





# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Caerus Oil & Gas (NAD 27)	<b>Local Co-ordinate Reference:</b>	Well PUCKETT 22D-1
<b>Project:</b>	Garfield County, CO	<b>TVD Reference:</b>	30' KB @ 8359.0usft (H&P 330)
<b>Site:</b>	S1-T7S-R97W (Mesa E1 797)	<b>MD Reference:</b>	30' KB @ 8359.0usft (H&P 330)
<b>Well:</b>	PUCKETT 22D-1	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

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

Site	S1-T7S-R97W (Mesa E1 797)				
Site Position:		Northing:	609,370.34 usft	Latitude:	39.476064
From:	Lat/Long	Easting:	1,245,650.28 usft	Longitude:	-108.172658
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	-1.69 °

Well	PUCKETT 22D-1					
Well Position	+N/-S	0.0 usft	Northing:	609,384.31 usft	Latitude:	39.476103
	+E/-W	0.0 usft	Easting:	1,245,658.32 usft	Longitude:	-108.172631
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	8,329.0 usft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	8/16/2015	9.85	65.82	51,955

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	337.68

<b>Survey Program</b>	<b>Date</b>	8/21/2015			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
256.0	9,152.0	Survey #1 (OH)	MWD+HDGM	OWSG MWD + HDGM	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100u)</b>	<b>Formations / Comments</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
256.0	3.10	347.20	255.9	6.8	-1.5	6.8	1.21	1.21		
287.0	4.50	0.90	286.8	8.8	-1.7	8.8	5.35	4.52		
317.0	5.80	355.00	316.7	11.5	-1.8	11.3	4.67	4.33		
347.0	6.80	358.90	346.5	14.8	-2.0	14.4	3.62	3.33		
378.0	8.30	354.30	377.2	18.8	-2.2	18.3	5.21	4.84		
423.0	9.30	347.20	421.7	25.6	-3.4	25.0	3.28	2.22		
470.0	9.60	334.60	468.1	32.8	-5.9	32.6	4.44	0.64		
560.0	12.70	325.10	556.4	47.7	-14.8	49.8	3.99	3.44		
655.0	15.00	324.70	648.6	66.3	-27.9	71.9	2.42	2.42		
749.0	16.70	331.70	739.0	88.2	-41.3	97.2	2.72	1.81		
844.0	18.10	336.20	829.7	113.7	-53.7	125.6	2.04	1.47		
938.0	17.70	337.90	919.1	140.3	-65.0	154.5	0.70	-0.43		



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<b>Site:</b>	S1-T7S-R97W (Mesa E1 797)	<b>MD Reference:</b>	30' KB @ 8359.0usft (H&P 330)
<b>Well:</b>	PUCKETT 22D-1	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	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 (°/100usft)	Build Rate (°/100u)	Formations / Comments
1,032.0	18.40	340.10	1,008.5	167.5	-75.4	183.6	1.04	0.74	
1,127.0	18.00	336.00	1,098.8	195.0	-86.5	213.2	1.41	-0.42	
1,222.0	17.80	336.70	1,189.2	221.7	-98.2	242.4	0.31	-0.21	
1,316.0	17.90	342.90	1,278.6	248.7	-108.1	271.2	2.02	0.11	
1,411.0	18.60	340.20	1,368.9	276.9	-117.6	300.8	1.16	0.74	
1,505.0	20.30	339.10	1,457.5	306.3	-128.4	332.1	1.85	1.81	
1,600.0	20.70	340.30	1,546.5	337.5	-140.0	365.4	0.61	0.42	
1,695.0	20.40	337.40	1,635.4	368.6	-152.0	398.7	1.12	-0.32	
1,789.0	19.40	338.20	1,723.8	398.2	-164.1	430.7	1.10	-1.06	
1,884.0	20.20	340.40	1,813.2	428.3	-175.5	462.9	1.15	0.84	
1,978.0	20.00	339.60	1,901.5	458.7	-186.5	495.1	0.36	-0.21	
2,073.0	19.60	339.70	1,990.9	488.8	-197.7	527.3	0.42	-0.42	
2,167.0	19.60	339.00	2,079.4	518.3	-208.8	558.8	0.25	0.00	
2,262.0	19.90	339.10	2,168.8	548.3	-220.3	590.9	0.32	0.32	
2,357.0	19.70	340.10	2,258.2	578.5	-231.5	623.1	0.41	-0.21	
2,451.0	20.00	340.80	2,346.6	608.6	-242.2	654.9	0.41	0.32	
2,464.0	20.00	340.80	2,358.8	612.8	-243.7	659.4	0.00	0.00	
2,501.0	20.50	342.00	2,393.6	624.9	-247.7	672.2	1.76	1.35	
2,595.0	19.80	342.70	2,481.8	655.7	-257.6	704.4	0.79	-0.74	
2,690.0	19.60	342.50	2,571.2	686.3	-267.1	736.3	0.22	-0.21	
2,784.0	19.10	341.60	2,659.9	715.9	-276.7	767.4	0.62	-0.53	
2,879.0	18.90	341.50	2,749.8	745.3	-286.5	798.3	0.21	-0.21	
2,973.0	19.90	339.90	2,838.4	774.7	-296.9	829.4	1.20	1.06	
3,068.0	18.90	339.00	2,928.0	804.3	-307.9	861.0	1.10	-1.05	
3,163.0	19.70	338.00	3,017.7	833.5	-319.4	892.4	0.91	0.84	
3,257.0	19.40	337.90	3,106.3	862.6	-331.2	923.8	0.32	-0.32	
3,352.0	18.70	335.70	3,196.1	891.1	-343.4	954.8	1.06	-0.74	
3,447.0	19.70	337.80	3,285.8	919.9	-355.8	986.0	1.28	1.05	
3,541.0	19.40	338.10	3,374.4	949.0	-367.6	1,017.5	0.34	-0.32	
3,636.0	19.00	339.20	3,464.1	978.1	-379.0	1,048.7	0.57	-0.42	
3,730.0	18.50	339.10	3,553.1	1,006.3	-389.7	1,078.9	0.53	-0.53	
3,825.0	19.60	337.20	3,642.9	1,035.1	-401.3	1,109.9	1.33	1.16	
3,919.0	19.50	338.00	3,731.5	1,064.2	-413.2	1,141.4	0.30	-0.11	
4,014.0	19.20	337.50	3,821.1	1,093.3	-425.2	1,172.9	0.36	-0.32	
4,108.0	18.60	336.50	3,910.0	1,121.4	-437.1	1,203.3	0.73	-0.64	
4,203.0	20.30	337.80	3,999.6	1,150.5	-449.3	1,235.0	1.85	1.79	
4,298.0	19.60	337.50	4,088.9	1,180.5	-461.6	1,267.4	0.74	-0.74	
4,392.0	19.20	337.80	4,177.6	1,209.4	-473.5	1,298.6	0.44	-0.43	
4,485.0	19.00	339.00	4,265.4	1,237.7	-484.7	1,329.0	0.47	-0.22	
4,581.0	18.20	338.20	4,356.4	1,266.2	-495.9	1,359.6	0.87	-0.83	
4,675.0	19.70	339.30	4,445.3	1,294.6	-506.9	1,390.1	1.64	1.60	
4,770.0	18.80	337.60	4,535.0	1,323.7	-518.4	1,421.5	1.12	-0.95	
4,864.0	19.80	339.40	4,623.7	1,352.7	-529.8	1,452.5	1.24	1.06	
4,959.0	20.60	339.10	4,712.9	1,383.3	-541.4	1,485.3	0.85	0.84	
5,054.0	20.30	338.70	4,801.9	1,414.3	-553.4	1,518.5	0.35	-0.32	
5,148.0	18.70	336.90	4,890.5	1,443.4	-565.2	1,549.9	1.82	-1.70	
5,243.0	19.40	338.40	4,980.3	1,472.0	-577.0	1,580.9	0.90	0.74	
5,337.0	21.30	337.70	5,068.4	1,502.3	-589.2	1,613.6	2.04	2.02	
5,432.0	20.30	336.10	5,157.3	1,533.4	-602.5	1,647.3	1.21	-1.05	
5,526.0	19.70	335.60	5,245.6	1,562.7	-615.6	1,679.4	0.66	-0.64	
5,621.0	19.70	335.60	5,335.0	1,591.9	-628.8	1,711.4	0.00	0.00	
5,715.0	18.40	333.20	5,423.9	1,619.5	-642.1	1,742.1	1.61	-1.38	
5,810.0	19.80	335.90	5,513.6	1,647.6	-655.4	1,773.1	1.74	1.47	



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<b>Well:</b>	PUCKETT 22D-1	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	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 (°/100usft)	Build Rate (°/100u)	Formations / Comments
5,905.0	19.30	336.30	5,603.2	1,676.7	-668.3	1,804.9	0.54	-0.53	
5,999.0	18.30	340.50	5,692.2	1,704.8	-679.5	1,835.1	1.79	-1.06	
6,094.0	18.10	344.40	5,782.4	1,733.1	-688.4	1,864.7	1.30	-0.21	
6,188.0	19.80	345.80	5,871.3	1,762.6	-696.2	1,895.0	1.87	1.81	
6,283.0	19.30	345.20	5,960.8	1,793.4	-704.2	1,926.4	0.57	-0.53	
6,377.0	19.50	345.10	6,049.5	1,823.6	-712.2	1,957.4	0.22	0.21	
6,472.0	17.10	341.60	6,139.7	1,852.1	-720.7	1,987.1	2.78	-2.53	
6,567.0	16.10	340.60	6,230.7	1,877.8	-729.5	2,014.2	1.09	-1.05	
6,661.0	13.80	339.60	6,321.5	1,900.6	-737.7	2,038.4	2.46	-2.45	
6,756.0	11.90	336.50	6,414.2	1,920.2	-745.6	2,059.5	2.13	-2.00	
6,850.0	11.10	336.90	6,506.3	1,937.4	-753.0	2,078.2	0.86	-0.85	
6,945.0	9.70	337.80	6,599.7	1,953.3	-759.6	2,095.4	1.48	-1.47	
6,997.0	8.10	334.90	6,651.1	1,960.6	-762.8	2,103.4	3.19	-3.08	
7,039.0	7.20	332.70	6,692.7	1,965.6	-765.3	2,109.0	2.25	-2.14	
7,134.0	3.70	324.10	6,787.3	1,973.4	-769.8	2,117.9	3.77	-3.68	
7,229.0	2.90	328.80	6,882.1	1,978.0	-772.8	2,123.3	0.89	-0.84	
7,323.0	1.70	295.30	6,976.0	1,980.6	-775.3	2,126.6	1.87	-1.28	
7,418.0	1.80	259.70	7,071.0	1,980.9	-778.1	2,128.0	1.13	0.11	
7,512.0	1.90	249.40	7,164.9	1,980.1	-781.0	2,128.4	0.37	0.11	
7,607.0	2.50	240.40	7,259.9	1,978.5	-784.2	2,128.1	0.73	0.63	
7,701.0	1.90	215.30	7,353.8	1,976.3	-786.9	2,127.0	1.19	-0.64	
7,796.0	2.40	196.70	7,448.7	1,973.1	-788.4	2,124.7	0.90	0.53	
7,890.0	2.30	202.30	7,542.6	1,969.4	-789.7	2,121.8	0.27	-0.11	
7,985.0	2.90	197.30	7,637.6	1,965.4	-791.1	2,118.6	0.67	0.63	
8,079.0	3.10	201.30	7,731.4	1,960.7	-792.8	2,114.9	0.31	0.21	
8,174.0	2.60	188.00	7,826.3	1,956.2	-794.0	2,111.2	0.87	-0.53	
8,269.0	2.10	204.60	7,921.2	1,952.5	-795.0	2,108.1	0.88	-0.53	
8,363.0	1.90	200.00	8,015.2	1,949.5	-796.3	2,105.8	0.27	-0.21	
8,458.0	2.30	226.70	8,110.1	1,946.7	-798.2	2,104.0	1.10	0.42	
8,552.0	2.30	215.90	8,204.0	1,943.9	-800.7	2,102.3	0.46	0.00	
8,647.0	3.00	211.10	8,298.9	1,940.2	-803.1	2,099.8	0.77	0.74	
8,741.0	3.30	209.60	8,392.8	1,935.7	-805.7	2,096.7	0.33	0.32	
8,836.0	3.10	211.80	8,487.6	1,931.2	-808.4	2,093.5	0.25	-0.21	
8,930.0	3.40	209.70	8,581.5	1,926.6	-811.1	2,090.3	0.34	0.32	
9,025.0	4.00	209.30	8,676.3	1,921.2	-814.1	2,086.5	0.63	0.63	
9,097.0	4.00	220.40	8,748.1	1,917.1	-817.0	2,083.8	1.07	0.00	Last CES Survey @ 9097' MD - PUCKETT 22D-1 Projection to Bit @ 9152' MD
9,152.0	4.00	220.40	8,803.0	1,914.2	-819.5	2,082.0	0.00	0.00	



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<b>Site:</b>	S1-T7S-R97W (Mesa E1 797)	<b>MD Reference:</b>	30' KB @ 8359.0usft (H&P 330)
<b>Well:</b>	PUCKETT 22D-1	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PUCKETT 22D-1 BHL - survey misses target center by 2671.3usft at 9152.0usft MD (8803.0 TVD, 1914.2 N, -819.5 E) - Circle (radius 50.0)	0.00	0.00	8,777.0	-297.6	678.3	609,066.93	1,246,327.62	39.475286	-108.170228
PUCKETT 22D-1 TGT - survey misses target center by 2691.3usft at 6711.8usft MD (6370.9 TVD, 1911.5 N, -741.9 E) - Point	0.00	0.00	6,959.0	-297.6	678.3	609,066.93	1,246,327.62	39.475286	-108.170228
PUCKETT 22D-1 BHL 7 - survey misses target center by 38.5usft at 9097.0usft MD (8748.1 TVD, 1917.1 N, -817.0 E) - Circle (radius 50.0)	0.00	0.00	8,767.0	1,945.4	-798.8	611,352.35	1,244,917.08	39.481444	-108.175461

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
9,097.0	8,748.1	1,917.1	-817.0	Last CES Survey @ 9097' MD
9,152.0	8,803.0	1,914.2	-819.5	Projection to Bit @ 9152' MD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_