



Azimuths to True North
Magnetic North: 8.93°

Magnetic Field
Strength: 53004.6snT
Dip Angle: 66.89°
Date: 9/19/2011
Model: IGRF2010

Approximate Bottom Hole Location
Margil Farms 12-2D
Lat : 40.256971
Long : -104.977511

Type Target		Target Margil Farms 12-2D BHL		Azimuth	Origin Type	N/S	E/W	From TVD
				185.79	Slot	0.0	0.0	0.0
Name	OH							
	Margil Farms 12-2D							
	115415/114255; SC							
	KBE @ 5025.0ft (Original Well Elev)							
	Ground Elevation 5014.0							
	North American Datum 1983							
	Well Margil Farms 12-2D, True North							
		TV	+N/-S	+E/-W	Latitude	Longitude		
	Margil Farms 12-2D TGT	4500.0	-495.4	-50.2	40.257060	-104.977470		
	Margil Farms 12-2D BHL	7568.0	-495.4	-50.2	40.257060	-104.977470		

Cathedral Energy Services

Survey Report - Geographic

Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Margil Farms 12-2D
Project:	Weld County, CO	TVD Reference:	KBE @ 5025.0ft (Original Well Elev)
Site:	Sec 2-T3N-R68W (Steffes/Margil Farms)	MD Reference:	KBE @ 5025.0ft (Original Well Elev)
Well:	Margil Farms 12-2D	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 12-2D					
Well Position	+N/-S	0.0 ft	Northing:	1,337,416.62 ft	Latitude:	40.258420
	+E/-W	0.0 ft	Easting:	3,145,889.62 ft	Longitude:	-104.977290
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,014.0 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/19/2011	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	185.79	

Survey Program	Date	9/28/2011			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
101.0	7,678.0	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	1,337,416.62	3,145,889.62	40.258420	-104.977290	
101.0	1.10	95.90	101.0	-0.1	1.0	1,337,416.53	3,145,890.59	40.258420	-104.977287	
189.0	0.80	88.20	189.0	-0.2	2.4	1,337,416.47	3,145,892.04	40.258420	-104.977282	
279.0	2.10	122.00	279.0	-1.0	4.4	1,337,415.63	3,145,894.07	40.258417	-104.977274	
368.0	2.50	124.90	367.9	-3.0	7.4	1,337,413.67	3,145,897.06	40.258412	-104.977264	
460.0	0.90	348.40	459.9	-3.4	8.9	1,337,413.24	3,145,898.56	40.258411	-104.977258	
552.0	0.50	342.20	551.8	-2.3	8.7	1,337,414.33	3,145,898.29	40.258414	-104.977259	
644.0	1.20	283.80	643.8	-1.7	7.6	1,337,414.93	3,145,897.23	40.258415	-104.977263	
736.0	2.00	273.20	735.8	-1.4	5.1	1,337,415.24	3,145,894.69	40.258416	-104.977272	
828.0	1.80	288.80	827.8	-0.9	2.1	1,337,415.77	3,145,891.71	40.258418	-104.977283	
867.0	2.40	291.10	866.7	-0.4	0.7	1,337,416.26	3,145,890.37	40.258419	-104.977288	
940.0	2.60	276.60	939.7	0.4	-2.3	1,337,416.98	3,145,887.29	40.258421	-104.977299	

Cathedral Energy Services

Survey Report - Geographic

Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Margil Farms 12-2D
Project:	Weld County, CO	TVD Reference:	KBE @ 5025.0ft (Original Well Elev)
Site:	Sec 2-T3N-R68W (Steffes/Margil Farms)	MD Reference:	KBE @ 5025.0ft (Original Well Elev)
Well:	Margil Farms 12-2D	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
1,036.0	3.40	259.60	1,035.5	0.1	-7.3	1,337,416.69	3,145,882.33	40.258420	-104.977316
1,131.0	2.80	238.00	1,130.4	-1.6	-12.0	1,337,414.92	3,145,877.60	40.258416	-104.977333
1,224.0	3.00	221.00	1,223.3	-4.7	-15.6	1,337,411.86	3,145,874.10	40.258407	-104.977346
1,319.0	3.20	191.10	1,318.1	-9.1	-17.7	1,337,407.37	3,145,871.98	40.258395	-104.977354
1,414.0	2.30	197.80	1,413.0	-13.6	-18.8	1,337,402.94	3,145,870.92	40.258383	-104.977358
1,508.0	2.60	179.30	1,506.9	-17.5	-19.3	1,337,399.01	3,145,870.39	40.258372	-104.977360
1,603.0	4.00	193.60	1,601.8	-22.9	-20.1	1,337,393.63	3,145,869.67	40.258357	-104.977362
1,698.0	4.40	185.90	1,696.5	-29.7	-21.2	1,337,386.78	3,145,868.55	40.258338	-104.977366
1,792.0	5.00	194.80	1,790.2	-37.3	-22.7	1,337,379.23	3,145,867.18	40.258318	-104.977371
1,887.0	6.50	183.70	1,884.7	-46.6	-24.1	1,337,369.85	3,145,865.83	40.258292	-104.977376
1,982.0	8.80	185.70	1,978.9	-59.2	-25.1	1,337,357.24	3,145,864.84	40.258257	-104.977380
2,077.0	11.70	181.30	2,072.4	-76.1	-26.1	1,337,340.37	3,145,864.00	40.258211	-104.977384
2,172.0	10.60	178.60	2,165.6	-94.5	-26.1	1,337,322.01	3,145,864.10	40.258161	-104.977384
2,265.0	10.90	172.80	2,256.9	-111.7	-24.8	1,337,304.74	3,145,865.51	40.258113	-104.977379
2,358.0	12.00	179.10	2,348.1	-130.1	-23.5	1,337,286.36	3,145,866.87	40.258063	-104.977375
2,452.0	11.80	180.90	2,440.1	-149.5	-23.5	1,337,266.98	3,145,866.99	40.258010	-104.977375
2,546.0	12.20	183.70	2,532.0	-169.0	-24.3	1,337,247.45	3,145,866.31	40.257956	-104.977377
2,639.0	11.30	182.30	2,623.1	-187.9	-25.3	1,337,228.53	3,145,865.43	40.257904	-104.977381
2,734.0	10.10	184.20	2,716.4	-205.5	-26.3	1,337,210.92	3,145,864.55	40.257856	-104.977384
2,828.0	10.90	184.50	2,808.8	-222.6	-27.6	1,337,193.83	3,145,863.35	40.257809	-104.977389
2,923.0	11.10	186.60	2,902.1	-240.7	-29.3	1,337,175.78	3,145,861.70	40.257759	-104.977395
3,016.0	10.80	182.30	2,993.4	-258.3	-30.7	1,337,158.18	3,145,860.42	40.257711	-104.977400
3,110.0	9.40	183.00	3,085.9	-274.7	-31.5	1,337,141.71	3,145,859.76	40.257666	-104.977403
3,205.0	9.70	181.60	3,179.6	-290.5	-32.1	1,337,125.96	3,145,859.23	40.257623	-104.977405
3,299.0	8.00	185.80	3,272.5	-304.9	-33.0	1,337,111.53	3,145,858.43	40.257583	-104.977408
3,392.0	8.40	189.80	3,364.6	-318.0	-34.8	1,337,098.38	3,145,856.70	40.257547	-104.977415
3,486.0	8.20	191.40	3,457.6	-331.4	-37.3	1,337,085.03	3,145,854.28	40.257510	-104.977424
3,581.0	9.00	190.40	3,551.5	-345.3	-40.0	1,337,071.07	3,145,851.68	40.257472	-104.977433
3,676.0	10.90	191.00	3,645.1	-361.5	-43.0	1,337,054.92	3,145,848.72	40.257428	-104.977444
3,770.0	12.60	190.60	3,737.1	-380.3	-46.6	1,337,036.10	3,145,845.25	40.257376	-104.977457
3,866.0	11.90	189.70	3,830.9	-400.3	-50.2	1,337,016.03	3,145,841.78	40.257321	-104.977470
3,961.0	11.00	195.10	3,924.0	-418.7	-54.2	1,336,997.60	3,145,837.87	40.257271	-104.977485
4,056.0	8.60	193.60	4,017.6	-434.4	-58.2	1,336,981.92	3,145,833.93	40.257228	-104.977499
4,150.0	7.10	193.20	4,110.7	-446.9	-61.2	1,336,969.41	3,145,831.03	40.257193	-104.977510
4,245.0	5.80	195.00	4,205.1	-457.2	-63.8	1,336,959.05	3,145,828.51	40.257165	-104.977519
4,338.0	4.90	192.70	4,297.7	-465.6	-65.9	1,336,950.62	3,145,826.47	40.257142	-104.977526
4,431.0	4.40	195.90	4,390.4	-472.9	-67.8	1,336,943.30	3,145,824.66	40.257122	-104.977533
4,527.0	3.30	201.70	4,486.2	-479.0	-69.8	1,336,937.18	3,145,822.66	40.257105	-104.977540
4,622.0	2.80	212.70	4,581.1	-483.5	-72.0	1,336,932.68	3,145,820.43	40.257093	-104.977548
4,717.0	2.20	210.00	4,676.0	-487.1	-74.2	1,336,929.13	3,145,818.28	40.257083	-104.977556
4,812.0	1.60	195.90	4,770.9	-489.9	-75.5	1,336,926.27	3,145,817.02	40.257075	-104.977561
4,908.0	1.70	198.00	4,866.9	-492.6	-76.3	1,336,923.62	3,145,816.23	40.257068	-104.977564
5,003.0	1.10	209.40	4,961.9	-494.7	-77.2	1,336,921.48	3,145,815.36	40.257062	-104.977567
5,097.0	1.20	195.40	5,055.8	-496.4	-77.9	1,336,919.74	3,145,814.67	40.257057	-104.977569
5,192.0	0.90	201.30	5,150.8	-498.1	-78.4	1,336,918.08	3,145,814.14	40.257053	-104.977571
5,288.0	0.50	179.00	5,246.8	-499.2	-78.7	1,336,916.96	3,145,813.88	40.257050	-104.977572
5,382.0	0.50	190.30	5,340.8	-500.0	-78.8	1,336,916.15	3,145,813.82	40.257047	-104.977572
5,476.0	0.30	253.30	5,434.8	-500.5	-79.1	1,336,915.67	3,145,813.51	40.257046	-104.977574
5,571.0	0.40	190.50	5,529.8	-500.9	-79.4	1,336,915.27	3,145,813.22	40.257045	-104.977575
5,666.0	0.80	250.20	5,624.8	-501.4	-80.0	1,336,914.72	3,145,812.54	40.257044	-104.977577
5,760.0	0.80	209.10	5,718.8	-502.2	-81.0	1,336,913.92	3,145,811.61	40.257041	-104.977580
5,852.0	0.10	217.50	5,810.8	-502.9	-81.3	1,336,913.29	3,145,811.25	40.257040	-104.977582
5,947.0	0.50	196.10	5,905.8	-503.3	-81.5	1,336,912.82	3,145,811.09	40.257038	-104.977582
6,041.0	0.40	111.80	5,999.8	-503.8	-81.3	1,336,912.31	3,145,811.28	40.257037	-104.977582
6,135.0	0.80	133.50	6,093.8	-504.4	-80.5	1,336,911.74	3,145,812.06	40.257035	-104.977579

Cathedral Energy Services

Survey Report - Geographic

Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Margil Farms 12-2D
Project:	Weld County, CO	TVD Reference:	KBE @ 5025.0ft (Original Well Elev)
Site:	Sec 2-T3N-R68W (Steffes/Margil Farms)	MD Reference:	KBE @ 5025.0ft (Original Well Elev)
Well:	Margil Farms 12-2D	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
6,229.0	0.60	116.40	6,187.8	-505.1	-79.6	1,336,911.08	3,145,812.98	40.257034	-104.977576
6,324.0	1.00	149.00	6,282.8	-506.0	-78.7	1,336,910.15	3,145,813.86	40.257031	-104.977572
6,418.0	1.00	125.60	6,376.8	-507.2	-77.7	1,336,908.97	3,145,814.96	40.257028	-104.977569
6,513.0	1.10	139.40	6,471.7	-508.4	-76.4	1,336,907.81	3,145,816.23	40.257025	-104.977564
6,608.0	1.10	148.40	6,566.7	-509.8	-75.3	1,336,906.34	3,145,817.31	40.257021	-104.977560
6,702.0	1.30	161.50	6,660.7	-511.6	-74.5	1,336,904.57	3,145,818.13	40.257016	-104.977557
6,797.0	1.50	154.70	6,755.7	-513.8	-73.6	1,336,902.43	3,145,819.02	40.257010	-104.977554
6,892.0	1.80	154.80	6,850.6	-516.2	-72.5	1,336,899.96	3,145,820.20	40.257003	-104.977550
6,987.0	1.60	148.10	6,945.6	-518.7	-71.1	1,336,897.49	3,145,821.55	40.256996	-104.977545
7,082.0	2.10	149.10	7,040.5	-521.3	-69.5	1,336,894.88	3,145,823.16	40.256989	-104.977539
7,177.0	1.70	122.60	7,135.5	-523.6	-67.5	1,336,892.64	3,145,825.26	40.256983	-104.977532
7,271.0	1.60	130.00	7,229.5	-525.2	-65.3	1,336,891.06	3,145,827.45	40.256978	-104.977524
7,365.0	0.80	132.30	7,323.4	-526.5	-63.8	1,336,889.78	3,145,828.94	40.256975	-104.977519
7,460.0	0.80	139.10	7,418.4	-527.4	-62.9	1,336,888.84	3,145,829.87	40.256972	-104.977515
7,555.0	0.10	151.00	7,513.4	-528.0	-62.4	1,336,888.27	3,145,830.35	40.256971	-104.977514
7,618.0	0.40	73.80	7,576.4	-528.0	-62.1	1,336,888.29	3,145,830.59	40.256971	-104.977513
Last Cathedral Survey @ 7618' MD									
7,678.0	0.40	73.80	7,636.4	-527.9	-61.7	1,336,888.41	3,145,830.99	40.256971	-104.977511
Projection to Bit @ 7678' MD									

Design Targets									
Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude Longitude
Margil Farms 12-2D TG1	- actual wellpath misses target center by 25.3ft at 4541.1ft MD (4500.3 TVD, -479.8 N, -70.1 E)	0.00	0.00	4,500.0	-495.4	-50.2	1,336,920.91	3,145,842.31	40.257060 -104.977470
	- Point								
Margil Farms 12-2D BHL	- actual wellpath misses target center by 34.7ft at 7609.6ft MD (7568.1 TVD, -528.0 N, -62.2 E)	0.00	0.00	7,568.0	-495.4	-50.2	1,336,920.91	3,145,842.31	40.257060 -104.977470
	- Rectangle (sides W400.0 H400.0 D0.0)								

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
7,618.0	7,576.4	-528.0	-62.1	Last Cathedral Survey @ 7618' MD	
7,678.0	7,636.4	-527.9	-61.7	Projection to Bit @ 7678' MD	

Checked By: _____ Approved By: _____ Date: _____