





Cathedral Energy Services

Survey Report

Company: Caerus Oil & Gas (NAD 27)	Local Co-ordinate Reference: Well Island Ranch 24D-13
Project: Garfield County, CO	TVD Reference: KB=24' @ 5079.5usft (Patterson #303)
Site: S13-T7S-R96W (Island Ranch)	MD Reference: KB=24' @ 5079.5usft (Patterson #303)
Well: Island Ranch 24D-13	North Reference: True
Wellbore: DD	Survey Calculation Method: Minimum Curvature
Design: FINAL	Database: USA EDM 5000 Multi Users DB

Project Garfield County, CO		
Map System: US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum: NAD 1927 (NADCON CONUS)		
Map Zone: Colorado Central 502		

Site S13-T7S-R96W (Island Ranch)				
Site Position:	Northing:	593,103.71 usft	Latitude:	39.433822
From: Lat/Long	Easting:	1,275,986.01 usft	Longitude:	-108.063611
Position Uncertainty: 0.0 usft	Slot Radius: 13-3/16"		Grid Convergence:	-1.62 °

Well Island Ranch 24D-13				
Well Position	+N/-S	0.0 usft	Northing:	593,111.75 usft
	+E/-W	0.0 usft	Easting:	1,275,984.54 usft
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft
			Latitude:	39.433844
			Longitude:	-108.063617
			Ground Level:	5,055.5 usft

Wellbore DD					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/12/2014	9.99	65.59	51,913

Design FINAL				
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	139.66

Survey Program		Date 6/17/2014
From (usft)	To (usft)	Survey (Wellbore)
142.0	6,166.0	Survey #1 (DD)
		Tool Name ISCWSA MWD
		Description MWD - Standard

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
142.0	0.40	249.40	142.0	-0.2	-0.5	-0.2	0.28	0.28	
204.0	1.60	164.70	204.0	-1.1	-0.4	0.5	2.60	1.94	
265.0	2.80	159.10	264.9	-3.3	0.3	2.7	2.00	1.97	
326.0	3.90	144.30	325.8	-6.4	2.1	6.2	2.28	1.80	
387.0	5.80	142.80	386.6	-10.5	5.1	11.3	3.12	3.11	
448.0	7.40	141.20	447.2	-16.0	9.5	18.3	2.64	2.62	
570.0	10.80	139.70	567.7	-30.9	21.8	37.6	2.79	2.79	
661.0	13.70	138.80	656.6	-45.5	34.4	56.9	3.19	3.19	
753.0	15.90	138.80	745.5	-63.2	49.9	80.4	2.39	2.39	
844.0	19.10	137.90	832.3	-83.6	68.1	107.8	3.53	3.52	
970.0	21.90	138.30	950.3	-116.5	97.5	151.9	2.22	2.22	
1,073.0	21.20	140.10	1,046.1	-145.1	122.3	189.7	0.93	-0.68	

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Site:	S13-T7S-R96W (Island Ranch)	MVD Reference:	KB=24' @ 5079.5usft (Patterson #303)
Well:	Island Ranch 24D-13	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
1,168.0	24.30	137.00	1,133.7	-172.6	146.6	226.4	3.50	3.26	
1,264.0	26.20	140.30	1,220.5	-203.3	173.6	267.4	2.46	1.98	
1,359.0	29.60	137.60	1,304.5	-236.8	202.8	311.8	3.82	3.58	
1,454.0	31.50	139.60	1,386.3	-273.0	234.8	360.1	2.27	2.00	
1,549.0	30.80	137.30	1,467.6	-309.8	267.3	409.2	1.45	-0.74	
1,644.0	31.40	137.80	1,548.9	-346.0	300.5	458.2	0.69	0.63	
1,739.0	32.10	141.20	1,629.7	-384.0	332.9	508.2	2.02	0.74	
1,834.0	32.90	138.00	1,709.9	-422.9	366.0	559.2	2.00	0.84	
1,930.0	32.00	142.40	1,790.9	-462.4	399.0	610.7	2.63	-0.94	
2,025.0	33.10	140.90	1,871.0	-502.5	430.7	661.8	1.44	1.16	
2,119.0	30.60	143.10	1,950.8	-541.5	461.2	711.3	2.93	-2.66	
2,214.0	30.60	141.90	2,032.6	-579.9	490.7	759.6	0.64	0.00	
2,310.0	29.40	139.50	2,115.7	-617.0	521.1	807.6	1.77	-1.25	
2,405.0	29.80	139.10	2,198.3	-652.6	551.7	854.5	0.47	0.42	
2,500.0	28.00	139.30	2,281.5	-687.4	581.7	900.4	1.90	-1.89	
2,595.0	28.30	136.40	2,365.3	-720.6	611.7	945.2	1.47	0.32	
2,690.0	28.70	135.40	2,448.7	-753.1	643.3	990.5	0.66	0.42	
2,785.0	27.30	138.30	2,532.6	-785.6	673.8	1,035.0	2.06	-1.47	
2,880.0	26.60	136.30	2,617.3	-817.3	703.0	1,078.0	1.21	-0.74	
2,975.0	25.30	139.20	2,702.7	-848.0	730.9	1,119.5	1.91	-1.37	
3,070.0	25.40	138.90	2,788.6	-878.8	757.6	1,160.2	0.17	0.11	
3,165.0	23.40	142.40	2,875.1	-909.1	782.5	1,199.4	2.60	-2.11	
3,260.0	21.70	141.50	2,962.8	-937.8	804.9	1,235.8	1.83	-1.79	
3,355.0	19.60	138.80	3,051.7	-963.5	826.4	1,269.3	2.43	-2.21	
3,450.0	16.90	139.60	3,141.9	-986.0	845.8	1,299.1	2.85	-2.84	
3,545.0	15.20	141.90	3,233.2	-1,006.3	862.5	1,325.3	1.91	-1.79	
3,641.0	13.30	139.00	3,326.3	-1,024.6	877.5	1,348.9	2.11	-1.98	
3,736.0	11.90	137.00	3,419.0	-1,040.0	891.3	1,369.7	1.54	-1.47	
3,831.0	10.60	137.10	3,512.2	-1,053.5	903.9	1,388.2	1.37	-1.37	
3,926.0	8.80	139.00	3,605.8	-1,065.4	914.7	1,404.2	1.92	-1.89	
4,021.0	6.20	149.60	3,700.0	-1,075.3	922.0	1,416.5	3.09	-2.74	
4,116.0	4.80	144.70	3,794.5	-1,083.0	926.9	1,425.5	1.55	-1.47	
4,211.0	2.80	123.70	3,889.3	-1,087.5	931.2	1,431.7	2.53	-2.11	
4,306.0	0.70	111.50	3,984.3	-1,089.0	933.6	1,434.4	2.23	-2.21	
4,401.0	0.70	122.90	4,079.3	-1,089.6	934.6	1,435.5	0.15	0.00	
4,496.0	0.90	130.10	4,174.3	-1,090.4	935.7	1,436.8	0.24	0.21	
4,591.0	0.70	138.90	4,269.3	-1,091.3	936.7	1,438.1	0.25	-0.21	
4,686.0	0.80	157.60	4,364.2	-1,092.3	937.3	1,439.3	0.28	0.11	
4,781.0	1.20	177.20	4,459.2	-1,093.9	937.6	1,440.7	0.55	0.42	
4,875.0	0.40	151.10	4,553.2	-1,095.2	937.8	1,441.8	0.91	-0.85	
4,971.0	0.20	143.10	4,649.2	-1,095.6	938.1	1,442.3	0.21	-0.21	
5,066.0	0.40	194.60	4,744.2	-1,096.1	938.1	1,442.7	0.33	0.21	
5,161.0	1.00	192.60	4,839.2	-1,097.2	937.8	1,443.4	0.63	0.63	
5,256.0	0.50	335.10	4,934.2	-1,097.6	937.5	1,443.5	1.50	-0.53	
5,351.0	1.00	308.90	5,029.2	-1,096.7	936.6	1,442.3	0.63	0.53	
5,446.0	1.30	294.80	5,124.2	-1,095.8	935.0	1,440.5	0.43	0.32	
5,541.0	2.20	269.20	5,219.1	-1,095.3	932.2	1,438.3	1.23	0.95	
5,636.0	2.00	256.70	5,314.1	-1,095.8	928.8	1,436.4	0.52	-0.21	
5,731.0	1.50	223.00	5,409.0	-1,097.0	926.3	1,435.8	1.18	-0.53	
5,826.0	2.10	229.40	5,504.0	-1,099.1	924.1	1,436.0	0.67	0.63	
5,921.0	1.70	233.10	5,598.9	-1,101.1	921.7	1,435.9	0.44	-0.42	
6,016.0	1.90	240.40	5,693.9	-1,102.7	919.2	1,435.5	0.32	0.21	
6,111.0	2.20	232.40	5,788.8	-1,104.6	916.4	1,435.1	0.44	0.32	Last CES Survey @ 6,111' MD

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
6,166.0	2.20	232.40	5,843.8	-1,105.9	914.7	1,435.0	0.00	0.00	PTB @ 6,166'

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Island Ranch 24D-13 TC - hit/miss target - Shape	0.00	0.00	3,830.0	-1,098.5	933.0	591,987.39	1,276,886.18	39.430828	-108.060314
- actual wellpath misses target center by 14.0usft at 4152.4usft MD (3830.8 TVD, -1085.2 N, 928.6 E)									
- Circle (radius 50.0)									
Island Ranch 24D-13 PE - hit/miss target - Shape	0.00	0.00	5,721.0	-1,098.5	933.0	591,987.39	1,276,886.18	39.430828	-108.060314
- actual wellpath misses target center by 15.3usft at 6042.6usft MD (5720.5 TVD, -1103.2 N, 918.4 E)									
- Circle (radius 50.0)									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
6,111.0	5,788.8	-1,104.6	916.4	Last CES Survey @ 6,111' MD	
6,166.0	5,843.8	-1,105.9	914.7	PTB @ 6,166'	

Checked By: _____	Approved By: _____	Date: _____
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