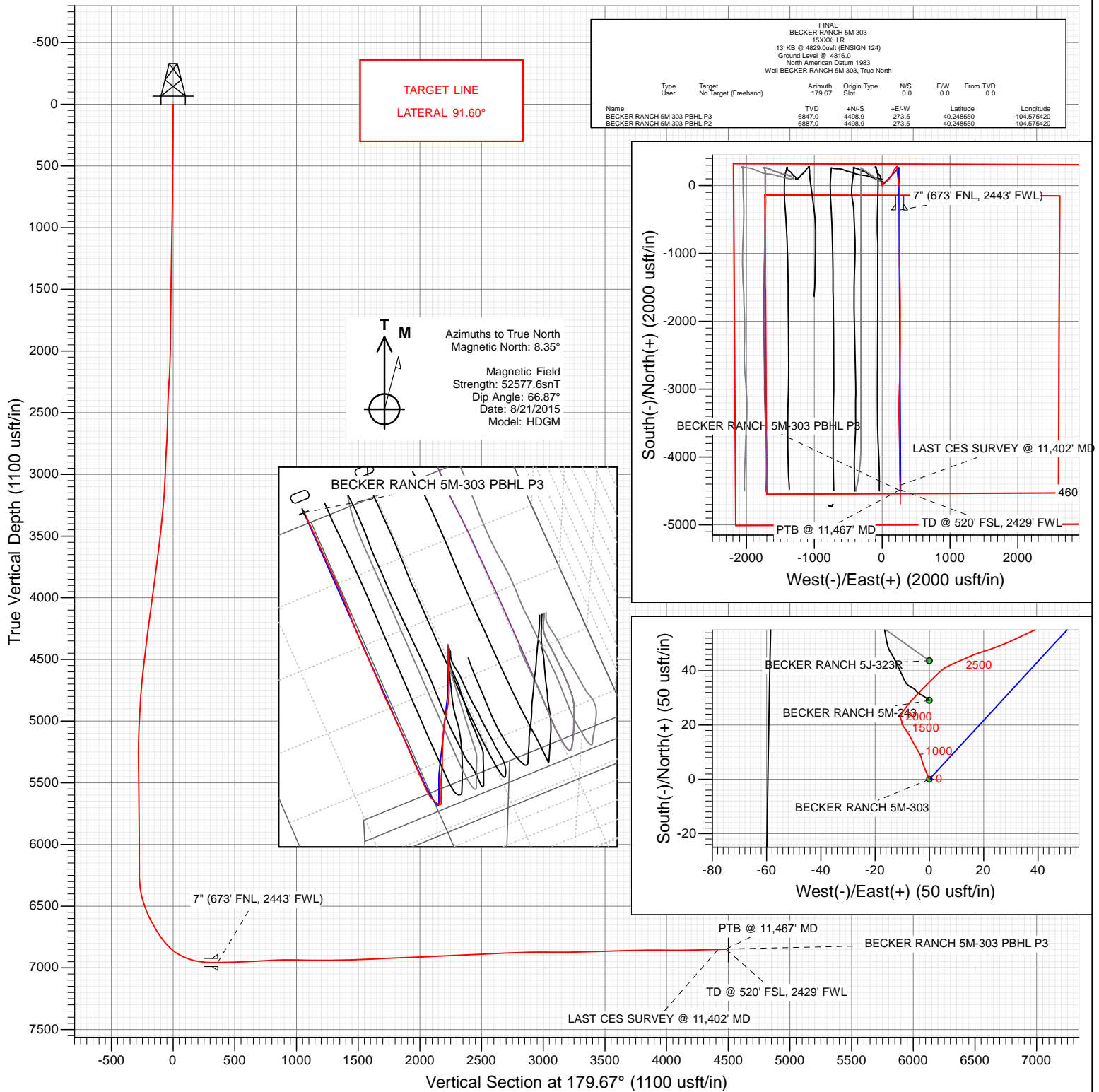




Petroleum Development Corporation

Project: Weld County
Site: S5-T3N-R64W
Well: BECKER RANCH 5M-303
Wellbore: OH
Design: FINAL



WELL DETAILS: BECKER RANCH 5M-303

+N/-S	+E/-W	Northing	Ground Level:	4816.0	Latitude	Longitude
0.0	0.0	1339229.76	Easting	3257755.29	40.260900	-104.576400



Survey Report

Company:	Petroleum Development Corp.	Local Co-ordinate Reference:	Well BECKER RANCH 5M-303
Project:	Weld County	TVD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Site:	S5-T3N-R64W	MD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Well:	BECKER RANCH 5M-303	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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 5M-303				
Well Position	+N/-S	0.0 usft	Northing:	1,339,229.76 usft	Latitude:	40.260900
	+E/-W	0.0 usft	Easting:	3,257,755.29 usft	Longitude:	-104.576400
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,816.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	8/21/2015	8.35	66.87	52,578

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	179.67	

Survey Program	Date	9/18/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
159.0	11,467.0	Survey #1 (OH)	MWD+HDGM	OWSG MWD + HDGM	

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		
159.0	0.50	338.20	159.0	0.6	-0.3	-0.6	0.31	0.31		
251.0	0.50	335.10	251.0	1.4	-0.6	-1.4	0.03	0.00		
343.0	0.50	349.20	343.0	2.1	-0.8	-2.1	0.13	0.00		
436.0	0.60	320.80	436.0	2.9	-1.2	-2.9	0.31	0.11		
528.0	0.60	348.30	528.0	3.8	-1.6	-3.8	0.31	0.00		
620.0	0.50	324.60	620.0	4.6	-1.9	-4.6	0.27	-0.11		
870.0	0.80	354.90	870.0	7.2	-2.7	-7.2	0.18	0.12		
955.0	1.00	334.90	955.0	8.4	-3.1	-8.5	0.43	0.24		
1,051.0	1.00	329.20	1,050.9	9.9	-3.9	-9.9	0.10	0.00		
1,143.0	1.20	331.20	1,142.9	11.5	-4.8	-11.5	0.22	0.22		
1,236.0	1.20	329.70	1,235.9	13.2	-5.7	-13.2	0.03	0.00		
1,328.0	1.30	332.10	1,327.9	14.9	-6.7	-14.9	0.12	0.11		

Survey Report

Company:	Petroleum Development Corp.	Local Co-ordinate Reference:	Well BECKER RANCH 5M-303
Project:	Weld County	TVD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Site:	S5-T3N-R64W	MD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Well:	BECKER RANCH 5M-303	North Reference:	True
Wellbore:	OH	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
1,420.0	0.90	333.00	1,419.9	16.5	-7.5	-16.5	0.44	-0.43	
1,512.0	0.80	322.40	1,511.9	17.6	-8.2	-17.7	0.20	-0.11	
1,604.0	0.70	329.70	1,603.8	18.6	-8.9	-18.7	0.15	-0.11	
1,696.0	0.80	319.80	1,695.8	19.6	-9.6	-19.7	0.18	0.11	
1,789.0	0.60	355.50	1,788.8	20.6	-10.1	-20.6	0.50	-0.22	
1,881.0	0.80	348.20	1,880.8	21.7	-10.2	-21.7	0.24	0.22	
1,973.0	0.70	314.20	1,972.8	22.7	-10.8	-22.8	0.49	-0.11	
2,066.0	2.50	36.40	2,065.8	24.7	-10.0	-24.8	2.69	1.94	
2,158.0	3.60	38.70	2,157.6	28.6	-7.0	-28.6	1.20	1.20	
2,250.0	5.20	46.60	2,249.4	33.7	-2.1	-33.7	1.86	1.74	
2,342.0	3.90	42.60	2,341.1	38.9	3.0	-38.9	1.45	-1.41	
2,435.0	4.20	69.60	2,433.9	42.4	8.4	-42.4	2.06	0.32	
2,527.0	3.40	62.60	2,525.7	44.8	13.9	-44.8	1.00	-0.87	
2,619.0	4.80	73.90	2,617.4	47.2	20.1	-47.0	1.75	1.52	
2,712.0	7.40	66.70	2,709.9	50.6	29.3	-50.4	2.91	2.80	
2,803.0	7.80	63.80	2,800.1	55.7	40.2	-55.4	0.61	0.44	
2,897.0	7.50	68.60	2,893.3	60.7	51.7	-60.4	0.75	-0.32	
2,992.0	6.20	71.50	2,987.6	64.6	62.3	-64.2	1.42	-1.37	
3,088.0	6.10	65.50	3,083.0	68.4	71.8	-67.9	0.68	-0.10	
3,183.0	7.90	49.00	3,177.3	74.7	81.4	-74.3	2.82	1.89	
3,279.0	6.20	42.60	3,272.6	82.9	89.9	-82.4	1.95	-1.77	
3,374.0	7.30	38.30	3,366.9	91.4	97.1	-90.8	1.27	1.16	
3,469.0	7.70	35.00	3,461.1	101.3	104.5	-100.7	0.62	0.42	
3,565.0	8.80	33.50	3,556.1	112.7	112.2	-112.1	1.17	1.15	
3,660.0	7.00	28.70	3,650.2	123.9	119.0	-123.2	2.02	-1.89	
3,756.0	8.50	34.90	3,745.3	134.8	125.9	-134.1	1.79	1.56	
3,851.0	10.50	34.40	3,839.0	147.7	134.8	-147.0	2.11	2.11	
3,947.0	10.00	31.50	3,933.5	162.1	144.1	-161.2	0.75	-0.52	
4,042.0	8.10	30.40	4,027.3	174.9	151.8	-174.0	2.01	-2.00	
4,137.0	7.70	31.30	4,121.4	186.1	158.5	-185.2	0.44	-0.42	
4,233.0	8.90	19.50	4,216.4	198.6	164.3	-197.6	2.16	1.25	
4,328.0	6.20	15.80	4,310.6	210.4	168.1	-209.5	2.89	-2.84	
4,424.0	7.90	23.20	4,405.9	221.5	172.1	-220.5	2.00	1.77	
4,519.0	9.00	32.70	4,499.8	233.7	178.7	-232.7	1.87	1.16	
4,615.0	7.30	28.10	4,594.9	245.4	185.7	-244.4	1.90	-1.77	
4,710.0	7.40	43.40	4,689.1	255.2	192.7	-254.1	2.06	0.11	
4,805.0	6.90	53.50	4,783.3	263.1	201.5	-261.9	1.42	-0.53	
4,901.0	4.70	44.10	4,878.9	269.3	208.9	-268.1	2.49	-2.29	
4,996.0	3.20	32.90	4,973.6	274.3	213.0	-273.1	1.77	-1.58	
5,092.0	2.90	24.50	5,069.5	278.8	215.5	-277.5	0.56	-0.31	
5,187.0	2.00	62.70	5,164.4	281.7	218.0	-280.5	1.91	-0.95	
5,283.0	0.70	225.30	5,260.4	282.1	219.0	-280.8	2.79	-1.35	
5,378.0	0.50	229.30	5,355.4	281.4	218.3	-280.2	0.21	-0.21	
5,473.0	0.70	268.70	5,450.4	281.1	217.4	-279.9	0.47	0.21	
5,569.0	1.30	166.90	5,546.4	280.1	217.1	-278.8	1.66	0.62	
5,664.0	0.90	215.40	5,641.4	278.4	216.9	-277.1	1.03	-0.42	
5,760.0	1.20	218.90	5,737.3	277.0	215.8	-275.8	0.32	0.31	
5,855.0	1.00	103.00	5,832.3	276.0	216.0	-274.8	1.97	-0.21	
5,950.0	0.70	71.20	5,927.3	276.0	217.3	-274.8	0.58	-0.32	
6,046.0	0.10	339.50	6,023.3	276.3	217.9	-275.0	0.74	-0.62	
6,141.0	0.80	239.60	6,118.3	276.0	217.3	-274.8	0.87	0.74	
6,237.0	1.50	249.60	6,214.3	275.3	215.5	-274.0	0.76	0.73	
6,285.0	1.50	241.60	6,262.3	274.8	214.4	-273.5	0.44	0.00	

Survey Report

Company:	Petroleum Development Corp.	Local Co-ordinate Reference:	Well BECKER RANCH 5M-303
Project:	Weld County	TVD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Site:	S5-T3N-R64W	MD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Well:	BECKER RANCH 5M-303	North Reference:	True
Wellbore:	OH	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
6,332.0	4.00	171.00	6,309.2	272.8	214.1	-271.6	8.03	5.32	
6,380.0	8.20	173.70	6,356.9	267.8	214.7	-266.5	8.77	8.75	
6,428.0	12.70	173.20	6,404.1	259.1	215.7	-257.9	9.38	9.37	
6,476.0	16.00	173.00	6,450.6	247.3	217.2	-246.1	6.88	6.87	
6,523.0	19.30	168.50	6,495.4	233.3	219.5	-232.0	7.59	7.02	
6,571.0	21.90	170.90	6,540.3	216.7	222.5	-215.4	5.69	5.42	
6,619.0	24.80	176.30	6,584.4	197.8	224.6	-196.5	7.50	6.04	
6,667.0	29.20	173.90	6,627.2	176.1	226.5	-174.8	9.44	9.17	
6,714.0	29.40	173.10	6,668.2	153.2	229.1	-151.9	0.94	0.43	
6,762.0	32.20	172.40	6,709.4	128.8	232.2	-127.5	5.88	5.83	
6,809.0	35.50	172.00	6,748.4	102.9	235.7	-101.6	7.04	7.02	
6,857.0	39.40	171.50	6,786.5	74.0	239.9	-72.7	8.15	8.12	
6,906.0	43.90	169.00	6,823.1	42.0	245.5	-40.5	9.79	9.18	
6,954.0	50.60	171.60	6,855.7	7.2	251.4	-5.8	14.51	13.96	
7,001.0	58.50	174.30	6,882.9	-30.7	256.0	32.2	17.45	16.81	
7,049.0	64.20	179.30	6,905.9	-72.8	258.3	74.2	14.98	11.87	
7,096.0	69.10	179.00	6,924.6	-115.9	258.9	117.4	10.44	10.43	
7,144.0	75.70	179.50	6,939.1	-161.6	259.5	163.1	13.79	13.75	
7,192.0	81.60	180.50	6,948.5	-208.7	259.5	210.1	12.46	12.29	
7,240.0	85.00	180.70	6,954.1	-256.3	259.0	257.8	7.10	7.08	
7,287.0	88.20	180.30	6,956.9	-303.2	258.6	304.7	6.86	6.81	
7,303.0	89.70	180.30	6,957.2	-319.2	258.5	320.7	9.37	9.37	
7,394.0	91.30	180.40	6,956.4	-410.2	258.0	411.7	1.76	1.76	
7,490.0	92.20	180.00	6,953.5	-506.2	257.7	507.6	1.03	0.94	
7,585.0	93.00	179.50	6,949.2	-601.1	258.1	602.5	0.99	0.84	
7,681.0	92.90	179.90	6,944.2	-696.9	258.6	698.4	0.43	-0.10	
7,776.0	93.40	180.00	6,939.0	-791.8	258.7	793.3	0.54	0.53	
7,871.0	91.00	181.50	6,935.4	-886.7	257.4	888.2	2.98	-2.53	
7,967.0	89.10	180.80	6,935.3	-982.7	255.5	984.1	2.11	-1.98	
8,062.0	89.40	180.00	6,936.5	-1,077.7	254.8	1,079.1	0.90	0.32	
8,158.0	88.60	179.70	6,938.2	-1,173.7	255.1	1,175.1	0.89	-0.83	
8,253.0	90.30	179.20	6,939.1	-1,268.6	256.0	1,270.1	1.87	1.79	
8,349.0	91.40	178.30	6,937.7	-1,364.6	258.1	1,366.1	1.48	1.15	
8,444.0	92.00	177.70	6,934.9	-1,459.5	261.4	1,461.0	0.89	0.63	
8,539.0	92.70	177.70	6,931.0	-1,554.3	265.2	1,555.8	0.74	0.74	
8,635.0	93.40	179.80	6,925.9	-1,650.2	267.3	1,651.7	2.30	0.73	
8,731.0	91.90	181.00	6,921.4	-1,746.1	266.6	1,747.6	2.00	-1.56	
8,826.0	92.00	180.70	6,918.2	-1,841.0	265.2	1,842.5	0.33	0.11	
8,921.0	92.40	180.00	6,914.5	-1,935.9	264.6	1,937.4	0.85	0.42	
9,017.0	93.10	179.70	6,909.9	-2,031.8	264.9	2,033.3	0.79	0.73	
9,112.0	92.00	179.70	6,905.7	-2,126.7	265.4	2,128.2	1.16	-1.16	
9,208.0	92.50	180.00	6,901.9	-2,222.7	265.6	2,224.1	0.61	0.52	
9,303.0	93.20	179.50	6,897.2	-2,317.5	266.0	2,319.0	0.91	0.74	
9,398.0	91.50	180.50	6,893.3	-2,412.4	266.0	2,413.9	2.08	-1.79	
9,494.0	92.90	180.10	6,889.6	-2,508.4	265.5	2,509.9	1.52	1.46	
9,589.0	93.10	180.70	6,884.7	-2,603.2	264.9	2,604.7	0.66	0.21	
9,685.0	93.10	181.00	6,879.5	-2,699.1	263.5	2,700.6	0.31	0.00	
9,780.0	91.60	180.70	6,875.6	-2,794.0	262.1	2,795.5	1.61	-1.58	
9,876.0	91.30	182.70	6,873.1	-2,889.9	259.2	2,891.4	2.11	-0.31	
9,971.0	89.80	182.10	6,872.2	-2,984.8	255.2	2,986.2	1.70	-1.58	
10,067.0	89.50	182.10	6,872.8	-3,080.8	251.7	3,082.2	0.31	-0.31	
10,162.0	90.60	181.30	6,872.7	-3,175.7	248.9	3,177.1	1.43	1.16	
10,257.0	90.90	180.00	6,871.5	-3,270.7	247.8	3,272.1	1.40	0.32	

Survey Report

Company:	Petroleum Development Corp.	Local Co-ordinate Reference:	Well BECKER RANCH 5M-303
Project:	Weld County	TVD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Site:	S5-T3N-R64W	MD Reference:	13' KB @ 4829.0usft (ENSIGN 124)
Well:	BECKER RANCH 5M-303	North Reference:	True
Wellbore:	OH	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
10,353.0	91.40	179.50	6,869.6	-3,366.7	248.2	3,368.1	0.74	0.52	
10,544.0	92.00	178.90	6,863.9	-3,557.6	250.9	3,559.0	0.44	0.31	
10,639.0	92.40	178.40	6,860.3	-3,652.5	253.1	3,653.9	0.67	0.42	
10,734.0	90.20	178.70	6,858.1	-3,747.4	255.5	3,748.8	2.34	-2.32	
10,829.0	90.30	179.80	6,857.7	-3,842.4	256.8	3,843.8	1.16	0.11	
10,925.0	89.40	178.20	6,857.9	-3,938.4	258.5	3,939.8	1.91	-0.94	
11,020.0	90.50	180.30	6,858.0	-4,033.4	259.7	4,034.8	2.50	1.16	
11,115.0	90.20	179.20	6,857.4	-4,128.4	260.1	4,129.8	1.20	-0.32	
11,211.0	91.60	179.50	6,855.9	-4,224.3	261.2	4,225.8	1.49	1.46	
11,306.0	91.50	179.20	6,853.4	-4,319.3	262.3	4,320.7	0.33	-0.11	
11,402.0	91.60	178.70	6,850.8	-4,415.3	264.0	4,416.7	0.53	0.10	LAST CES SURVEY @ 11,402' MD
11,467.0	91.60	178.70	6,848.9	-4,480.2	265.5	4,481.7	0.00	0.00	PTB @ 11,467' MD - TD @ 520' FSL, 2429' FWL

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
BECKER RANCH 5M-303 - actual wellpath misses target center by 20.5usft at 11467.0usft MD (6848.9 TVD, -4480.2 N, 265.5 E) - Point	0.00	0.00	6,847.0	-4,498.9	273.5	1,334,733.92	3,258,075.69	40.248550	-104.575420
BECKER RANCH 5M-303 - actual wellpath misses target center by 43.2usft at 11467.0usft MD (6848.9 TVD, -4480.2 N, 265.5 E) - Point	0.00	0.00	6,887.0	-4,498.9	273.5	1,334,733.92	3,258,075.69	40.248550	-104.575420

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,343.0	6,957.2	7" (673' FNL, 2443' FWL)	0	0

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft) +E/-W (usft)	Comment	
11,402.0	6,850.8	-4,415.3 264.0	LAST CES SURVEY @ 11,402' MD	
11,467.0	6,848.9	-4,480.2 265.5	PTB @ 11,467' MD	
11,467.0	6,848.9	-4,480.2 265.5	TD @ 520' FSL, 2429' FWL	

Checked By: _____ Approved By: _____ Date: _____