333.91	32.04	-201.97	201.67	9.45	734,476.64	708,754.83	
8,822.00	53.64	267.41	8,747.45	4,353.45	30.77	-227.28	226.99	8.09	734,475.37	708,729.52	
8,854.00	55.93	266.83	8,765.90	4,371.90	29.45	-253.39	253.11	7.31	734,474.05	708,703.41	
8,886.00	58.12	267.20	8,783.32	4,389.32	28.06	-280.19	279.93	6.91	734,472.66	708,676.61	
8,917.00	61.38	266.34	8,798.93	4,404.93	26.54	-306.93	306.67	10.79	734,471.14	708,649.87	
8,949.00	66.21	265.34	8,813.06	4,419.06	24.46	-335.55	335.32	15.35	734,469.06	708,621.25	
8,981.00	72.55	266.13	8,824.32	4,430.32	22.24	-365.40	365.19	19.95	734,466.84	708,591.40	
9,013.00	77.91	265.19	8,832.48	4,438.48	19.89	-396.25	396.05	16.99	734,464.49	708,560.55	
9,045.00	79.23	264.74	8,838.82	4,444.82	17.14	-427.49	427.32	4.35	734,461.74	708,529.31	
9,077.00	80.11	265.36	8,844.56	4,450.56	14.42	-458.85	458.70	3.35	734,459.02	708,497.95	
9,109.00	81.87	266.11	8,849.57	4,455.57	12.07	-490.37	490.24	5.97	734,456.67	708,466.43	
9,141.00	84.77	265.52	8,853.29	4,459.29	9.75	-522.06	521.95	9.25	734,454.35	708,434.74	
9,175.00	85.74	264.08	8,856.10	4,462.10	6.68	-555.81	555.72	5.09	734,451.28	708,400.99	
9,207.00	85.82	264.71	8,858.46	4,464.46	3.56	-587.57	587.51	1.98	734,448.16	708,369.23	
9,239.00	86.00	264.47	8,860.74	4,466.74	0.56	-619.34	619.31	0.94	734,445.16	708,337.46	
9,271.00	86.61	264.85	8,862.80	4,468.80	-2.42	-651.14	651.13	2.24	734,442.18	708,305.66	
9,303.00	87.67	265.31	8,864.40	4,470.40	-5.16	-682.98	683.00	3.61	734,439.44	708,273.82	
9,335.00	88.46	265.84	8,865.48	4,471.48	-7.62	-714.87	714.90	2.97	734,436.98	708,241.93	
9,367.00	89.34	266.39	8,866.10	4,472.10	-9.79	-746.79	746.84	3.24	734,434.81	708,210.01	
9,399.00	91.19	266.74	8,865.95	4,471.95	-11.71	-778.73	778.80	5.88	734,432.89	708,178.07	
9,431.00	92.15	266.62	8,865.02	4,471.02	-13.56	-810.66	810.75	3.02	734,431.04	708,146.14	
9,463.00	91.54	267.56	8,863.98	4,469.98	-15.19	-842.60	842.70	3.50	734,429.41	708,114.20	



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9,495.00	91.10	268.17	8,863.25	4,469.25	-16.38	-874.57	874.68	2.35	734,428.22	708,082.23	
9,527.00	91.10	268.08	8,862.63	4,468.63	-17.42	-906.55	906.67	0.28	734,427.18	708,050.25	
9,559.00	91.80	267.84	8,861.82	4,467.82	-18.56	-938.52	938.65	2.31	734,426.04	708,018.28	
9,591.00	91.19	268.22	8,860.99	4,466.99	-19.66	-970.49	970.62	2.25	734,424.94	707,986.31	
9,623.00	90.84	268.74	8,860.42	4,466.42	-20.51	-1,002.47	1,002.61	1.96	734,424.09	707,954.33	
9,655.00	91.19	268.17	8,859.86	4,465.86	-21.37	-1,034.45	1,034.60	2.09	734,423.23	707,922.35	
9,686.00	91.45	268.54	8,859.14	4,465.14	-22.26	-1,065.43	1,065.59	1.46	734,422.34	707,891.37	
9,718.00	90.92	270.12	8,858.48	4,464.48	-22.64	-1,097.42	1,097.58	5.21	734,421.96	707,859.38	
9,750.00	90.04	270.27	8,858.21	4,464.21	-22.53	-1,129.42	1,129.58	2.79	734,422.07	707,827.38	
9,782.00	90.66	270.43	8,858.02	4,464.02	-22.33	-1,161.42	1,161.57	2.00	734,422.27	707,795.38	
9,814.00	90.84	271.08	8,857.60	4,463.60	-21.91	-1,193.41	1,193.56	2.11	734,422.69	707,763.39	
9,846.00	89.87	271.59	8,857.40	4,463.40	-21.17	-1,225.40	1,225.54	3.42	734,423.43	707,731.40	
9,878.00	90.66	271.97	8,857.25	4,463.25	-20.17	-1,257.39	1,257.52	2.74	734,424.43	707,699.41	
9,910.00	91.36	272.44	8,856.69	4,462.69	-18.94	-1,289.36	1,289.48	2.63	734,425.66	707,667.44	
9,942.00	91.10	273.49	8,856.00	4,462.00	-17.29	-1,321.31	1,321.41	3.38	734,427.31	707,635.49	
9,974.00	90.66	273.47	8,855.51	4,461.51	-15.34	-1,353.24	1,353.33	1.38	734,429.26	707,603.56	
10,006.00	91.01	273.46	8,855.04	4,461.04	-13.41	-1,385.18	1,385.25	1.09	734,431.19	707,571.62	
10,038.00	90.75	274.28	8,854.55	4,460.55	-11.25	-1,417.10	1,417.15	2.69	734,433.35	707,539.70	
10,070.00	89.87	274.66	8,854.38	4,460.38	-8.76	-1,449.01	1,449.03	3.00	734,435.84	707,507.79	
10,102.00	90.84	274.23	8,854.18	4,460.18	-6.28	-1,480.91	1,480.91	3.32	734,438.32	707,475.89	
10,134.00	90.57	274.90	8,853.78	4,459.78	-3.73	-1,512.81	1,512.78	2.26	734,440.87	707,443.99	
10,166.00	89.87	275.12	8,853.66	4,459.66	-0.94	-1,544.68	1,544.63	2.29	734,443.66	707,412.12	
10,198.00	89.25	275.75	8,853.91	4,459.91	2.10	-1,576.54	1,576.45	2.76	734,446.70	707,380.26	
10,230.00	89.60	276.24	8,854.23	4,460.23	5.44	-1,608.36	1,608.24	1.88	734,450.04	707,348.44	
10,262.00	89.25	276.45	8,854.55	4,460.55	8.97	-1,640.16	1,640.01	1.28	734,453.57	707,316.64	
10,294.00	89.52	276.04	8,854.89	4,460.89	12.45	-1,671.97	1,671.79	1.53	734,457.05	707,284.83	
10,325.00	89.52	275.55	8,855.15	4,461.15	15.58	-1,702.81	1,702.60	1.58	734,460.18	707,253.99	



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Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
10,357.00	89.08	275.46	8,855.54	4,461.54	18.65	-1,734.66	1,734.42	1.40	734,463.25	707,222.14
10,389.00	89.08	275.79	8,856.06	4,462.06	21.79	-1,766.50	1,766.23	1.03	734,466.39	707,190.30
10,421.00	89.69	275.18	8,856.40	4,462.40	24.85	-1,798.35	1,798.05	2.70	734,469.45	707,158.45
10,453.00	90.57	273.85	8,856.33	4,462.33	27.37	-1,830.25	1,829.93	4.98	734,471.97	707,126.55
10,486.00	91.10	273.44	8,855.85	4,461.85	29.46	-1,863.18	1,862.84	2.03	734,474.06	707,093.62
10,517.00	92.07	273.18	8,854.99	4,460.99	31.25	-1,894.12	1,893.76	3.24	734,475.85	707,062.68
10,549.00	90.57	271.94	8,854.25	4,460.25	32.68	-1,926.08	1,925.70	6.08	734,477.28	707,030.72
10,581.00	90.75	272.37	8,853.88	4,459.88	33.89	-1,958.05	1,957.66	1.46	734,478.49	706,998.75
10,613.00	92.24	272.41	8,853.05	4,459.05	35.22	-1,990.01	1,989.61	4.66	734,479.82	706,966.79
10,645.00	91.54	272.01	8,851.99	4,457.99	36.45	-2,021.97	2,021.56	2.52	734,481.05	706,934.83
10,677.00	91.10	271.93	8,851.26	4,457.26	37.55	-2,053.94	2,053.52	1.40	734,482.15	706,902.86
10,709.00	91.80	271.83	8,850.45	4,456.45	38.60	-2,085.92	2,085.48	2.21	734,483.20	706,870.88
10,742.00	93.12	272.40	8,849.03	4,455.03	39.82	-2,118.86	2,118.41	4.36	734,484.42	706,837.94
10,774.00	93.03	271.46	8,847.31	4,453.31	40.90	-2,150.80	2,150.34	2.95	734,485.50	706,806.00
10,805.00	93.74	271.54	8,845.48	4,451.48	41.71	-2,181.73	2,181.27	2.30	734,486.31	706,775.07
10,838.00	93.21	270.93	8,843.48	4,449.48	42.42	-2,214.66	2,214.19	2.45	734,487.02	706,742.14
10,870.00	93.39	270.34	8,841.64	4,447.64	42.77	-2,246.61	2,246.13	1.92	734,487.37	706,710.19
10,902.00	93.74	269.32	8,839.65	4,445.65	42.67	-2,278.55	2,278.07	3.36	734,487.27	706,678.25
10,934.00	93.83	268.85	8,837.54	4,443.54	42.16	-2,310.47	2,310.00	1.49	734,486.76	706,646.33
10,964.00	93.47	268.90	8,835.63	4,441.63	41.58	-2,340.41	2,339.93	1.21	734,486.18	706,616.39
10,996.00	93.74	268.58	8,833.62	4,439.62	40.87	-2,372.34	2,371.87	1.31	734,485.47	706,584.46
11,028.00	93.12	268.40	8,831.70	4,437.70	40.03	-2,404.27	2,403.80	2.02	734,484.63	706,552.53
11,060.00	93.30	268.10	8,829.91	4,435.91	39.06	-2,436.20	2,435.75	1.09	734,483.66	706,520.60
11,092.00	92.68	267.82	8,828.24	4,434.24	37.92	-2,468.14	2,467.69	2.13	734,482.52	706,488.66
11,124.00	92.95	267.24	8,826.67	4,432.67	36.54	-2,500.07	2,499.63	2.00	734,481.14	706,456.73
11,156.00	93.91	266.44	8,824.76	4,430.76	34.78	-2,531.96	2,531.54	3.90	734,479.38	706,424.84
11,187.00	93.39	265.73	8,822.78	4,428.78	32.67	-2,562.83	2,562.43	2.84	734,477.27	706,393.97



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11,218.00	92.59	265.68	8,821.17	4,427.17	30.35	-2,593.70	2,593.32	2.59	734,474.95	706,363.10
11,250.00	92.95	265.54	8,819.62	4,425.62	27.90	-2,625.57	2,625.21	1.21	734,472.50	706,331.23
11,282.00	91.98	266.58	8,818.24	4,424.24	25.71	-2,657.46	2,657.12	4.44	734,470.31	706,299.34
11,343.00	90.92	267.90	8,816.70	4,422.70	22.77	-2,718.37	2,718.05	2.77	734,467.37	706,238.43
11,375.00	92.07	268.10	8,815.86	4,421.86	21.66	-2,750.34	2,750.03	3.65	734,466.26	706,206.46
11,407.00	92.07	267.99	8,814.71	4,420.71	20.56	-2,782.30	2,782.00	0.34	734,465.16	706,174.50
11,439.00	92.15	267.86	8,813.53	4,419.53	19.41	-2,814.25	2,813.96	0.48	734,464.01	706,142.55
11,471.00	92.15	267.96	8,812.33	4,418.33	18.24	-2,846.21	2,845.93	0.31	734,462.84	706,110.59
11,503.00	92.07	267.90	8,811.15	4,417.15	17.09	-2,878.17	2,877.90	0.31	734,461.69	706,078.63
11,533.00	91.01	267.86	8,810.35	4,416.35	15.98	-2,908.14	2,907.87	3.54	734,460.58	706,048.66
11,564.00	91.36	268.08	8,809.70	4,415.70	14.88	-2,939.11	2,938.85	1.33	734,459.48	706,017.69
11,599.00	91.63	268.12	8,808.79	4,414.79	13.72	-2,974.08	2,973.83	0.78	734,458.32	705,982.72
11,631.00	91.01	268.01	8,808.05	4,414.05	12.64	-3,006.05	3,005.81	1.97	734,457.24	705,950.75
11,664.00	91.01	268.26	8,807.47	4,413.47	11.56	-3,039.03	3,038.80	0.76	734,456.16	705,917.77
11,697.00	90.84	268.28	8,806.94	4,412.94	10.57	-3,072.01	3,071.79	0.52	734,455.17	705,884.79
11,727.00	91.01	268.48	8,806.46	4,412.46	9.72	-3,101.99	3,101.78	0.87	734,454.32	705,854.81
11,759.00	90.84	268.46	8,805.94	4,411.94	8.87	-3,133.98	3,133.77	0.53	734,453.47	705,822.82
11,793.00	91.19	268.71	8,805.34	4,411.34	8.03	-3,167.96	3,167.76	1.26	734,452.63	705,788.84
11,824.00	91.63	268.89	8,804.57	4,410.57	7.38	-3,198.95	3,198.75	1.53	734,451.98	705,757.85
11,855.00	92.07	268.86	8,803.57	4,409.57	6.77	-3,229.92	3,229.73	1.42	734,451.37	705,726.88
11,888.00	92.33	268.93	8,802.31	4,408.31	6.13	-3,262.89	3,262.70	0.82	734,450.73	705,693.91
11,915.00	92.95	269.11	8,801.06	4,407.06	5.67	-3,289.86	3,289.67	2.39	734,450.27	705,666.94
11,949.00	91.89	268.47	8,799.63	4,405.63	4.95	-3,323.82	3,323.64	3.64	734,449.55	705,632.98
11,980.00	91.63	268.77	8,798.67	4,404.67	4.21	-3,354.80	3,354.62	1.28	734,448.81	705,602.00
12,012.00	90.92	268.81	8,797.96	4,403.96	3.53	-3,386.78	3,386.61	2.22	734,448.13	705,570.02
12,044.00	91.01	269.10	8,797.42	4,403.42	2.95	-3,418.77	3,418.61	0.95	734,447.55	705,538.03
12,076.00	91.36	269.04	8,796.76	4,402.76	2.43	-3,450.76	3,450.60	1.11	734,447.03	705,506.04



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12,108.00	91.36	268.99	8,796.00	4,402.00	1.88	-3,482.75	3,482.59	0.16	734,446.48	705,474.05	
12,140.00	91.01	268.95	8,795.34	4,401.34	1.30	-3,514.74	3,514.58	1.10	734,445.90	705,442.06	
12,172.00	90.84	269.14	8,794.82	4,400.82	0.77	-3,546.73	3,546.58	0.80	734,445.37	705,410.07	
12,204.00	90.66	269.17	8,794.41	4,400.41	0.30	-3,578.72	3,578.57	0.57	734,444.90	705,378.08	
12,236.00	90.92	269.50	8,793.96	4,399.96	-0.07	-3,610.72	3,610.57	1.31	734,444.53	705,346.08	
12,268.00	90.92	269.43	8,793.45	4,399.45	-0.37	-3,642.71	3,642.56	0.22	734,444.23	705,314.09	
12,299.00	92.15	269.14	8,792.62	4,398.62	-0.76	-3,673.70	3,673.55	4.08	734,443.84	705,283.10	
12,331.00	91.89	269.43	8,791.49	4,397.49	-1.16	-3,705.68	3,705.53	1.22	734,443.44	705,251.12	
12,362.00	91.80	269.21	8,790.49	4,396.49	-1.52	-3,736.66	3,736.52	0.77	734,443.08	705,220.14	
12,394.00	92.86	269.20	8,789.19	4,395.19	-1.97	-3,768.63	3,768.49	3.31	734,442.63	705,188.17	
12,425.00	93.03	269.16	8,787.60	4,393.60	-2.41	-3,799.58	3,799.45	0.56	734,442.19	705,157.22	
12,457.00	94.62	269.32	8,785.47	4,391.47	-2.83	-3,831.51	3,831.38	4.99	734,441.77	705,125.29	
12,489.00	94.79	269.26	8,782.84	4,388.84	-3.23	-3,863.40	3,863.27	0.56	734,441.37	705,093.40	
12,521.00	94.09	269.35	8,780.36	4,386.36	-3.62	-3,895.30	3,895.17	2.21	734,440.98	705,061.50	
12,552.00	94.97	269.19	8,777.91	4,383.91	-4.01	-3,926.20	3,926.07	2.88	734,440.59	705,030.60	
12,584.00	94.35	269.12	8,775.32	4,381.32	-4.48	-3,958.09	3,957.97	1.95	734,440.12	704,998.71	
12,616.00	94.53	269.31	8,772.84	4,378.84	-4.92	-3,989.99	3,989.87	0.82	734,439.68	704,966.81	
12,622.00	94.88	269.50	8,772.35	4,378.35	-4.98	-3,995.97	3,995.85	6.63	734,439.62	704,960.83	
12,698.00	94.88	269.50	8,765.88	4,371.88	-5.64	-4,071.69	4,071.58	0.00	734,438.96	704,885.11	

BHL-12698.00°MD,94.88°INC,269.50°AZI, 8765.88°TVD, 4071.58°VS, -5.64°N, -4071.69°E - And14fedcom#2H_BHL



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Chaves County
Site: Andromeda "14" Federal Com
Well: #2H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #2H
TVD Reference: RKBtoGL-19' @ 4394.00ft (Original Well Elev)
MD Reference: RKBtoGL-19' @ 4394.00ft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
And14fedcom#2H_BH - survey misses target center by 66.53ft at 12698.00ft MD (8765.88 TVD, -5.64 N, -4071.69 E) - Point	0.00	0.00	8,815.72	-37.09	-4,102.56	734,407.510	704,854.240	33° 1' 3.883 N	103° 47' 59.518 W

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
12,698.00	8,765.88	-5.64	-4,071.69	BHL-12698.00MD,94.88°INC,269.50°AZI, 8765.88'TVD, 4071.58'VS, -1

Checked By: _____ Approved By: _____ Date: _____

Additional data for EC transaction #99404 that would not fit on the form

32. Additional remarks, continued

Frac Port @ 10,773
Packer @ 10,909
Frac Port @ 11,128
Packer @ 11,225
Frac Port @ 11,447
Packer @ 11,543
Frac Port @ 11,723
Packer @ 11,863
Frac Port @ 12,042
Packer @ 12,182
Frac Port @ 12,362
Packer @ 12,502
Anchor @ 12,557
POP @ 12,604
10/25/10 Acidize 12 ports w/ 38,000 gals 15% acid, 16,000 gals 2% KCL acid.
Frac w/ 1,482,390 gals gel, 1,581,134# 30/50 Ottawa sand.
11/23/10 TIH w/230jts 2-7/8 J55 6.5# tbg. EOT @ 7,800.
11/24/10 RIH w/ 2-1/2x2x20 RHTC pump. Hang on well.