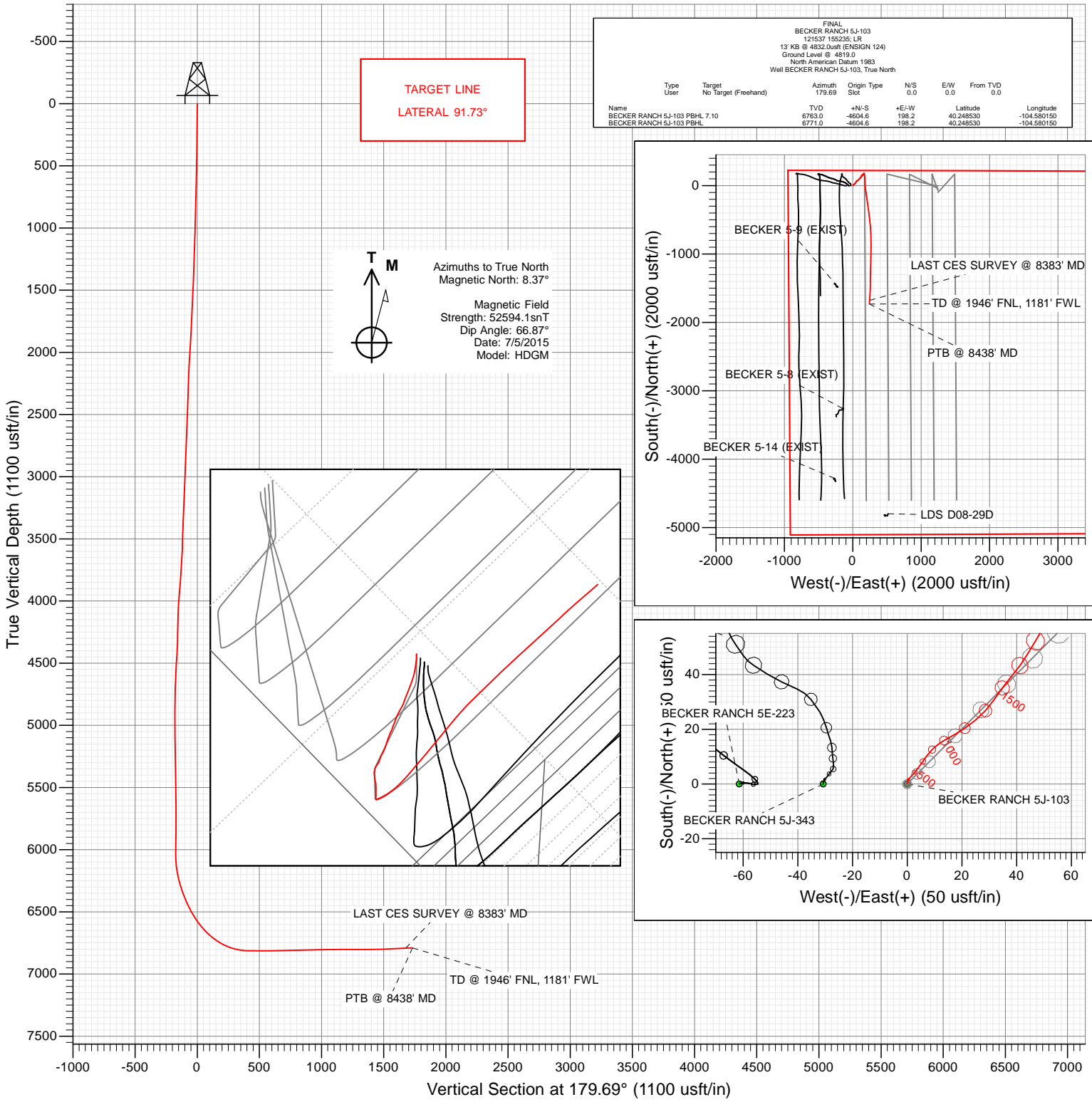




Petroleum Development Corporation

Project: Weld County
 Site: S5-T3N-R64W
 Well: BECKER RANCH 5J-103
 Wellbore: OH
 Design: FINAL



WELL DETAILS: BECKER RANCH 5J-103

Ground Level: 4819.0
 +N/-S 0.0 +E/-W 0.0 Northing 1339315.15 Easting 3256509.64 Latitude 40.261170 Longitude -104.580860



Survey Report

Company: Petroleum Development Corp.	Local Co-ordinate Reference: Well BECKER RANCH 5J-103
Project: Weld County	TVD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Site: S5-T3N-R64W	MD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Well: BECKER RANCH 5J-103	North Reference: True
Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: SURVEYS	Database: USA EDM 5000 Multi Users DB

Project Weld County		
Map System: US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum: North American Datum 1983		
Map Zone: 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 5J-103				
Well Position	+N/-S	0.0 usft	Northing:	1,339,315.15 usft
	+E/-W	0.0 usft	Easting:	3,256,509.64 usft
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft
			Ground Level:	4,819.0 usft

Wellbore OH					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/5/2015	8.37	66.87	52,594

Design SURVEYS				
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	179.69

Survey Program		Date 8/10/2015
From (usft)	To (usft)	Survey (Wellbore)
157.0	8,438.0	Survey #1 (OH)
		Tool Name
		MWD
		Description
		Geolink MWD

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
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
157.0	0.50	4.10	157.0	0.7	0.0	-0.7	0.32	0.32	
249.0	1.00	35.30	249.0	1.7	0.5	-1.7	0.68	0.54	
341.0	1.00	45.90	341.0	3.0	1.6	-2.9	0.20	0.00	
433.0	1.40	39.00	433.0	4.4	2.9	-4.4	0.46	0.43	
526.0	1.50	35.70	525.9	6.3	4.3	-6.2	0.14	0.11	
618.0	1.60	36.00	617.9	8.3	5.7	-8.2	0.11	0.11	
710.0	1.70	35.60	709.9	10.4	7.3	-10.4	0.11	0.11	
803.0	1.80	43.50	802.8	12.6	9.1	-12.6	0.28	0.11	
890.0	2.00	54.00	889.8	14.5	11.3	-14.4	0.46	0.23	
954.0	2.70	59.30	953.7	15.9	13.5	-15.8	1.14	1.09	
1,049.0	2.60	61.00	1,048.6	18.1	17.3	-18.0	0.13	-0.11	
1,142.0	2.90	56.10	1,141.5	20.4	21.1	-20.3	0.41	0.32	

Survey Report

Company: Petroleum Development Corp.	Local Co-ordinate Reference: Well BECKER RANCH 5J-103
Project: Weld County	TD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Site: S5-T3N-R64W	MVD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Well: BECKER RANCH 5J-103	North Reference: True
Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: SURVEYS	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
1,234.0	3.10	50.40	1,233.4	23.3	24.9	-23.2	0.39	0.22	
1,326.0	3.30	42.10	1,325.2	26.9	28.6	-26.7	0.55	0.22	
1,418.0	3.10	34.30	1,417.1	30.9	31.8	-30.7	0.52	-0.22	
1,511.0	3.30	35.40	1,509.9	35.1	34.8	-35.0	0.22	0.22	
1,603.0	3.30	41.20	1,601.8	39.3	38.0	-39.1	0.36	0.00	
1,695.0	3.10	35.10	1,693.6	43.3	41.2	-43.1	0.43	-0.22	
1,788.0	3.40	31.70	1,786.5	47.7	44.1	-47.5	0.38	0.32	
1,880.0	3.30	30.90	1,878.3	52.3	46.9	-52.1	0.12	-0.11	
1,973.0	3.50	26.60	1,971.2	57.2	49.6	-56.9	0.35	0.22	
2,065.0	5.10	27.50	2,062.9	63.3	52.7	-63.0	1.74	1.74	
2,157.0	4.40	64.90	2,154.6	68.4	57.8	-68.1	3.38	-0.76	
2,250.0	3.70	59.50	2,247.4	71.5	63.6	-71.1	0.86	-0.75	
2,342.0	3.70	58.80	2,339.2	74.5	68.7	-74.1	0.05	0.00	
2,435.0	3.30	61.00	2,432.0	77.4	73.6	-77.0	0.45	-0.43	
2,527.0	3.30	51.70	2,523.9	80.3	78.0	-79.9	0.58	0.00	
2,620.0	3.00	40.20	2,616.7	83.8	81.7	-83.4	0.75	-0.32	
2,713.0	2.80	35.20	2,709.6	87.5	84.6	-87.1	0.35	-0.22	
2,805.0	4.10	40.60	2,801.4	91.8	88.0	-91.4	1.45	1.41	
2,898.0	2.70	54.70	2,894.3	95.6	91.9	-95.1	1.74	-1.51	
2,994.0	2.40	49.10	2,990.2	98.3	95.3	-97.7	0.41	-0.31	
3,089.0	3.30	41.40	3,085.1	101.6	98.6	-101.1	1.03	0.95	
3,184.0	4.40	44.70	3,179.9	106.3	103.0	-105.7	1.18	1.16	
3,280.0	3.30	44.30	3,275.6	110.8	107.5	-110.3	1.15	-1.15	
3,375.0	2.20	44.00	3,370.5	114.1	110.7	-113.5	1.16	-1.16	
3,471.0	3.70	51.40	3,466.4	117.4	114.4	-116.8	1.61	1.56	
3,566.0	1.80	39.10	3,561.3	120.4	117.7	-119.8	2.08	-2.00	
3,661.0	4.20	22.60	3,656.1	124.8	120.0	-124.2	2.66	2.53	
3,757.0	3.10	5.60	3,751.9	130.6	121.6	-130.0	1.60	-1.15	
3,852.0	5.10	22.80	3,846.7	137.1	123.5	-136.4	2.45	2.11	
3,948.0	4.70	16.40	3,942.4	144.8	126.3	-144.1	0.70	-0.42	
4,043.0	5.10	44.80	4,037.0	151.5	130.3	-150.8	2.56	0.42	
4,138.0	3.20	69.30	4,131.8	155.5	135.8	-154.7	2.69	-2.00	
4,234.0	2.60	62.90	4,227.7	157.4	140.2	-156.6	0.71	-0.62	
4,329.0	1.50	35.60	4,322.6	159.4	142.9	-158.6	1.52	-1.16	
4,425.0	5.40	48.90	4,418.4	163.4	147.0	-162.6	4.12	4.06	
4,520.0	5.00	44.70	4,513.0	169.3	153.3	-168.4	0.58	-0.42	
4,616.0	4.00	64.00	4,608.7	173.7	159.2	-172.9	1.88	-1.04	
4,711.0	2.90	43.90	4,703.5	176.9	163.9	-176.0	1.70	-1.16	
4,807.0	1.80	32.50	4,799.5	179.9	166.4	-179.0	1.24	-1.15	
4,902.0	0.60	305.30	4,894.4	181.5	166.8	-180.6	1.97	-1.26	
4,998.0	1.00	246.40	4,990.4	181.4	165.6	-180.5	0.90	0.42	
5,093.0	1.00	222.40	5,085.4	180.5	164.3	-179.6	0.44	0.00	
5,188.0	1.10	197.00	5,180.4	179.0	163.5	-178.1	0.50	0.11	
5,284.0	1.70	184.60	5,276.4	176.7	163.1	-175.8	0.70	0.62	
5,379.0	1.50	174.70	5,371.3	174.1	163.1	-173.2	0.36	-0.21	
5,475.0	1.00	125.60	5,467.3	172.3	163.9	-171.4	1.18	-0.52	
5,570.0	0.50	112.30	5,562.3	171.7	164.9	-170.8	0.55	-0.53	
5,666.0	0.20	270.40	5,658.3	171.5	165.1	-170.6	0.72	-0.31	
5,761.0	0.40	330.50	5,753.3	171.8	164.8	-170.9	0.37	0.21	
5,856.0	0.70	347.00	5,848.3	172.7	164.5	-171.8	0.35	0.32	
5,952.0	0.70	63.10	5,944.3	173.5	164.9	-172.6	0.90	0.00	
6,047.0	0.10	278.30	6,039.3	173.8	165.4	-172.9	0.83	-0.63	
6,095.0	3.10	157.90	6,087.3	172.6	165.8	-171.7	6.57	6.25	

Survey Report

Company: Petroleum Development Corp.	Local Co-ordinate Reference: Well BECKER RANCH 5J-103
Project: Weld County	TVD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Site: S5-T3N-R64W	MD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Well: BECKER RANCH 5J-103	North Reference: True
Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: SURVEYS	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
6,143.0	7.70	154.90	6,135.1	168.5	167.7	-167.5	9.60	9.58	
6,191.0	10.20	164.80	6,182.5	161.4	170.1	-160.5	6.10	5.21	
6,238.0	13.00	165.80	6,228.5	152.3	172.5	-151.4	5.97	5.96	
6,286.0	15.20	172.70	6,275.1	140.8	174.6	-139.9	5.76	4.58	
6,333.0	18.70	176.40	6,320.0	127.2	175.9	-126.2	7.79	7.45	
6,381.0	21.70	178.90	6,365.1	110.6	176.6	-109.7	6.50	6.25	
6,429.0	23.50	179.60	6,409.4	92.2	176.8	-91.2	3.79	3.75	
6,477.0	25.50	177.90	6,453.0	72.3	177.2	-71.3	4.42	4.17	
6,524.0	28.30	178.50	6,495.0	51.0	177.9	-50.1	5.99	5.96	
6,572.0	32.20	176.20	6,536.4	26.9	179.0	-25.9	8.47	8.12	
6,620.0	35.70	174.40	6,576.2	0.2	181.3	0.8	7.59	7.29	
6,668.0	39.80	174.50	6,614.2	-29.1	184.1	30.1	8.54	8.54	
6,715.0	44.00	173.00	6,649.1	-60.3	187.5	61.3	9.19	8.94	
6,763.0	47.50	169.40	6,682.6	-94.2	192.8	95.2	9.05	7.29	
6,810.0	52.30	170.80	6,712.9	-129.6	199.0	130.7	10.46	10.21	
6,858.0	57.70	173.70	6,740.4	-168.6	204.3	169.7	12.29	11.25	
6,906.0	63.50	171.60	6,764.0	-210.0	209.6	211.1	12.67	12.08	
6,954.0	69.30	171.00	6,783.2	-253.5	216.3	254.6	12.14	12.08	
7,001.0	75.20	172.80	6,797.5	-297.8	222.6	299.0	13.07	12.55	
7,049.0	81.20	172.40	6,807.3	-344.3	228.6	345.6	12.53	12.50	
7,097.0	87.40	173.30	6,812.1	-391.7	234.6	393.0	13.05	12.92	
7,110.0	88.90	173.30	6,812.5	-404.6	236.1	405.9	11.54	11.54	
7,155.0	89.90	172.50	6,813.0	-449.3	241.6	450.6	2.85	2.22	
7,165.0	89.88	172.50	6,813.0	-459.2	242.9	460.5	0.20	-0.20	7" 1185' FWL, 680' FNL
7,204.0	89.80	172.50	6,813.1	-497.8	248.0	499.2	0.20	-0.20	
7,299.0	90.70	175.20	6,812.7	-592.3	258.2	593.7	3.00	0.95	
7,395.0	91.20	177.70	6,811.1	-688.1	264.2	689.5	2.66	0.52	
7,490.0	91.00	180.20	6,809.3	-783.0	265.9	784.5	2.64	-0.21	
7,586.0	92.10	179.70	6,806.7	-879.0	266.0	880.4	1.26	1.15	
7,681.0	90.90	180.20	6,804.2	-974.0	266.1	975.4	1.37	-1.26	
7,776.0	90.00	181.70	6,803.5	-1,068.9	264.5	1,070.4	1.84	-0.95	
7,872.0	90.90	181.20	6,802.7	-1,164.9	262.1	1,166.3	1.07	0.94	
7,967.0	89.40	181.60	6,802.4	-1,259.9	259.7	1,261.3	1.63	-1.58	
8,096.0	90.70	180.50	6,802.3	-1,388.9	257.4	1,390.2	1.32	1.01	
8,192.0	92.10	181.00	6,800.0	-1,484.8	256.1	1,486.2	1.55	1.46	
8,287.0	92.20	183.40	6,796.4	-1,579.7	252.5	1,581.0	2.53	0.11	
8,383.0	93.60	184.30	6,791.6	-1,675.3	246.0	1,676.6	1.73	1.46	LAST CES SURVEY @ 8383' MD
8,438.0	90.00	181.00	6,789.8	-1,730.2	243.5	1,731.5	8.88	-6.55	PTB @ 8438' MD - TD @ 1946' FNL, 1181' FWL

Survey Report

Company: Petroleum Development Corp.	Local Co-ordinate Reference: Well BECKER RANCH 5J-103
Project: Weld County	TVD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Site: S5-T3N-R64W	MD Reference: 13' KB @ 4832.0usft (ENSIGN 124)
Well: BECKER RANCH 5J-103	North Reference: True
Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: SURVEYS	Database: USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
BECKER RANCH 5J-10 - survey misses target center by 2874.8usft at 8438.0usft MD (6789.8 TVD, -1730.2 N, 243.5 E) - Point	0.00	0.00	6,763.0	-4,604.6	198.2	1,334,712.90	3,256,755.54	40.248530	-104.580150
BECKER RANCH 5J-10 - survey misses target center by 2874.7usft at 8438.0usft MD (6789.8 TVD, -1730.2 N, 243.5 E) - Point	0.00	0.00	6,771.0	-4,604.6	198.2	1,334,712.90	3,256,755.54	40.248530	-104.580150

Casing Points					
Measured Depth	Vertical Depth	Name		Casing Diameter	Hole Diameter
(usft)	(usft)			(")	(")
7,165.0	6,813.0	7"	1185' FWL, 680' FNL	0	0

Survey Annotations					
Measured Depth	Vertical Depth	Local Coordinates		Comment	
		+N/-S	+E/-W		
(usft)	(usft)	(usft)	(usft)		
8,383.0	6,791.6	-1,675.3	246.0	LAST CES SURVEY @ 8383' MD	
8,438.0	6,789.8	-1,730.2	243.5	PTB @ 8438' MD	
8,438.0	6,789.8	-1,730.2	243.5	TD @ 1946' FNL, 1181' FWL	

Checked By: _____ Approved By: _____ Date: _____