

Results of Directional Survey

API number:	30-005-29049		
OGRID:		Operator:	COG OPERATING, LLC
		Property:	HERCULES FEDERAL COM # 2

surface	ULSTR:	D	15	T 15S	R 31E
				660 FNL	430 FWL

BH Loc	ULSTR:	A	15	T 15S	R 31E
13106	MD	8804.6	TVD	308 FNL	4990 FWL

Top Perf/OH	ULSTR:	D	15	T 15S	R 31E
9228	MD	8784.9	TVD	595 FNL	1126 FWL

Bot Perf/OH	ULSTR:	A	15	T 15S	R 31E
12620	MD	8804.0	TVD	365 FNL	4507 FWL

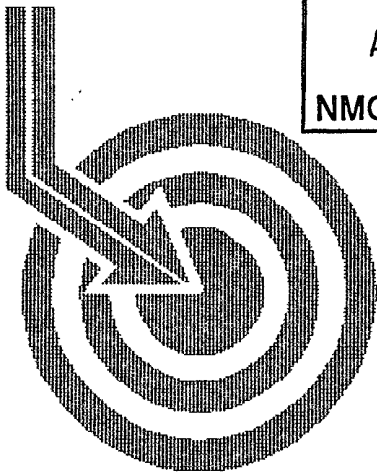
	MD	N/S	E/W	VD
	9216	64.55	683.56	8785.53
TOP PERFS/OH	9228	64.73	695.54	8784.93
	9248	65.03	715.51	8783.94
	12596	292.35	4053.30	8803.81
BOT PERFS/OH	12620	294.94	4077.16	8803.97
	12627	295.70	4084.12	8804.02

NEXT TO LAST	12995	339.71	4449.47	8804.35
LAST READING	13018	342.32	4472.32	8804.40
TD	13106	352.31	4559.75	8804.59

Surface Location	660	FN	430	FW
Projected BHL	308	FN	4990	FW
Location of				
Top Perfs/OH	595	FN	1126	FW
Bottom Perfs/OH	365	FN	4507	FW

SUMMARY of Subsurface Locations

Surface Location	D-15-15S-31E	660	FN	430	FW	Vert. Depth
Top Perfs/OH	D-15-15S-31E	595	FN	1126	FW	8784.93
Bottom Perfs/OH	A-15-15S-31E	365	FN	4507	FW	8803.97
Projected TD	A-15-15S-31E	308	FN	4990	FW	8804.59



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COG RESOURCES

Field: Wildcat
Site: Chaves County, NM
Well: Hercules Federal Com #2H
Wellpath: VH - Job #32K0510318
Survey: 05/03/10

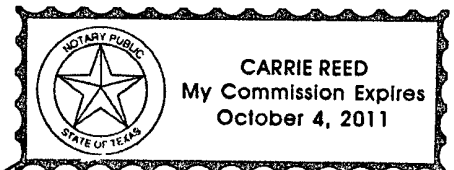
SUR @ D-15-15S-31E, 660/N & 430/W
BHL @ A-15-15S-31E, 308/N & 4990/W
API # 30-005-29049

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

Robert
Company Representative

Notarized this date 2nd of June, 2010.

Carrie Reed
Notary Signature
County of Midland
State of Texas





Scientific Drilling International, Inc.

Survey Report

Company: COG RESOURCES	Date: 5/8/2010	Time: 11:13:22	Page: 1
Field: Wildcat	Co-ordinate(NE) Reference:	Site: Chaves County, NM, Grid North	
Site: Chaves County, NM	Vertical (TVD) Reference:	SITE 0.0	
Well: Hercules Federal Com #2H	Section (VS) Reference:	Well (0.00N,0.00E,8 02Azi)	
Wellpath: VH - Job #32K0510318	Survey Calculation Method:	Minimum Curvature	Db: Sybase

Survey: 05/03/10	Start Date: 5/3/2010
Company: KSRG 0'-8916'	
Tool: Scientific Drilling Internatio	Engineer: Sutherland w/Express
Keeper, Keeper Gyro	Tied-to: From Surface

Survey

MD ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	ClsD ft	ClsA deg
0.0	0.00	359.00	0.0	0.0	0.0	0.0	0.00	0.0	0.00
100.0	0.91	341.17	100.0	0.7	0.8	-0.3	0.91	0.8	341.17
200.0	1.04	347.53	200.0	2.3	2.4	-0.7	0.17	2.5	343.48
300.0	0.94	341.13	300.0	3.8	4.1	-1.2	0.15	4.2	343.89
400.0	0.68	346.97	400.0	5.1	5.4	-1.6	0.27	5.6	343.82
500.0	0.83	335.29	499.9	6.3	6.6	-2.0	0.21	6.9	343.20
600.0	0.73	339.38	599.9	7.5	7.9	-2.5	0.11	8.3	342.22
700.0	0.85	336.17	699.9	8.7	9.2	-3.1	0.13	9.7	341.57
800.0	0.90	335.07	799.9	9.9	10.6	-3.7	0.05	11.2	340.75
900.0	0.79	335.81	899.9	11.2	11.9	-4.3	0.11	12.7	340.13
1000.0	0.84	334.77	999.9	12.4	13.2	-4.9	0.05	14.1	339.64
1100.0	0.93	339.72	1099.9	13.7	14.6	-5.5	0.12	15.6	339.42
1200.0	0.81	347.50	1199.9	15.1	16.1	-5.9	0.17	17.1	339.77
1300.0	0.87	335.79	1299.9	16.4	17.5	-6.4	0.18	18.6	339.90
1400.0	0.80	327.42	1399.9	17.6	18.7	-7.1	0.14	20.0	339.31
1500.0	0.82	340.63	1499.8	18.7	20.0	-7.7	0.19	21.4	338.97
1600.0	0.60	355.42	1599.8	19.9	21.2	-8.0	0.28	22.6	339.40
1700.0	0.57	341.63	1699.8	20.8	22.2	-8.2	0.14	23.6	339.79
1800.0	0.71	333.07	1799.8	21.8	23.2	-8.6	0.17	24.8	339.66
1900.0	0.94	354.77	1899.8	23.1	24.6	-9.0	0.38	26.2	339.97
2000.0	1.62	36.27	1999.8	25.1	26.5	-8.2	1.11	27.8	342.83
2100.0	1.73	38.40	2099.7	27.7	28.9	-6.4	0.13	29.6	347.45
2200.0	1.45	39.20	2199.7	30.1	31.0	-4.7	0.28	31.4	351.41
2300.0	1.29	38.41	2299.7	32.1	32.9	-3.2	0.16	33.0	354.46
2400.0	1.19	36.63	2399.7	34.0	34.6	-1.9	0.11	34.7	356.91
2500.0	1.21	32.66	2499.6	35.9	36.3	-0.7	0.09	36.3	358.93
2600.0	1.13	34.53	2599.6	37.7	38.0	0.4	0.09	38.0	0.68
2700.0	1.20	38.28	2699.6	39.5	39.7	1.7	0.10	39.7	2.39
2800.0	1.13	36.10	2799.6	41.3	41.3	2.9	0.08	41.4	4.00
2900.0	1.09	43.66	2899.6	42.9	42.8	4.1	0.15	43.0	5.51
3000.0	0.98	52.30	2999.5	44.3	44.0	5.5	0.19	44.3	7.07
3100.0	1.10	68.00	3099.5	45.4	44.9	7.0	0.31	45.4	8.90
3200.0	0.73	66.50	3199.5	46.2	45.5	8.5	0.37	46.3	10.59
3300.0	0.67	67.73	3299.5	46.8	45.9	9.6	0.06	46.9	11.83
3400.0	0.42	59.73	3399.5	47.4	46.4	10.5	0.26	47.5	12.74
3500.0	0.38	54.36	3499.5	47.8	46.7	11.1	0.05	48.0	13.32
3600.0	0.36	39.81	3599.5	48.3	47.2	11.5	0.10	48.6	13.75
3700.0	0.12	35.17	3699.5	48.7	47.5	11.8	0.24	48.9	13.95
3800.0	0.18	332.12	3799.5	48.9	47.7	11.8	0.16	49.2	13.87
3900.0	0.27	329.27	3899.5	49.2	48.1	11.6	0.09	49.4	13.56
4000.0	0.35	325.97	3999.5	49.6	48.5	11.3	0.08	49.8	13.11
4100.0	0.22	327.80	4099.5	50.0	48.9	11.0	0.13	50.2	12.70
4200.0	0.26	332.35	4199.5	50.3	49.3	10.8	0.04	50.5	12.38
4300.0	0.27	335.01	4299.5	50.7	49.7	10.6	0.02	50.8	12.06
4400.0	0.23	78.49	4399.5	51.0	50.0	10.7	0.39	51.1	12.10
4500.0	0.41	356.73	4499.5	51.4	50.4	10.9	0.44	51.5	12.20
4600.0	0.26	11.34	4599.5	52.0	50.9	10.9	0.17	52.1	12.09
4700.0	0.30	31.99	4699.5	52.4	51.4	11.1	0.11	52.6	12.19
4800.0	0.33	47.69	4799.5	52.9	51.8	11.4	0.09	53.0	12.46



Scientific Drilling International, Inc.

Survey Report

Company: COG RESOURCES	Date: 5/8/2010	Time: 11:13:22	Page: 2
Field: Wildcat	Co-ordinate(NE) Reference:	Site: Chaves County, NM, Grid North	
Site: Chaves County, NM	Vertical (TVD) Reference:	SITE 0.0	
Well: Hercules Federal Com #2H	Section (VS) Reference:	Well (0.00N,0.00E,8.02Azi)	
Wellpath: VH - Job #32K0510318	Survey Calculation Method:	Minimum Curvature	Db: Sybase

Survey

MD ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	ClsD ft	ClsA deg
4900.0	0.32	31.62	4899.5	53.4	52.2	11.8	0.09	53.5	12.74
5000.0	0.26	143.94	4999.5	53.5	52.3	12.1	0.48	53.7	13.02
5100.0	0.29	161.93	5099.5	53.1	51.9	12.3	0.09	53.3	13.34
5200.0	0.40	163.42	5199.5	52.5	51.3	12.5	0.11	52.8	13.67
5300.0	0.43	186.52	5299.5	51.8	50.6	12.5	0.17	52.1	13.92
5400.0	0.47	185.65	5399.5	51.0	49.8	12.5	0.04	51.3	14.04
5500.0	0.44	196.12	5499.5	50.3	49.0	12.3	0.09	50.5	14.09
5600.0	0.52	232.46	5599.5	49.6	48.4	11.8	0.31	49.8	13.75
5700.0	0.45	208.54	5699.5	48.9	47.8	11.3	0.21	49.1	13.30
5800.0	0.49	227.71	5799.5	48.2	47.1	10.8	0.16	48.3	12.89
5900.0	0.60	246.57	5899.4	47.6	46.6	10.0	0.21	47.7	12.09
6000.0	0.71	249.51	5999.4	47.0	46.2	8.9	0.11	47.1	10.94
6100.0	0.70	256.35	6099.4	46.5	45.8	7.8	0.08	46.5	9.60
6200.0	0.83	267.47	6199.4	46.1	45.7	6.4	0.20	46.1	8.03
6300.0	0.64	253.50	6299.4	45.7	45.5	5.2	0.26	45.8	6.50
6400.0	0.58	256.47	6399.4	45.3	45.2	4.2	0.07	45.4	5.25
6500.0	0.48	260.10	6499.4	45.0	45.0	3.2	0.11	45.1	4.13
6600.0	0.62	273.41	6599.4	44.8	45.0	2.3	0.19	45.0	2.92
6700.0	0.51	272.70	6699.4	44.8	45.0	1.3	0.11	45.0	1.67
6800.0	0.63	271.49	6799.4	44.7	45.1	0.3	0.12	45.1	0.40
6900.0	0.75	281.52	6899.4	44.6	45.2	-0.9	0.17	45.2	358.89
7000.0	0.51	273.24	6999.4	44.6	45.4	-2.0	0.26	45.4	357.52
7100.0	0.49	284.71	7099.4	44.6	45.5	-2.8	0.10	45.6	356.45
7200.0	0.46	287.22	7199.4	44.8	45.7	-3.6	0.04	45.9	355.48
7300.0	0.45	287.62	7299.4	44.9	46.0	-4.4	0.01	46.2	354.56
7400.0	0.18	270.31	7399.4	44.9	46.1	-4.9	0.28	46.3	353.92
7500.0	0.10	90.07	7499.4	44.9	46.1	-5.0	0.28	46.3	353.84
7600.0	0.17	126.31	7599.4	44.9	46.0	-4.8	0.11	46.2	354.08
7700.0	0.55	123.12	7699.4	44.6	45.6	-4.2	0.38	45.8	354.68
7800.0	0.30	128.12	7799.4	44.3	45.2	-3.6	0.25	45.4	355.40
7900.0	0.26	118.62	7899.4	44.0	44.9	-3.2	0.06	45.1	355.88
8000.0	0.24	92.62	7999.4	44.0	44.8	-2.8	0.11	44.9	356.39
8100.0	0.47	53.98	8099.4	44.3	45.1	-2.3	0.32	45.1	357.10
8200.0	0.70	57.38	8199.4	45.0	45.6	-1.4	0.23	45.6	358.19
8300.0	0.98	71.08	8299.3	45.8	46.2	-0.1	0.34	46.2	359.86
8400.0	0.98	77.83	8399.3	46.4	46.7	1.5	0.12	46.7	1.88
8500.0	0.61	93.83	8499.3	46.8	46.8	2.9	0.43	46.9	3.54
8600.0	0.71	115.28	8599.3	46.6	46.5	4.0	0.26	46.7	4.90
8700.0	0.82	120.44	8699.3	46.2	45.9	5.2	0.13	46.2	6.42
8800.0	0.39	152.17	8799.3	45.6	45.2	5.9	0.53	45.6	7.48
8900.0	0.25	133.39	8899.3	45.2	44.8	6.3	0.17	45.2	7.96
8916.0	0.26	136.05	8915.3	45.2	44.7	6.3	0.10	45.2	8.03



SUR @ D-15-15S-31E, 660/N & 430/W
BHL @ A-15-15S-31E, 308/N & 4990/W
API # 30-005-29049

COG Operating LLC

Chaves County
Hercules Federal Com #2H
Hercules Federal Com #2H
Original Hole

Survey: ST01

Pathfinder X & Y Survey Report

28 May, 2010

PATHFINDER

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Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC	Local Co-ordinate Reference: Well Hercules Federal Com #2H
Project: Chaves County	TVD Reference: EST RKB @ 4407.00ft
Site: Hercules Federal Com #2H	MD Reference: EST RKB @ 4407.00ft
Well: Hercules Federal Com #2H	North Reference: Grid
Wellbore: Original Hole	Survey Calculation Method: Minimum Curvature
Design: Original Hole	Database: Midland Database

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

Site: Hercules Federal Com #2H			
Site Position:	Northing: 735,381.591 ft	Latitude: 33° 1' 13.778 N	
From: Map	Easting: 699,661.278 ft	Longitude: 103° 49' 0.450 W	
Position Uncertainty: 0.00 ft	Slot Radius: "	Grid Convergence: 0.28 °	

Well: Hercules Federal Com #2H			
Well Position +N/-S 0.00 ft	Northing: 735,381.591 ft	Latitude: 33° 1' 13.778 N	
+E/-W 0.00 ft	Easting: 699,661.278 ft	Longitude: 103° 49' 0.450 W	
Position Uncertainty 0.00 ft	Wellhead Elevation: ft	Ground Level: 4,407.00 ft	

Wellbore: Original Hole					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	04/23/2010	7.89	60.93	49,208

Design: Original Hole				
Audit Notes:				
Version: 1 0	Phase: ACTUAL	Tie On Depth: 0.00		
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	85 66



Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC
Project: Chaves County
Site: Hercules Federal Com #2H
Well: Hercules Federal Com #2H
Wellbore: Original Hole
Design: Original Hole

Local Co-ordinate Reference: Well Hercules Federal Com #2H
TVD Reference: EST RKB @ 4407.00ft
MD Reference: EST RKB @ 4407.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Survey Program		Date	05/28/2010		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	8,100.00	GYRO (Original Hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	
8,138.00	9,378.00	MWD #1 (Original Hole)	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)
	8,100.00	0.47	53.70	8,099.36	3,692.36	45.04	-2.50	0.91	0.00	735,426.63	699,658.77
	8,138.00	1.58	62.08	8,137.35	3,730.35	45.38	-1.92	1.52	2.94	735,426.97	699,659.36
	8,169.00	4.48	70.30	8,168.31	3,761.31	45.99	-0.40	3.08	9.44	735,427.58	699,660.88
	8,201.00	6.07	69.22	8,200.17	3,793.17	47.01	2.36	5.91	4.98	735,428.60	699,663.64
	8,233.00	6.60	73.73	8,231.97	3,824.97	48.12	5.71	9.33	2.27	735,429.72	699,666.99
	8,259.00	7.12	86.17	8,257.79	3,850.79	48.65	8.75	12.41	6.04	735,430.24	699,670.03
	8,291.00	9.06	93.92	8,289.47	3,882.47	48.61	13.24	16.88	6.94	735,430.20	699,674.52
	8,323.00	11.70	95.49	8,320.94	3,913.94	48.13	18.99	22.57	8.30	735,429.72	699,680.27
	8,355.00	14.25	93.61	8,352.12	3,945.12	47.57	26.15	29.67	8.08	735,429.16	699,687.43
	8,387.00	16.62	91.32	8,382.97	3,975.97	47.22	34.66	38.13	7.65	735,428.81	699,695.93
	8,419.00	19.35	89.76	8,413.40	4,006.40	47.13	44.53	47.97	8.66	735,428.72	699,705.81
	8,451.00	22.25	88.87	8,443.31	4,036.31	47.28	55.90	59.31	9.12	735,428.87	699,717.17
	8,483.00	25.32	88.14	8,472.59	4,065.59	47.62	68.79	72.20	9.64	735,429.21	699,730.07
	8,515.00	28.58	87.61	8,501.11	4,094.11	48.16	83.29	86.69	10.22	735,429.75	699,744.56
	8,547.00	32.71	86.60	8,528.64	4,121.64	48.99	99.57	102.99	13.01	735,430.58	699,760.85
	8,579.00	37.64	85.68	8,554.79	4,147.79	50.24	117.96	121.42	15.49	735,431.83	699,779.23
	8,611.00	41.59	85.91	8,579.43	4,172.43	51.73	138.30	141.82	12.35	735,433.33	699,799.58
	8,643.00	44.32	86.49	8,602.85	4,195.85	53.18	160.06	163.62	8.62	735,434.77	699,821.34
	8,674.00	46.60	87.66	8,624.59	4,217.59	54.30	182.12	185.71	7.83	735,435.89	699,843.40
	8,706.00	49.77	88.00	8,645.93	4,238.93	55.20	205.95	209.54	9.94	735,436.79	699,867.23
	8,738.00	53.29	88.26	8,665.83	4,258.83	56.02	230.99	234.57	11.02	735,437.61	699,892.27



Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC
Project: Chaves County
Site: Hercules Federal Com #2H
Well: Hercules Federal Com #2H
Wellbore: Original Hole
Design: Original Hole

Local Co-ordinate Reference: Well Hercules Federal Com #2H
TVD Reference: EST RKB @ 4407.00ft
MD Reference: EST RKB @ 4407.00ft
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)
8,770.00	56.81	87.88	8,684.16	4,277.16	56.90	257.20	260.77	11.04	735,438.49	699,918.48
8,802.00	59.88	87.49	8,700.95	4,293.95	58.00	284.41	287.99	9.65	735,439.59	699,945.69
8,834.00	62.78	87.51	8,716.30	4,309.30	59.23	312.46	316.04	9.06	735,440.82	699,973.74
8,866.00	65.77	88.15	8,730.19	4,323.19	60.32	341.26	344.85	9.52	735,441.91	700,002.54
8,898.00	69.64	88.79	8,742.33	4,335.33	61.11	370.85	374.42	12.23	735,442.70	700,032.13
8,930.00	72.63	89.35	8,752.67	4,345.67	61.60	401.13	404.64	9.49	735,443.19	700,062.41
8,962.00	75.36	89.66	8,761.50	4,354.50	61.86	431.88	435.33	8.58	735,443.45	700,093.16
8,994.00	77.38	89.65	8,769.04	4,362.04	62.05	462.98	466.35	6.31	735,443.64	700,124.26
9,025.00	79.49	89.49	8,775.25	4,368.25	62.28	493.35	496.65	6.83	735,443.87	700,154.63
9,057.00	82.57	89.27	8,780.24	4,373.24	62.62	524.95	528.18	9.65	735,444.21	700,186.23
9,089.00	84.50	89.39	8,783.84	4,376.84	62.99	556.74	559.91	6.04	735,444.58	700,218.02
9,120.00	86.44	89.39	8,786.29	4,379.29	63.32	587.64	590.75	6.26	735,444.91	700,248.92
9,152.00	88.90	89.16	8,787.59	4,380.59	63.72	619.61	622.66	7.72	735,445.31	700,280.89
9,184.00	92.68	89.41	8,787.15	4,380.15	64.12	651.60	654.59	11.84	735,445.71	700,312.88
9,216.00	93.12	89.06	8,785.53	4,378.53	64.55	683.56	686.48	1.76	735,446.14	700,344.84
9,248.00	92.59	89.20	8,783.94	4,376.94	65.03	715.51	718.38	1.71	735,446.63	700,376.79
9,270.00	91.63	88.54	8,783.13	4,376.13	65.47	737.49	740.33	5.29	735,447.06	700,398.77
9,302.00	90.40	88.30	8,782.56	4,375.56	66.35	769.48	772.29	3.92	735,447.94	700,430.75
9,333.00	89.16	88.41	8,782.68	4,375.68	67.24	800.46	803.26	4.02	735,448.83	700,461.74
9,365.00	87.93	88.31	8,783.49	4,376.49	68.16	832.44	835.21	3.86	735,449.75	700,493.72
9,397.00	87.58	87.88	8,784.75	4,377.75	69.22	864.40	867.16	1.73	735,450.81	700,525.67
9,429.00	88.46	87.88	8,785.85	4,378.85	70.40	896.36	899.11	2.75	735,451.99	700,557.63
9,461.00	89.43	88.28	8,786.44	4,379.44	71.47	928.33	931.08	3.28	735,453.06	700,589.61
9,493.00	89.87	88.76	8,786.64	4,379.64	72.30	960.32	963.04	2.03	735,453.89	700,621.60
9,525.00	89.96	88.56	8,786.68	4,379.68	73.05	992.31	994.99	0.69	735,454.64	700,653.59
9,557.00	89.96	88.79	8,786.71	4,379.71	73.79	1,024.30	1,026.95	0.72	735,455.38	700,685.58
9,588.00	89.43	88.62	8,786.87	4,379.87	74.49	1,055.29	1,057.90	1.80	735,456.08	700,716.57



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Wellbore: Original Hole
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TVD Reference: EST RKB @ 4407.00ft
MD Reference: EST RKB @ 4407.00ft
North Reference: Grd
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)
9,620.00	89.52	88.16	8,787.16	4,380.16	75.39	1,087.28	1,089.87	1.46	735,456.98	700,748.56
9,652.00	90.04	87.88	8,787.29	4,380.29	76.49	1,119.26	1,121.84	1.85	735,458.08	700,780.54
9,684.00	90.04	88.10	8,787.27	4,380.27	77.62	1,151.24	1,153.81	0.69	735,459.21	700,812.52
9,716.00	89.78	88.13	8,787.32	4,380.32	78.67	1,183.22	1,185.78	0.82	735,460.26	700,844.50
9,747.00	88.81	88.00	8,787.70	4,380.70	79.72	1,214.20	1,216.75	3.16	735,461.31	700,875.48
9,779.00	88.64	87.58	8,788.41	4,381.41	80.95	1,246.17	1,248.72	1.42	735,462.54	700,907.45
9,811.00	89.08	87.34	8,789.05	4,382.05	82.37	1,278.13	1,280.70	1.57	735,463.96	700,939.41
9,843.00	89.25	87.15	8,789.51	4,382.51	83.90	1,310.09	1,312.69	0.80	735,465.50	700,971.37
9,875.00	89.52	87.10	8,789.86	4,382.86	85.51	1,342.05	1,344.67	0.86	735,467.10	701,003.33
9,907.00	88.90	86.55	8,790.30	4,383.30	87.28	1,374.00	1,376.66	2.59	735,468.87	701,035.28
9,939.00	88.72	86.27	8,790.96	4,383.96	89.29	1,405.93	1,408.65	1.04	735,470.88	701,067.21
9,971.00	88.90	85.86	8,791.63	4,384.63	91.48	1,437.85	1,440.65	1.40	735,473.07	701,099.12
10,003.00	89.08	85.94	8,792.19	4,385.19	93.77	1,469.76	1,472.64	0.62	735,475.36	701,131.04
10,035.00	88.46	85.85	8,792.88	4,385.88	96.06	1,501.67	1,504.63	1.96	735,477.65	701,162.95
10,067.00	88.64	85.57	8,793.69	4,386.69	98.45	1,533.57	1,536.62	1.04	735,480.04	701,194.85
10,098.00	88.81	85.36	8,794.38	4,387.38	100.90	1,564.46	1,567.61	0.87	735,482.49	701,225.74
10,130.00	89.08	85.31	8,794.97	4,387.97	103.50	1,596.35	1,599.61	0.86	735,485.09	701,257.63
10,162.00	88.81	85.10	8,795.55	4,388.55	106.18	1,628.24	1,631.60	1.07	735,487.77	701,289.51
10,194.00	88.64	84.60	8,796.27	4,389.27	109.05	1,660.10	1,663.59	1.65	735,490.64	701,321.38
10,226.00	89.08	84.04	8,796.90	4,389.90	112.22	1,691.94	1,695.58	2.23	735,493.81	701,353.21
10,258.00	89.16	83.90	8,797.39	4,390.39	115.58	1,723.75	1,727.56	0.50	735,497.17	701,385.03
10,290.00	88.81	83.45	8,797.96	4,390.96	119.10	1,755.55	1,759.53	1.78	735,500.69	701,416.83
10,322.00	88.81	83.31	8,798.63	4,391.63	122.79	1,787.33	1,791.50	0.44	735,504.38	701,448.61
10,354.00	88.99	83.50	8,799.24	4,392.24	126.47	1,819.12	1,823.47	0.82	735,508.06	701,480.39
10,386.00	88.90	83.13	8,799.83	4,392.83	130.19	1,850.89	1,855.44	1.19	735,511.78	701,512.17
10,418.00	89.34	83.05	8,800.32	4,393.32	134.04	1,882.66	1,887.40	1.40	735,515.63	701,543.94
10,450.00	89.25	83.89	8,800.71	4,393.71	137.68	1,914.45	1,919.38	2.64	735,519.27	701,575.73



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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)
10,481.00	89.60	83.88	8,801.03	4,394.03	140.98	1,945.27	1,950.36	1.13	735,522.57	701,606.55
10,513.00	91.01	83.48	8,800.86	4,393.86	144.50	1,977.07	1,982.34	4.58	735,526.09	701,638.35
10,545.00	91.98	83.83	8,800.02	4,393.02	148.04	2,008.87	2,014.31	3.22	735,529.63	701,670.14
10,577.00	92.07	84.12	8,798.89	4,391.89	151.39	2,040.67	2,046.27	0.95	735,532.99	701,701.95
10,609.00	91.10	84.83	8,798.00	4,391.00	154.47	2,072.51	2,078.25	3.76	735,536.07	701,733.79
10,641.00	90.22	84.55	8,797.64	4,390.64	157.44	2,104.37	2,110.25	2.89	735,539.03	701,765.65
10,673.00	90.84	84.41	8,797.34	4,390.34	160.51	2,136.22	2,142.24	1.99	735,542.10	701,797.50
10,705.00	91.19	84.24	8,796.77	4,389.77	163.68	2,168.06	2,174.23	1.22	735,545.27	701,829.33
10,737.00	90.84	84.17	8,796.21	4,389.21	166.91	2,199.89	2,206.21	1.12	735,548.50	701,861.17
10,768.00	90.66	83.76	8,795.80	4,388.80	170.17	2,230.71	2,237.19	1.44	735,551.76	701,891.99
10,801.00	90.75	83.62	8,795.39	4,388.39	173.79	2,263.51	2,270.17	0.50	735,555.38	701,924.79
10,832.00	90.84	83.32	8,794.96	4,387.96	177.32	2,294.31	2,301.15	1.01	735,558.91	701,955.58
10,864.00	90.40	83.28	8,794.62	4,387.62	181.05	2,326.09	2,333.12	1.38	735,562.64	701,987.36
10,896.00	90.22	83.00	8,794.45	4,387.45	184.87	2,357.86	2,365.09	1.04	735,566.46	702,019.13
10,928.00	90.57	83.40	8,794.22	4,387.22	188.66	2,389.63	2,397.06	1.66	735,570.25	702,050.91
10,960.00	90.13	83.73	8,794.03	4,387.03	192.25	2,421.43	2,429.03	1.72	735,573.84	702,082.71
10,992.00	89.96	84.24	8,794.00	4,387.00	195.60	2,453.25	2,461.02	1.68	735,577.19	702,114.53
11,023.00	89.69	84.08	8,794.10	4,387.10	198.76	2,484.09	2,492.01	1.01	735,580.35	702,145.37
11,055.00	89.25	84.74	8,794.39	4,387.39	201.87	2,515.94	2,524.00	2.48	735,583.46	702,177.22
11,087.00	88.90	84.52	8,794.91	4,387.91	204.87	2,547.79	2,555.99	1.29	735,586.46	702,209.07
11,119.00	89.43	84.32	8,795.38	4,388.38	207.98	2,579.64	2,587.98	1.77	735,589.57	702,240.92
11,151.00	89.43	84.58	8,795.70	4,388.70	211.07	2,611.49	2,619.97	0.81	735,592.66	702,272.76
11,183.00	89.16	84.83	8,796.09	4,389.09	214.03	2,643.35	2,651.96	1.15	735,595.62	702,304.62
11,215.00	89.34	85.26	8,796.51	4,389.51	216.79	2,675.22	2,683.96	1.46	735,598.38	702,336.50
11,247.00	89.34	85.27	8,796.88	4,389.88	219.43	2,707.11	2,715.96	0.03	735,601.02	702,368.39
11,279.00	89.52	84.71	8,797.20	4,390.20	222.23	2,738.99	2,747.95	1.84	735,603.82	702,400.27
11,311.00	89.60	85.22	8,797.44	4,390.44	225.03	2,770.86	2,779.95	1.61	735,606.63	702,432.14



Pathfinder
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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)
11,343.00	88.72	85.32	8,797.91	4,390.91	227.67	2,802.75	2,811.94	2.77	735,609.26	702,464.03
11,375.00	89.25	85.36	8,798.48	4,391.48	230.27	2,834.64	2,843.94	1.66	735,611.86	702,495.92
11,407.00	88.99	85.87	8,798.97	4,391.97	232.72	2,866.54	2,875.93	1.79	735,614.31	702,527.82
11,439.00	89.52	85.47	8,799.38	4,392.38	235.13	2,898.45	2,907.93	2.07	735,616.73	702,559.73
11,471.00	88.90	86.17	8,799.83	4,392.83	237.47	2,930.36	2,939.93	2.92	735,619.06	702,591.64
11,503.00	88.72	86.16	8,800.49	4,393.49	239.61	2,962.28	2,971.92	0.56	735,621.20	702,623.56
11,535.00	89.43	86.23	8,801.01	4,394.01	241.73	2,994.21	3,003.91	2.23	735,623.32	702,655.49
11,565.00	88.90	86.68	8,801.44	4,394.44	243.58	3,024.15	3,033.91	2.32	735,625.18	702,685.42
11,597.00	88.55	86.54	8,802.16	4,395.16	245.48	3,056.08	3,065.90	1.18	735,627.07	702,717.36
11,629.00	89.16	86.85	8,802.80	4,395.80	247.32	3,088.02	3,097.88	2.14	735,628.91	702,749.30
11,660.00	89.69	88.23	8,803.11	4,396.11	248.65	3,118.99	3,128.86	4.77	735,630.24	702,780.27
11,692.00	90.40	88.24	8,803.08	4,396.08	249.64	3,150.98	3,160.83	2.22	735,631.23	702,812.25
11,724.00	90.31	88.88	8,802.88	4,395.88	250.44	3,182.97	3,192.79	2.02	735,632.03	702,844.24
11,756.00	90.22	89.21	8,802.74	4,395.74	250.97	3,214.96	3,224.73	1.07	735,632.57	702,876.24
11,788.00	90.40	89.73	8,802.56	4,395.56	251.27	3,246.96	3,256.66	1.72	735,632.86	702,908.24
11,820.00	90.22	89.93	8,802.39	4,395.39	251.37	3,278.96	3,288.58	0.84	735,632.96	702,940.24
11,852.00	89.96	89.97	8,802.34	4,395.34	251.39	3,310.96	3,320.49	0.82	735,632.98	702,972.24
11,884.00	90.48	90.23	8,802.22	4,395.22	251.34	3,342.96	3,352.39	1.82	735,632.93	703,004.24
11,916.00	89.96	90.31	8,802.09	4,395.09	251.19	3,374.96	3,384.29	1.64	735,632.78	703,036.23
11,948.00	89.87	90.07	8,802.14	4,395.14	251.08	3,406.96	3,416.19	0.80	735,632.67	703,068.23
11,980.00	89.87	89.82	8,802.21	4,395.21	251.11	3,438.96	3,448.10	0.78	735,632.70	703,100.23
12,012.00	90.31	89.15	8,802.16	4,395.16	251.40	3,470.95	3,480.03	2.50	735,632.99	703,132.23
12,044.00	90.84	88.65	8,801.84	4,394.84	252.01	3,502.95	3,511.97	2.28	735,633.60	703,164.22
12,075.00	91.19	88.41	8,801.29	4,394.29	252.81	3,533.93	3,542.93	1.37	735,634.40	703,195.21
12,106.00	90.22	87.69	8,800.91	4,393.91	253.86	3,564.91	3,573.90	3.90	735,635.45	703,226.19
12,138.00	89.60	86.75	8,800.96	4,393.96	255.41	3,596.87	3,605.89	3.52	735,637.01	703,258.15
12,168.00	89.78	86.72	8,801.12	4,394.12	257.12	3,626.82	3,635.88	0.61	735,638.71	703,288.10



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MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
12,198.00	89.43	86.87	8,801.33	4,394.33	258.80	3,656.78	3,665.87	1.27	735,640.39	703,318.05
12,229.00	89.43	86.49	8,801.64	4,394.64	260.60	3,687.72	3,696.87	1.23	735,642.19	703,349.00
12,260.00	89.96	86.16	8,801.80	4,394.80	262.58	3,718.66	3,727.87	2.01	735,644.17	703,379.94
12,290.00	89.78	85.83	8,801.87	4,394.87	264.68	3,748.58	3,757.87	1.25	735,646.27	703,409.86
12,321.00	89.43	85.87	8,802.09	4,395.09	266.92	3,779.50	3,788.86	1.14	735,648.51	703,440.78
12,351.00	89.43	85.51	8,802.38	4,395.38	269.18	3,809.42	3,818.86	1.20	735,650.77	703,470.69
12,382.00	90.04	85.38	8,802.53	4,395.53	271.64	3,840.32	3,849.86	2.01	735,653.23	703,501.60
12,413.00	89.87	85.39	8,802.55	4,395.55	274.13	3,871.22	3,880.86	0.55	735,655.72	703,532.50
12,444.00	89.43	84.69	8,802.74	4,395.74	276.81	3,902.10	3,911.86	2.67	735,658.40	703,563.38
12,474.00	89.60	84.30	8,803.00	4,396.00	279.69	3,931.96	3,941.85	1.42	735,661.28	703,593.24
12,505.00	89.52	84.02	8,803.23	4,396.23	282.84	3,962.80	3,972.84	0.94	735,664.44	703,624.08
12,535.00	89.52	83.86	8,803.48	4,396.48	286.01	3,992.63	4,002.83	0.53	735,667.60	703,653.91
12,566.00	89.87	84.14	8,803.65	4,396.65	289.25	4,023.46	4,033.81	1.45	735,670.84	703,684.74
12,596.00	89.52	84.02	8,803.81	4,396.81	292.35	4,053.30	4,063.80	1.23	735,673.94	703,714.58
12,627.00	89.69	83.56	8,804.02	4,397.02	295.70	4,084.12	4,094.78	1.58	735,677.29	703,745.39
12,658.00	90.13	83.54	8,804.07	4,397.07	299.18	4,114.92	4,125.76	1.42	735,680.77	703,776.20
12,688.00	89.87	83.83	8,804.07	4,397.07	302.48	4,144.74	4,155.74	1.30	735,684.07	703,806.02
12,719.00	89.69	83.12	8,804.19	4,397.19	306.00	4,175.54	4,186.72	2.36	735,687.60	703,836.82
12,750.00	90.22	83.20	8,804.22	4,397.22	309.70	4,206.32	4,217.69	1.73	735,691.29	703,867.59
12,780.00	90.13	82.98	8,804.12	4,397.12	313.31	4,236.10	4,247.66	0.79	735,694.90	703,897.38
12,811.00	89.78	82.99	8,804.15	4,397.15	317.09	4,266.87	4,278.63	1.13	735,698.68	703,928.14
12,841.00	89.43	82.95	8,804.35	4,397.35	320.76	4,296.64	4,308.59	1.17	735,702.35	703,957.92
12,872.00	89.87	82.65	8,804.54	4,397.54	324.65	4,327.39	4,339.55	1.72	735,706.24	703,988.67
12,902.00	90.40	82.81	8,804.47	4,397.47	328.44	4,357.15	4,369.51	1.85	735,710.04	704,018.43
12,933.00	90.22	82.95	8,804.31	4,397.31	332.29	4,387.91	4,400.48	0.74	735,713.88	704,049.19
12,964.00	89.87	83.04	8,804.28	4,397.28	336.07	4,418.68	4,431.44	1.17	735,717.66	704,079.96
12,995.00	89.87	83.46	8,804.35	4,397.35	339.71	4,449.47	4,462.42	1.35	735,721.30	704,110.75



Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC
Project: Chaves County
Site: Hercules Federal Com #2H
Well: Hercules Federal Com #2H
Wellbore: Original Hole
Design: Original Hole

Local Co-ordinate Reference: Well Hercules Federal Com #2H
TVD Reference: EST RKB @ 4407.00ft
MD Reference: EST RKB @ 4407.00ft
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)
13,018.00	89.87	83.49	8,804.40	4,397.40	342.32	4,472.32	4,485.40	0.13	735,723.92	704,133.60
13,106.00	89.87	83.49	8,804.60	4,397.60	352.30	4,559.75	4,573.34	0.00	735,733.89	704,221.03

BHL-13106.00°MD,89.87°INC,83.49°AZI, 8804.60°TVD, 4573.34°VS, 352.30°N, 4559.75°E



Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC
Project: Chaves County
Site: Hercules Federal Com #2H
Well: Hercules Federal Com #2H
Wellbore: Original Hole
Design: Original Hole

Local Co-ordinate Reference: Well Hercules Federal Com #2H
TVD Reference: EST RKB @ 4407.00ft
MD Reference: EST RKB @ 4407.00ft
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
LT1 (HFC#2) - survey misses target center by 75.45ft at 9526.21ft MD (8786.68 TVD, 73.08 N, 993.52 E) - Point	0.00		8,832.50	133.00	992.11	735,514.596	700,653.384	33° 1' 15.046 N	103° 48' 48.791 W
LT6 (HFC#2) - survey misses target center by 47.13ft at 12030.04ft MD (8802.02 TVD, 251.71 N, 3488.99 E) - Point	0.00		8,838.50	281.54	3,488.78	735,663.132	703,150.061	33° 1' 16.392 N	103° 48' 19.459 W
LT2 (HFC#2) - survey misses target center by 79.66ft at 10030.49ft MD (8792.76 TVD, 95.73 N, 1497.17 E) - Point	0.00		8,835.50	162.71	1,491.44	735,544.303	701,152.720	33° 1' 15.315 N	103° 48' 42.924 W
LT4 (HFC#2) - survey misses target center by 50.68ft at 11031.69ft MD (8794.15 TVD, 199.64 N, 2492.73 E) - Point	0.00		8,839.50	222.13	2,490.11	735,603.718	702,151.390	33° 1' 15.854 N	103° 48' 31.192 W
PBHL (HFC#2) - survey misses target center by 15.42ft at 13071.75ft MD (8804.53 TVD, 348.42 N, 4525.72 E) - Point	0.00	0.00	8,790.00	343.27	4,526.34	735,724.860	704,187.620	33° 1' 16.951 N	103° 48' 7.269 W
LT7 (HFC#2) - survey misses target center by 41.77ft at 12533.45ft MD (8803.47 TVD, 285.85 N, 3991.09 E) - Point	0.00		8,836.50	311.25	3,988.12	735,692.839	703,649.397	33° 1' 16.661 N	103° 48' 13.592 W
LT5 (HFC#2) - survey misses target center by 40.88ft at 11531.56ft MD (8800.97 TVD, 241.50 N, 2990.77 E) - Point	0.00		8,840.50	251.83	2,989.45	735,633.425	702,650.726	33° 1' 16.123 N	103° 48' 25.325 W
LT8 (HFC#2) - survey misses target center by 32.83ft at 13018.00ft MD (8804.40 TVD, 342.32 N, 4472.32 E) - Point	0.00		8,833.50	340.96	4,487.45	735,722.546	704,148.732	33° 1' 16.930 N	103° 48' 7.726 W
LT3 (HFC#2) - survey misses target center by 59.77ft at 10530.93ft MD (8800.45 TVD, 146.51 N, 1994.88 E) - Point	0.00		8,838.50	192.42	1,990.78	735,574.010	701,652.055	33° 1' 15.584 N	103° 48' 37.058 W



Pathfinder
Pathfinder X & Y Survey Report



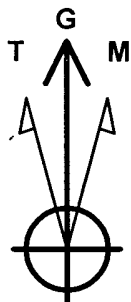
Company: COG Operating LLC
Project: Chaves County
Site: Hercules Federal Com #2H
Well: Hercules Federal Com #2H
Wellbore: Original Hole
Design: Original Hole

Local Co-ordinate Reference: Well Hercules Federal Com #2H
TVD Reference: EST RKB @ 4407.00ft
MD Reference: EST RKB @ 4407.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
13,106.00	8,804.60	352.30	4,559.75	BHL-13106.00°MD,89.87°INC,83.49°AZI, 8804.60°TVD, 4573.34°VS, 35

Checked By: _____ Approved By: _____ Date: _____



Azimuths to Grid North
True North: -0.28°
Magnetic North: 7.60°

Magnetic Field
Strength: 49207.6snT
Dip Angle: 60.93°
Date: 04/23/2010
Model: IGRF200510

PATHFINDER

WELL DETAILS: Hercules Federal Com #2H

Ground Elevation:: 4407.00
RKB Elevation: EST RKB @ 4407.00ft
Rig Name:

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	735381.591	699661.278	33° 1' 13.778 N	103° 49' 0.450 W	

Project: Chaves County

Site: Hercules Federal Com #2H

Well: Hercules Federal Com #2H

Wellbore: Original Hole

Plan: Plan #8 (Hercules Federal Com #2H/Original Hole)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	8300.00	10.48	82.34	8298.27	49.72	15.13	0.00	0.00	18.85	
2	9133.67	90.00	91.00	8790.00	53.12	605.26	9.55	8.81	607.55	
3	9348.83	90.00	85.62	8790.00	59.46	820.25	2.50	-90.00	822.40	
4	13065.77	90.00	85.62	8790.00	343.27	4526.34	0.00	0.00	4539.34	PBHL (HFC#2)

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2410.00	2410.35	Yates
3220.00	3220.49	Queen
3950.00	3950.51	San Andres D
6770.00	6770.60	Tubb
7460.00	7460.63	Abo
8660.00	8731.19	Wolfcamp

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL (HFC#2)	790.00	343.27	4526.34	735724.860	704187.620	Point

West(-)/East(+) (200 ft/in)

