



## Survey Report

<b>Company:</b>	Petroleum Development Corp.	<b>Local Co-ordinate Reference:</b>	Well BECKER RANCH 5E-403
<b>Project:</b>	Weld County	<b>TVD Reference:</b>	13' KB @ 4833.0usft (ENSIGN 124)
<b>Site:</b>	S5-T3N-R64W	<b>MD Reference:</b>	13' KB @ 4833.0usft (ENSIGN 124)
<b>Well:</b>	BECKER RANCH 5E-403	<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>	Weld County		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

Site		S5-T3N-R64W			
Site Position:		Northing:	1,339,314.55 usft	Latitude:	40.261170
From:	Lat/Long	Easting:	3,256,448.24 usft	Longitude:	-104.581080
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.59 °

Well		BECKER RANCH 5E-403				
Well Position	+N/-S	0.0 usft	Northing:	1,339,314.25 usft	Latitude:	40.261170
	+E/-W	0.0 usft	Easting:	3,256,420.34 usft	Longitude:	-104.581180
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,820.0 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	5/13/2015	8.37	66.87	52,573

<b>Design</b>	FINAL				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	180.00	

<b>Survey Program</b>	<b>Date</b>	6/2/2015			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
162.0	11,599.0	Survey #1 (OH)	MWD	Geolink MWD	

<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 (°/100usf)</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		
162.0	0.80	234.20	162.0	-0.7	-0.9	0.7	0.49	0.49		
253.0	1.10	258.90	253.0	-1.2	-2.3	1.2	0.55	0.33		
346.0	3.60	271.70	345.9	-1.3	-6.1	1.3	2.73	2.69		
438.0	7.50	276.30	437.4	-0.5	-14.9	0.5	4.26	4.24		
530.0	10.50	280.60	528.3	1.7	-29.2	-1.7	3.34	3.26		
623.0	10.00	280.40	619.8	4.7	-45.4	-4.7	0.54	-0.54		
715.0	10.00	285.10	710.4	8.2	-61.0	-8.2	0.89	0.00		
807.0	10.30	284.30	801.0	12.3	-76.7	-12.3	0.36	0.33		
881.0	10.40	287.00	873.8	15.9	-89.5	-15.9	0.67	0.14		
947.0	10.50	286.90	938.7	19.4	-100.9	-19.4	0.15	0.15		
1,039.0	10.60	286.00	1,029.1	24.2	-117.1	-24.2	0.21	0.11		
1,132.0	10.40	284.20	1,120.6	28.6	-133.4	-28.6	0.41	-0.22		

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<b>Site:</b>	S5-T3N-R64W	<b>MD Reference:</b>	13' KB @ 4833.0usft (ENSIGN 124)
<b>Well:</b>	BECKER RANCH 5E-403	<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 (°/100usf)	Build Rate (°/100u)	Formations / Comments
1,225.0	10.30	283.10	1,212.1	32.5	-149.7	-32.5	0.24	-0.11	
1,317.0	10.30	281.50	1,302.6	36.0	-165.7	-36.0	0.31	0.00	
1,410.0	10.20	280.00	1,394.1	39.1	-182.0	-39.1	0.31	-0.11	
1,503.0	8.30	278.40	1,485.9	41.5	-196.8	-41.5	2.06	-2.04	
1,596.0	8.40	293.50	1,577.9	45.2	-209.6	-45.2	2.35	0.11	
1,688.0	8.00	289.30	1,669.0	50.0	-221.8	-50.0	0.78	-0.43	
1,780.0	7.50	284.40	1,760.1	53.6	-233.7	-53.6	0.90	-0.54	
1,872.0	8.30	284.10	1,851.3	56.7	-245.9	-56.7	0.87	0.87	
1,964.0	9.10	291.30	1,942.2	61.0	-259.2	-61.0	1.47	0.87	
2,056.0	10.20	283.60	2,032.9	65.5	-273.9	-65.5	1.84	1.20	
2,148.0	10.10	280.00	2,123.5	68.9	-289.7	-68.9	0.70	-0.11	
2,240.0	10.10	276.90	2,214.0	71.2	-305.7	-71.2	0.59	0.00	
2,332.0	9.60	274.90	2,304.7	72.9	-321.3	-72.9	0.66	-0.54	
2,424.0	10.90	275.00	2,395.2	74.3	-337.6	-74.3	1.41	1.41	
2,520.0	10.40	272.00	2,489.6	75.4	-355.3	-75.4	0.78	-0.52	
2,615.0	10.20	277.80	2,583.0	76.8	-372.2	-76.8	1.11	-0.21	
2,711.0	10.40	280.80	2,677.5	79.6	-389.2	-79.6	0.60	0.21	
2,806.0	9.20	288.80	2,771.1	83.6	-404.8	-83.6	1.91	-1.26	
2,902.0	9.40	288.10	2,865.8	88.5	-419.5	-88.5	0.24	0.21	
2,997.0	9.40	287.20	2,959.6	93.2	-434.3	-93.2	0.15	0.00	
3,093.0	9.20	284.40	3,054.3	97.5	-449.2	-97.5	0.52	-0.21	
3,188.0	10.40	294.00	3,147.9	102.9	-464.4	-102.9	2.13	1.26	
3,283.0	9.90	290.00	3,241.4	109.1	-479.9	-109.1	0.91	-0.53	
3,379.0	10.50	297.90	3,335.9	116.0	-495.4	-116.0	1.58	0.62	
3,474.0	9.80	295.90	3,429.4	123.6	-510.3	-123.6	0.82	-0.74	
3,570.0	11.30	292.30	3,523.8	130.8	-526.4	-130.8	1.71	1.56	
3,665.0	10.50	290.10	3,617.1	137.3	-543.1	-137.3	0.95	-0.84	
3,761.0	9.70	288.40	3,711.6	142.8	-559.0	-142.8	0.89	-0.83	
3,856.0	10.90	291.40	3,805.1	148.6	-575.0	-148.6	1.38	1.26	
3,951.0	13.30	284.30	3,898.0	154.6	-593.9	-154.6	2.97	2.53	
4,047.0	13.40	285.60	3,991.4	160.3	-615.3	-160.3	0.33	0.10	
4,142.0	12.70	277.80	4,083.9	164.7	-636.3	-164.7	1.99	-0.74	
4,238.0	12.50	277.50	4,177.6	167.5	-657.0	-167.5	0.22	-0.21	
4,333.0	9.70	271.00	4,270.8	169.0	-675.2	-169.0	3.22	-2.95	
4,428.0	8.10	282.10	4,364.7	170.5	-689.8	-170.5	2.46	-1.68	
4,524.0	6.40	285.10	4,459.9	173.3	-701.6	-173.3	1.81	-1.77	
4,619.0	6.40	286.10	4,554.3	176.2	-711.8	-176.2	0.12	0.00	
4,715.0	4.40	278.70	4,649.9	178.2	-720.5	-178.2	2.20	-2.08	
4,810.0	4.70	279.20	4,744.6	179.4	-728.0	-179.4	0.32	0.32	
4,905.0	3.80	254.80	4,839.3	179.2	-734.9	-179.2	2.10	-0.95	
5,001.0	0.60	210.60	4,935.3	177.9	-738.2	-177.9	3.54	-3.33	
5,096.0	0.50	211.60	5,030.3	177.1	-738.7	-177.1	0.11	-0.11	
5,192.0	0.60	222.80	5,126.2	176.4	-739.2	-176.4	0.15	0.10	
5,287.0	0.70	220.20	5,221.2	175.6	-739.9	-175.6	0.11	0.11	
5,382.0	0.70	216.30	5,316.2	174.7	-740.7	-174.7	0.05	0.00	
5,478.0	1.80	109.40	5,412.2	173.7	-739.6	-173.7	2.20	1.15	
5,573.0	1.70	102.20	5,507.2	172.9	-736.8	-172.9	0.25	-0.11	
5,668.0	1.80	91.60	5,602.1	172.6	-733.9	-172.6	0.36	0.11	
5,764.0	1.80	93.00	5,698.1	172.5	-730.9	-172.5	0.05	0.00	
5,859.0	1.60	116.00	5,793.0	171.8	-728.2	-171.8	0.74	-0.21	
5,955.0	1.80	106.00	5,889.0	170.8	-725.6	-170.8	0.37	0.21	
6,050.0	1.80	106.40	5,984.0	170.0	-722.7	-170.0	0.01	0.00	
6,146.0	1.60	109.40	6,079.9	169.1	-720.0	-169.1	0.23	-0.21	

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<b>Well:</b>	BECKER RANCH 5E-403	<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 (°/100usf)	Build Rate (°/100u)	Formations / Comments
6,241.0	1.20	173.60	6,174.9	167.7	-718.6	-167.7	1.61	-0.42	
6,337.0	0.80	163.10	6,270.9	166.0	-718.3	-166.0	0.46	-0.42	
6,432.0	0.70	176.30	6,365.9	164.8	-718.1	-164.8	0.21	-0.11	
6,527.0	1.70	185.90	6,460.8	162.8	-718.2	-162.8	1.07	1.05	
6,575.0	7.20	186.30	6,508.7	159.1	-718.6	-159.1	11.46	11.46	
6,623.0	13.20	178.30	6,555.9	150.7	-718.8	-150.7	12.81	12.50	
6,671.0	18.00	176.20	6,602.1	137.8	-718.1	-137.8	10.07	10.00	
6,718.0	23.50	179.20	6,646.1	121.2	-717.5	-121.2	11.91	11.70	
6,766.0	27.60	179.70	6,689.4	100.5	-717.3	-100.5	8.55	8.54	
6,814.0	30.70	178.50	6,731.3	77.1	-716.9	-77.1	6.57	6.46	
6,862.0	35.90	177.70	6,771.4	50.8	-716.1	-50.8	10.87	10.83	
6,909.0	40.80	178.40	6,808.2	21.6	-715.1	-21.6	10.47	10.43	
6,957.0	45.20	179.20	6,843.3	-11.1	-714.4	11.1	9.24	9.17	
7,005.0	47.80	180.30	6,876.4	-45.9	-714.3	45.9	5.67	5.42	
7,053.0	51.90	180.70	6,907.3	-82.6	-714.6	82.6	8.57	8.54	
7,100.0	57.90	180.30	6,934.3	-121.0	-714.9	121.0	12.78	12.77	
7,148.0	61.30	179.70	6,958.6	-162.4	-714.9	162.4	7.16	7.08	
7,196.0	63.50	177.70	6,980.8	-204.9	-713.9	204.9	5.89	4.58	
7,244.0	64.40	175.30	7,001.9	-248.0	-711.3	248.0	4.87	1.87	
7,291.0	71.30	177.10	7,019.6	-291.4	-708.4	291.4	15.10	14.68	
7,339.0	76.20	178.40	7,033.1	-337.4	-706.6	337.4	10.53	10.21	
7,386.0	83.80	178.10	7,041.2	-383.7	-705.2	383.7	16.18	16.17	
7,409.0	87.80	179.00	7,042.9	-406.6	-704.6	406.6	17.82	17.39	
7,484.0	89.20	179.70	7,044.9	-481.5	-703.8	481.5	2.09	1.87	
7,579.0	95.00	181.70	7,041.4	-576.4	-704.9	576.4	6.46	6.11	
7,674.0	91.00	182.00	7,036.4	-671.2	-708.0	671.2	4.22	-4.21	
7,770.0	89.30	182.10	7,036.2	-767.2	-711.4	767.2	1.77	-1.77	
7,865.0	90.80	182.10	7,036.1	-862.1	-714.9	862.1	1.58	1.58	
7,960.0	89.80	182.70	7,035.6	-957.0	-718.9	957.0	1.23	-1.05	
8,056.0	89.00	181.10	7,036.6	-1,053.0	-722.1	1,053.0	1.86	-0.83	
8,151.0	89.10	179.80	7,038.2	-1,147.9	-722.8	1,147.9	1.37	0.11	
8,246.0	88.20	178.50	7,040.4	-1,242.9	-721.4	1,242.9	1.66	-0.95	
8,342.0	89.20	181.20	7,042.6	-1,338.9	-721.2	1,338.9	3.00	1.04	
8,437.0	86.70	176.90	7,046.0	-1,433.8	-719.6	1,433.8	5.23	-2.63	
8,533.0	90.60	176.70	7,048.2	-1,529.6	-714.2	1,529.6	4.07	4.06	
8,628.0	89.70	176.60	7,048.0	-1,624.4	-708.7	1,624.4	0.95	-0.95	
8,723.0	90.30	177.60	7,048.0	-1,719.3	-703.9	1,719.3	1.23	0.63	
8,818.0	90.10	180.10	7,047.7	-1,814.2	-702.0	1,814.2	2.64	-0.21	
8,914.0	90.50	178.10	7,047.2	-1,910.2	-700.5	1,910.2	2.12	0.42	
9,009.0	89.70	177.10	7,047.0	-2,005.1	-696.5	2,005.1	1.35	-0.84	
9,105.0	90.00	177.10	7,047.2	-2,101.0	-691.6	2,101.0	0.31	0.31	
9,200.0	91.50	181.50	7,046.0	-2,196.0	-690.5	2,196.0	4.89	1.58	
9,295.0	91.20	181.20	7,043.8	-2,290.9	-692.7	2,290.9	0.45	-0.32	
9,391.0	89.80	181.70	7,042.9	-2,386.9	-695.1	2,386.9	1.55	-1.46	
9,486.0	90.70	180.80	7,042.5	-2,481.9	-697.2	2,481.9	1.34	0.95	
9,582.0	91.40	180.70	7,040.7	-2,577.8	-698.5	2,577.8	0.74	0.73	
9,677.0	89.70	179.20	7,039.8	-2,672.8	-698.4	2,672.8	2.39	-1.79	
9,772.0	89.60	176.00	7,040.4	-2,767.7	-694.4	2,767.7	3.37	-0.11	
9,868.0	88.80	175.10	7,041.8	-2,863.4	-687.0	2,863.4	1.25	-0.83	
9,963.0	92.40	174.20	7,040.8	-2,958.0	-678.1	2,958.0	3.91	3.79	
10,058.0	92.90	177.00	7,036.4	-3,052.6	-670.8	3,052.6	2.99	0.53	
10,154.0	91.20	177.80	7,032.9	-3,148.4	-666.5	3,148.4	1.96	-1.77	
10,249.0	87.50	176.30	7,034.0	-3,243.3	-661.6	3,243.3	4.20	-3.89	

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<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 (°/100usf)	Build Rate (°/100u)	Formations / Comments
10,344.0	89.00	179.90	7,036.9	-3,338.2	-658.4	3,338.2	4.10	1.58	
10,439.0	89.10	181.30	7,038.5	-3,433.1	-659.4	3,433.1	1.48	0.11	
10,535.0	88.80	181.10	7,040.2	-3,529.1	-661.4	3,529.1	0.38	-0.31	
10,630.0	91.00	183.80	7,040.4	-3,624.0	-665.5	3,624.0	3.67	2.32	
10,725.0	90.80	182.70	7,038.9	-3,718.8	-670.9	3,718.8	1.18	-0.21	
10,821.0	90.60	180.50	7,037.7	-3,814.8	-673.6	3,814.8	2.30	-0.21	
10,916.0	89.70	183.60	7,037.5	-3,909.7	-677.0	3,909.7	3.40	-0.95	
11,012.0	89.90	182.80	7,037.8	-4,005.6	-682.3	4,005.6	0.86	0.21	
11,107.0	90.30	182.20	7,037.7	-4,100.5	-686.5	4,100.5	0.76	0.42	
11,202.0	89.90	181.40	7,037.5	-4,195.4	-689.5	4,195.4	0.94	-0.42	
11,298.0	90.40	181.50	7,037.3	-4,291.4	-691.9	4,291.4	0.53	0.52	
11,394.0	90.70	181.50	7,036.3	-4,387.4	-694.4	4,387.4	0.31	0.31	
11,489.0	91.50	181.00	7,034.5	-4,482.3	-696.5	4,482.3	0.99	0.84	
11,544.0	89.60	177.70	7,034.0	-4,537.3	-695.8	4,537.3	6.92	-3.45	LAST CES SURVEY @ 11,544' MD
11,599.0	89.60	177.70	7,034.4	-4,592.3	-693.6	4,592.3	0.00	0.00	PTB @ 11,599' MD - PTB @ 134' FWL & 514' FSL

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
BECKER RANCH 5E-40	0.00	0.00	7,042.0	-4,608.2	-703.4	1,334,699.00	3,255,764.71	40.248520	-104.583700
- hit/miss target									
- Shape									
- actual wellpath misses target center by 20.2usft at 11599.0usft MD (7034.4 TVD, -4592.3 N, -693.6 E)									
- Point									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
7,438.0	7,043.9	7" (662' FNL & 149' FWL)	0	0	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
11,544.0	7,034.0	-4,537.3	-695.8	LAST CES SURVEY @ 11,544' MD	
11,599.0	7,034.4	-4,592.3	-693.6	PTB @ 11,599' MD	
11,599.0	7,034.4	-4,592.3	-693.6	PTB @ 134' FWL & 514' FSL	

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