



Approximate Bottom Hole Location
Margil Farms 11-2D
Lat : 40.261069
Long : -104.977548



Azimuths to True North
Magnetic North: 8.93°
Magnetic Field
Strength: 53005.0snT
Dip Angle: 66.89°
Date: 9/18/2011
Model: IGRF2010

Type	User	Target	No Target (Freehand)	Azimuth	Origin	Type	N/S	E/W	From	TVD
				356.76	Slot		0.0	0.0		0.0
Name				TVD						
Margil Farms 11-2D TGT				4740.0		+N/-S		+E/-W	Latitude	Longitude
Margil Farms 11-2D BHL				7558.0		819.7		-41.9	40.260780	-104.977480

Cathedral Energy Services

Survey Report - Geographic

Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Margil Farms 11-2D
Project:	Weld County, CO	TVD Reference:	Kbe @ 5027.0ft
Site:	Sec 2-T3N-R68W (Steffes/Margil Farms)	MD Reference:	Kbe @ 5027.0ft
Well:	Margil Farms 11-2D	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	USA EDM 5000 Multi Users DB

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		Sec 2-T3N-R68W (Steffes/Margil Farms)			
Site Position:		Northing:	1,337,438.45 ft	Latitude:	40.258480
From:	Lat/Long	Easting:	3,145,883.91 ft	Longitude:	-104.977310
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.34 °

Well	Margil Farms 11-2D					
Well Position	+N/-S	0.0 ft	Northing:	1,337,456.63 ft	Latitude:	40.258530
	+E/-W	0.0 ft	Easting:	3,145,878.22 ft	Longitude:	-104.977330
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,016.0 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/18/2011	8.93	66.89	53,005

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	356.76	

Survey Program	Date	10/5/2011			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
101.0	7,683.0	Survey #1 (OH)	MWD	Geolink MWD	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude	
0.0	0.00	0.00	0.0	0.0	0.0	1,337,456.63	3,145,878.22	40.258530	-104.977330	
101.0	0.10	236.22	101.0	0.0	-0.1	1,337,456.58	3,145,878.15	40.258530	-104.977331	
190.0	0.20	230.70	190.0	-0.2	-0.3	1,337,456.43	3,145,877.97	40.258530	-104.977331	
279.0	0.40	249.20	279.0	-0.4	-0.7	1,337,456.22	3,145,877.56	40.258529	-104.977333	
368.0	0.30	215.90	368.0	-0.7	-1.1	1,337,455.92	3,145,877.13	40.258528	-104.977334	
460.0	0.60	344.60	460.0	-0.4	-1.4	1,337,456.19	3,145,876.86	40.258529	-104.977335	
552.0	0.70	3.70	552.0	0.6	-1.5	1,337,457.21	3,145,876.76	40.258532	-104.977335	
644.0	0.40	340.60	644.0	1.5	-1.5	1,337,458.08	3,145,876.69	40.258534	-104.977336	
737.0	0.40	345.50	737.0	2.1	-1.7	1,337,458.70	3,145,876.49	40.258536	-104.977336	
828.0	0.20	178.50	828.0	2.2	-1.8	1,337,458.84	3,145,876.42	40.258536	-104.977337	
866.0	0.40	167.90	866.0	2.0	-1.8	1,337,458.65	3,145,876.45	40.258536	-104.977337	
938.0	1.20	218.60	938.0	1.2	-2.2	1,337,457.81	3,145,876.04	40.258533	-104.977338	

Cathedral Energy Services

Survey Report - Geographic

Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Margil Farms 11-2D
Project:	Weld County, CO	TVD Reference:	Kbe @ 5027.0ft
Site:	Sec 2-T3N-R68W (Steffes/Margil Farms)	MD Reference:	Kbe @ 5027.0ft
Well:	Margil Farms 11-2D	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
1,033.0	1.60	310.00	1,033.0	1.3	-3.8	1,337,457.88	3,145,874.40	40.258534	-104.977344
1,127.0	2.70	324.10	1,126.9	3.9	-6.1	1,337,460.50	3,145,872.08	40.258541	-104.977352
1,221.0	2.90	346.60	1,220.8	8.0	-8.0	1,337,464.60	3,145,870.21	40.258552	-104.977359
1,315.0	2.90	352.30	1,314.7	12.7	-8.8	1,337,469.26	3,145,869.31	40.258565	-104.977362
1,409.0	2.30	346.30	1,408.6	16.9	-9.6	1,337,473.44	3,145,868.52	40.258576	-104.977365
1,504.0	4.00	343.40	1,503.4	21.9	-11.0	1,337,478.46	3,145,867.09	40.258590	-104.977370
1,597.0	5.20	347.20	1,596.1	29.1	-12.9	1,337,485.67	3,145,865.19	40.258610	-104.977376
1,691.0	5.50	358.90	1,689.7	37.8	-13.9	1,337,494.32	3,145,864.11	40.258634	-104.977380
1,785.0	6.10	7.30	1,783.2	47.2	-13.3	1,337,503.78	3,145,864.60	40.258660	-104.977378
1,879.0	7.30	4.50	1,876.6	58.1	-12.2	1,337,514.70	3,145,865.64	40.258690	-104.977374
1,972.0	8.30	358.80	1,968.7	70.7	-11.9	1,337,527.30	3,145,865.89	40.258724	-104.977373
2,066.0	10.00	357.90	2,061.5	85.7	-12.4	1,337,542.24	3,145,865.36	40.258765	-104.977375
2,161.0	11.20	355.70	2,154.9	103.1	-13.4	1,337,559.68	3,145,864.26	40.258813	-104.977378
2,256.0	12.60	358.60	2,247.9	122.7	-14.3	1,337,579.23	3,145,863.20	40.258867	-104.977381
2,352.0	14.20	353.50	2,341.2	144.9	-15.9	1,337,601.39	3,145,861.48	40.258928	-104.977387
2,446.0	17.10	352.80	2,431.8	170.0	-18.9	1,337,626.54	3,145,858.30	40.258997	-104.977398
2,540.0	19.60	351.70	2,521.0	199.3	-22.9	1,337,655.84	3,145,854.11	40.259077	-104.977412
2,634.0	22.00	354.80	2,608.8	232.5	-26.8	1,337,688.95	3,145,850.05	40.259168	-104.977426
2,730.0	20.00	353.50	2,698.5	266.7	-30.3	1,337,723.15	3,145,846.36	40.259262	-104.977439
2,825.0	21.50	355.30	2,787.3	300.2	-33.6	1,337,756.63	3,145,842.89	40.259354	-104.977451
2,920.0	20.40	354.40	2,876.0	334.0	-36.6	1,337,790.44	3,145,839.65	40.259447	-104.977461
3,015.0	21.20	0.90	2,964.8	367.7	-37.9	1,337,824.09	3,145,838.11	40.259539	-104.977466
3,110.0	21.40	1.10	3,053.3	402.2	-37.3	1,337,858.60	3,145,838.51	40.259634	-104.977464
3,204.0	20.00	357.40	3,141.3	435.4	-37.7	1,337,891.80	3,145,837.91	40.259725	-104.977466
3,299.0	20.70	356.30	3,230.3	468.4	-39.6	1,337,924.77	3,145,835.90	40.259816	-104.977472
3,394.0	21.80	1.50	3,318.9	502.8	-40.2	1,337,959.16	3,145,835.07	40.259910	-104.977474
3,489.0	19.20	358.80	3,407.9	536.0	-40.1	1,337,992.42	3,145,835.01	40.260002	-104.977474
3,584.0	20.50	357.60	3,497.2	568.3	-41.1	1,338,024.65	3,145,833.80	40.260090	-104.977477
3,679.0	20.50	358.30	3,586.2	601.5	-42.3	1,338,057.90	3,145,832.41	40.260181	-104.977482
3,772.0	21.20	357.90	3,673.1	634.6	-43.4	1,338,090.97	3,145,831.12	40.260272	-104.977486
3,867.0	23.40	357.90	3,761.0	670.6	-44.7	1,338,126.99	3,145,829.58	40.260371	-104.977490
3,961.0	22.90	356.40	3,847.4	707.5	-46.5	1,338,163.88	3,145,827.53	40.260472	-104.977497
4,054.0	21.00	358.00	3,933.7	742.3	-48.2	1,338,198.59	3,145,825.61	40.260568	-104.977503
4,149.0	18.10	354.10	4,023.2	774.0	-50.4	1,338,230.27	3,145,823.31	40.260655	-104.977511
4,244.0	15.10	352.60	4,114.2	800.9	-53.5	1,338,257.21	3,145,820.04	40.260729	-104.977522
4,338.0	14.10	352.50	4,205.2	824.4	-56.5	1,338,280.69	3,145,816.83	40.260793	-104.977533
4,434.0	12.90	349.80	4,298.6	846.5	-60.0	1,338,302.81	3,145,813.28	40.260854	-104.977545
4,529.0	12.00	354.30	4,391.3	866.8	-62.8	1,338,323.05	3,145,810.30	40.260910	-104.977555
4,624.0	9.70	348.60	4,484.6	884.5	-65.4	1,338,340.71	3,145,807.63	40.260958	-104.977565
4,720.0	7.70	349.50	4,579.5	898.7	-68.2	1,338,354.95	3,145,804.78	40.260997	-104.977574
4,814.0	6.30	353.80	4,672.8	910.1	-69.9	1,338,366.26	3,145,803.00	40.261028	-104.977581
4,908.0	4.60	11.10	4,766.4	918.9	-69.7	1,338,375.09	3,145,803.12	40.261052	-104.977580
5,003.0	2.80	28.40	4,861.2	924.7	-67.8	1,338,380.88	3,145,804.92	40.261068	-104.977573
5,098.0	0.70	129.80	4,956.2	926.3	-66.3	1,338,382.56	3,145,806.46	40.261073	-104.977568
5,193.0	0.40	125.30	5,051.2	925.8	-65.6	1,338,382.00	3,145,807.18	40.261071	-104.977565
5,288.0	0.40	165.60	5,146.1	925.3	-65.2	1,338,381.49	3,145,807.54	40.261070	-104.977564
5,381.0	0.10	278.90	5,239.1	925.0	-65.2	1,338,381.19	3,145,807.54	40.261069	-104.977564
5,475.0	0.00	203.00	5,333.1	925.0	-65.3	1,338,381.20	3,145,807.46	40.261069	-104.977564
5,569.0	0.20	278.90	5,427.1	925.0	-65.5	1,338,381.22	3,145,807.30	40.261069	-104.977565
5,664.0	0.30	278.90	5,522.1	925.1	-65.9	1,338,381.29	3,145,806.89	40.261069	-104.977566
5,759.0	0.30	252.90	5,617.1	925.0	-66.4	1,338,381.25	3,145,806.41	40.261069	-104.977568
5,854.0	0.30	169.20	5,712.1	924.7	-66.6	1,338,380.93	3,145,806.22	40.261068	-104.977569
5,948.0	0.10	194.50	5,806.1	924.4	-66.5	1,338,380.61	3,145,806.24	40.261068	-104.977569
6,043.0	0.40	98.90	5,901.1	924.3	-66.2	1,338,380.48	3,145,806.55	40.261067	-104.977568
6,137.0	0.60	98.90	5,995.1	924.1	-65.4	1,338,380.36	3,145,807.36	40.261067	-104.977565

Cathedral Energy Services

Survey Report - Geographic

Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Margil Farms 11-2D
Project:	Weld County, CO	TVD Reference:	Kbe @ 5027.0ft
Site:	Sec 2-T3N-R68W (Steffes/Margil Farms)	MD Reference:	Kbe @ 5027.0ft
Well:	Margil Farms 11-2D	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
6,231.0	0.80	68.70	6,089.1	924.3	-64.3	1,338,380.53	3,145,808.46	40.261067	-104.977561
6,325.0	1.00	60.90	6,183.1	924.9	-63.0	1,338,381.17	3,145,809.78	40.261069	-104.977556
6,420.0	0.70	52.30	6,278.1	925.7	-61.8	1,338,381.94	3,145,810.96	40.261071	-104.977552
6,514.0	0.30	69.30	6,372.1	926.1	-61.1	1,338,382.38	3,145,811.65	40.261072	-104.977549
6,608.0	0.30	57.40	6,466.1	926.3	-60.7	1,338,382.60	3,145,812.08	40.261073	-104.977548
6,704.0	0.20	88.40	6,562.1	926.5	-60.3	1,338,382.74	3,145,812.46	40.261073	-104.977546
6,799.0	0.10	256.00	6,657.1	926.5	-60.2	1,338,382.73	3,145,812.55	40.261073	-104.977546
6,895.0	0.20	197.90	6,753.1	926.3	-60.4	1,338,382.55	3,145,812.41	40.261073	-104.977547
7,056.0	0.30	214.90	6,914.1	925.7	-60.7	1,338,381.93	3,145,812.09	40.261071	-104.977548
7,180.0	0.20	260.90	7,038.1	925.4	-61.1	1,338,381.63	3,145,811.69	40.261070	-104.977549
7,275.0	0.30	240.30	7,133.1	925.2	-61.5	1,338,381.48	3,145,811.31	40.261070	-104.977550
7,369.0	0.20	122.00	7,227.1	925.0	-61.5	1,338,381.27	3,145,811.24	40.261069	-104.977551
7,464.0	0.10	71.40	7,322.1	925.0	-61.3	1,338,381.21	3,145,811.46	40.261069	-104.977550
7,559.0	0.20	75.90	7,417.1	925.0	-61.1	1,338,381.28	3,145,811.70	40.261069	-104.977549
7,623.0	0.20	110.09	7,481.1	925.0	-60.9	1,338,381.27	3,145,811.91	40.261069	-104.977548
Last Cathedral Survey @ 7,623' MD									
7,683.0	0.20	110.10	7,541.1	924.9	-60.7	1,338,381.20	3,145,812.11	40.261069	-104.977548
Projection to Bit @ 7,683'									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
Margil Farms 11-2D TG1	0.00	0.00	4,740.0	819.7	-41.9	1,338,276.02	3,145,831.53	40.260780	-104.977480
- actual wellpath misses target center by 100.7ft at 4872.5ft MD (4731.0 TVD, 915.9 N, -70.1 E)									
- Point									
Margil Farms 11-2D BHL	0.00	0.00	7,558.0	819.7	-41.9	1,338,276.02	3,145,831.53	40.260780	-104.977480
- actual wellpath misses target center by 108.3ft at 7683.0ft MD (7541.1 TVD, 924.9 N, -60.7 E)									
- Rectangle (sides W400.0 H400.0 D0.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
7,623.0	7,481.1	925.0	-60.9	Last Cathedral Survey @ 7,623' MD	
7,683.0	7,541.1	924.9	-60.7	Projection to Bit @ 7,683'	

Checked By: _____ Approved By: _____ Date: _____