

# Petro Operating Company

Location Weld County, CO Slot BEF West 20  
Field Wattenberg Well W BEF West 20  
Installation Brighton East Farm Pad Wellbore W BEF West 20 (PWB)

Tie on - 0.00 Inc, 21.00 MD, 21.00 TVD, 0.00 VS

Scale 1 cm = 400 ft East (Feet) ->

-5600 -4800 -4000 -3200 -2400 -1600 -800 -0 800 1600

Created by admin  
Date plotted 12-Nov-2018  
Plot reference is W BEF West 20 (PWB).  
Ref wellpath is W BEF West 20 (PWP#1).  
Coordinates are in Feet reference BEF West 20.  
True Vertical Depths are reference Rig Datum.  
Measured Depths are reference Rig Datum.  
Rig Datum: Planned Datum #1  
Rig Datum to Mean Sea Level: 5068.00 ft.  
Plot North is aligned to GRID North.

BEF WEST 20 BHL

BEF WEST 20 EP

W BEF West 20 (PWB)

3DS Kick off Point - 0.00 Inc, 1500.00 MD, 1500.00 TVD, 0.00 VS

Surface 0.00 N 0.00 E

End of Build - 12.85 Inc, 2142.62 MD, 2137.24 TVD, 4.91 VS

## WELL PROFILE DATA

Point	MD	Inc	Azi	TVD	North	East	deg/100ft	V. Sect
Tie on	21.00	0.00	0.00	21.00	S 0.00	W 0.00	0.00	0.00
KOP	1500.00	0.00	11.10	1500.00	S 0.00	W 0.00	0.00	0.00
End of Build	2142.62	12.85	11.10	2137.24	N 70.43	E 13.81	2.00	4.91
End of Hold	7110.95	12.85	11.10	6981.10	N 1154.93	E 226.50	0.00	80.57
Target BEF WEST 20 EP	7885.86	90.40	269.35	7468.00	N 1259.06	W 254.97	12.00	572.56
T.D. & Target BEF...BHL	12144.23	90.40	269.35	7438.00	N 1211.01	W 4512.96	0.00	4672.62

End of Hold - 12.85 Inc, 7110.95 MD, 6981.10 TVD, 80.57 VS

BEF WEST 20 EP

S/C Kick off Point - 90.40 Inc, 7885.86 MD, 7468.00 TVD, 572.56 VS

T.D. & End of Hold - 7438.00 TVD, 1211.01 N 4512.96 W

N  
GRID

On 4-20-17  
DRAKE (01-15 20000.00 00000.00) (01-15 40.00 deg East: 50100.00 ft)  
Lat: 40.00 N 100.00 W Long: 100.00 W 100.00 W 100.00 W  
Magnetic North is 0.22 deg East of True North  
GRID North is 0.40 deg East of True North  
To correct azimuth from True to GRID add/sub 0.40 deg  
To correct azimuth from Magnetic to GRID add/sub 0.22 deg

W BEF West 20 (PWB)

BEF WEST 20 BHL

<- North(Feet) Scale 1 cm = 400 ft

<- True Vertical Depth (Feet)

Scale 1 cm = 200 ft Vertical Section (Feet) ->

Azimuth 285.02 with reference 0.00 N, 0.00 E from BEF West 20



SYSDRILL  
Well Design Combined Report  
Wellbore: W BEF West 20 (PWB)



Wellhead Details							
Name	Latitude	Longitude	Northing	Easting	North	East	Slot Elevation Above Ground
BEF West 20	39.99485000	-104.73470000	1241896.0701	3214415.0721	764.95N	9.40W	0.00

Declination		
Date	Source	Time
Oct-6-2017	EMM-2015 [2000.0-2020.0]	14:35

Installation Details						
Name	Installation Position (Latitude)	Installation Position (Longitude)	Northing	Easting	Coord System Name	North Alignment
Brighton East Farm Pad	39.99275000	-104.73469000	1241131.1481	3214424.4758	CO83-NF on NORTH AMERICAN DATUM 1983 datum	Grid

Summary Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	Vertical Depth SS	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]
21.00	0.00	0.000	21.00	-5047.00	0.00N	0.00E		0.00
1500.00	0.00	11.100	1500.00	-3568.00	0.00N	0.00E	==>	0.00
2142.62	12.85	11.100	2137.24	-2930.76	70.43N	13.81E	2.00	4.91
7110.95	12.85	11.100	6981.10	1913.10	1154.93N	226.50E	==>	80.57
7885.86	90.40	269.350	7468.00	2400.00	1259.06N	254.97W	12.00	572.56
12144.23	90.40	269.350	7438.00	2370.00	1211.01N	4512.96W	==>	4672.62

Interpolated Wellpath									
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	Station Position (Latitude)	Station Position (Longitude)
0.00	0.00	0.000	0.00	0.00N	0.00E		0.00	39.99485000	-104.73470000
21.00	0.00	0.000	21.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
100.00	0.00	0.000	100.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
200.00	0.00	0.000	200.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
300.00	0.00	0.000	300.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
400.00	0.00	0.000	400.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
500.00	0.00	0.000	500.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
600.00	0.00	0.000	600.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
700.00	0.00	0.000	700.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
800.00	0.00	0.000	800.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
900.00	0.00	0.000	900.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
1000.00	0.00	0.000	1000.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
1100.00	0.00	0.000	1100.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
1200.00	0.00	0.000	1200.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
1300.00	0.00	0.000	1300.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
1400.00	0.00	0.000	1400.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
1500.00	0.00	11.100	1500.00	0.00N	0.00E	==>	0.00	39.99485000	-104.73470000
1600.00	2.00	11.100	1599.98	1.71N	0.34E	2.00	0.12	39.99485469	-104.73469875
1700.00	4.00	11.100	1699.84	6.85N	1.34E	2.00	0.48	39.99486877	-104.73469500
1800.00	6.00	11.100	1799.45	15.40N	3.02E	2.00	1.07	39.99489220	-104.73468875
1900.00	8.00	11.100	1898.70	27.36N	5.37E	2.00	1.91	39.99492497	-104.73468001
2000.00	10.00	11.100	1997.47	42.71N	8.38E	2.00	2.98	39.99496704	-104.73466879
2100.00	12.00	11.100	2095.62	61.43N	12.05E	2.00	4.29	39.99501835	-104.73465511
2142.62	12.85	11.100	2137.24	70.43N	13.81E	2.00	4.91	39.99504301	-104.73464853
2200.00	12.85	11.100	2193.19	82.96N	16.27E	==>	5.79	39.99507733	-104.73463938
2300.00	12.85	11.100	2290.68	104.78N	20.55E	==>	7.31	39.99513715	-104.73462343
2400.00	12.85	11.100	2388.18	126.61N	24.83E	==>	8.83	39.99519696	-104.73460748
2500.00	12.85	11.100	2485.67	148.44N	29.11E	==>	10.35	39.99525678	-104.73459153
2600.00	12.85	11.100	2583.17	170.27N	33.39E	==>	11.88	39.99531660	-104.73457558
2700.00	12.85	11.100	2680.66	192.10N	37.67E	==>	13.40	39.99537641	-104.73455963
2800.00	12.85	11.100	2778.15	213.93N	41.95E	==>	14.92	39.99543623	-104.73454368
2900.00	12.85	11.100	2875.65	235.75N	46.23E	==>	16.45	39.99549605	-104.73452773

All data is in Feet unless otherwise stated  
Coordinates are from Slot MD's are from Rig and TVD's are from Rig ( Planned Datum #1 5068.0ft above Mean Sea Level )  
Vertical Section is from 0.00N 0.00E on azimuth 285.020 degrees  
Bottom hole distance is 4672.62 Feet on azimuth 285.02 degrees from Wellhead  
Calculation method uses Minimum Curvature method  
Prepared by IPT  
Date Printed: 12-Nov-2018



SYSDRILL  
Well Design Combined Report  
Wellbore: W BEF West 20 (PWB)



Interpolated Wellpath									
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	Station Position (Latitude)	Station Position (Longitude)
3000.00	12.85	11.100	2973.14	257.58N	50.52E	==>	17.97	39.99555586	-104.73451178
3100.00	12.85	11.100	3070.64	279.41N	54.80E	==>	19.49	39.99561568	-104.73449583
3200.00	12.85	11.100	3168.13	301.24N	59.08E	==>	21.01	39.99567550	-104.73447988
3300.00	12.85	11.100	3265.63	323.07N	63.36E	==>	22.54	39.99573531	-104.73446393
3400.00	12.85	11.100	3363.12	344.89N	67.64E	==>	24.06	39.99579513	-104.73444797
3500.00	12.85	11.100	3460.62	366.72N	71.92E	==>	25.58	39.99585495	-104.73443202
3600.00	12.85	11.100	3558.11	388.55N	76.20E	==>	27.10	39.99591476	-104.73441607
3700.00	12.85	11.100	3655.61	410.38N	80.48E	==>	28.63	39.99597458	-104.73440012
3800.00	12.85	11.100	3753.10	432.21N	84.76E	==>	30.15	39.99603439	-104.73438417
3900.00	12.85	11.100	3850.60	454.04N	89.04E	==>	31.67	39.99609421	-104.73436822
4000.00	12.85	11.100	3948.09	475.86N	93.32E	==>	33.20	39.99615403	-104.73435227
4100.00	12.85	11.100	4045.59	497.69N	97.60E	==>	34.72	39.99621384	-104.73433632
4200.00	12.85	11.100	4143.08	519.52N	101.89E	==>	36.24	39.99627366	-104.73432037
4300.00	12.85	11.100	4240.57	541.35N	106.17E	==>	37.76	39.99633348	-104.73430442
4400.00	12.85	11.100	4338.07	563.18N	110.45E	==>	39.29	39.99639329	-104.73428847
4500.00	12.85	11.100	4435.56	585.00N	114.73E	==>	40.81	39.99645311	-104.73427251
4600.00	12.85	11.100	4533.06	606.83N	119.01E	==>	42.33	39.99651293	-104.73425656
4700.00	12.85	11.100	4630.55	628.66N	123.29E	==>	43.85	39.99657274	-104.73424061
4800.00	12.85	11.100	4728.05	650.49N	127.57E	==>	45.38	39.99663256	-104.73422466
4900.00	12.85	11.100	4825.54	672.32N	131.85E	==>	46.90	39.99669238	-104.73420871
5000.00	12.85	11.100	4923.04	694.14N	136.13E	==>	48.42	39.99675219	-104.73419276
5100.00	12.85	11.100	5020.53	715.97N	140.41E	==>	49.94	39.99681201	-104.73417681
5200.00	12.85	11.100	5118.03	737.80N	144.69E	==>	51.47	39.99687183	-104.73416086
5300.00	12.85	11.100	5215.52	759.63N	148.97E	==>	52.99	39.99693164	-104.73414491
5400.00	12.85	11.100	5313.02	781.46N	153.25E	==>	54.51	39.99699146	-104.73412895
5500.00	12.85	11.100	5410.51	803.29N	157.54E	==>	56.04	39.99705128	-104.73411300
5600.00	12.85	11.100	5508.00	825.11N	161.82E	==>	57.56	39.99711109	-104.73409705
5700.00	12.85	11.100	5605.50	846.94N	166.10E	==>	59.08	39.99717091	-104.73408110
5800.00	12.85	11.100	5702.99	868.77N	170.38E	==>	60.60	39.99723073	-104.73406515
5900.00	12.85	11.100	5800.49	890.60N	174.66E	==>	62.13	39.99729054	-104.73404920
6000.00	12.85	11.100	5897.98	912.43N	178.94E	==>	63.65	39.99735036	-104.73403325
6100.00	12.85	11.100	5995.48	934.25N	183.22E	==>	65.17	39.99741017	-104.73401729
6200.00	12.85	11.100	6092.97	956.08N	187.50E	==>	66.69	39.99746999	-104.73400134
6300.00	12.85	11.100	6190.47	977.91N	191.78E	==>	68.22	39.99752981	-104.73398539
6400.00	12.85	11.100	6287.96	999.74N	196.06E	==>	69.74	39.99758962	-104.73396944
6500.00	12.85	11.100	6385.46	1021.57N	200.34E	==>	71.26	39.99764944	-104.73395349
6600.00	12.85	11.100	6482.95	1043.39N	204.62E	==>	72.79	39.99770926	-104.73393754
6700.00	12.85	11.100	6580.45	1065.22N	208.91E	==>	74.31	39.99776907	-104.73392159
6800.00	12.85	11.100	6677.94	1087.05N	213.19E	==>	75.83	39.99782889	-104.73390563
6900.00	12.85	11.100	6775.44	1108.88N	217.47E	==>	77.35	39.99788871	-104.73388968
7000.00	12.85	11.100	6872.93	1130.71N	221.75E	==>	78.88	39.99794852	-104.73387373
7100.00	12.85	11.100	6970.42	1152.54N	226.03E	==>	80.40	39.99800834	-104.73385778
7110.95	12.85	11.100	6981.10	1154.93N	226.50E	==>	80.57	39.99801489	-104.73385603
7200.00	14.95	326.280	7067.78	1174.25N	222.02E	12.00	89.90	39.99806805	-104.73387143
7300.00	23.59	300.220	7162.26	1195.13N	197.48E	12.00	119.01	39.99812593	-104.73395837
7400.00	34.25	288.610	7249.73	1214.24N	153.36E	12.00	166.58	39.99817945	-104.73411524
7500.00	45.52	282.120	7326.38	1230.77N	91.59E	12.00	230.52	39.99822629	-104.73433519
7600.00	57.03	277.780	7388.85	1243.99N	14.87E	12.00	308.04	39.99826438	-104.73460861
7700.00	68.66	274.450	7434.42	1253.31N	73.45W	12.00	395.76	39.99829207	-104.73492354
7800.00	80.35	271.620	7461.09	1258.34N	169.50W	12.00	489.84	39.99830815	-104.73526622
7885.86	90.40	269.350	7468.00	1259.06N	254.97W	12.00	572.56	39.99831213	-104.73557122
7900.00	90.40	269.350	7467.90	1258.90N	269.11W	==>	586.18	39.99831203	-104.73562169
8000.00	90.40	269.350	7467.20	1257.77N	369.10W	==>	682.46	39.99831130	-104.73597861
8100.00	90.40	269.350	7466.49	1256.64N	469.09W	==>	778.74	39.99831056	-104.73633552
8200.00	90.40	269.350	7465.79	1255.51N	569.08W	==>	875.03	39.99830983	-104.73669244
8300.00	90.40	269.350	7465.08	1254.38N	669.07W	==>	971.31	39.99830909	-104.73704935
8400.00	90.40	269.350	7464.38	1253.25N	769.06W	==>	1067.59	39.99830836	-104.73740627
8500.00	90.40	269.350	7463.67	1252.13N	869.05W	==>	1163.87	39.99830762	-104.73776319

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Vertical Section is from 0.00N 0.00E on azimuth 285.020 degrees  
Bottom hole distance is 4672.62 Feet on azimuth 285.02 degrees from Wellhead  
Calculation method uses Minimum Curvature method  
Prepared by IPT  
Date Printed: 12-Nov-2018



SYSDRILL  
Well Design Combined Report  
Wellbore: W BEF West 20 (PWB)



Interpolated Wellpath									
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	Station Position (Latitude)	Station Position (Longitude)
8600.00	90.40	269.350	7462.97	1251.00N	969.04W	==>	1260.16	39.99830688	-104.73812010
8700.00	90.40	269.350	7462.26	1249.87N	1069.03W	==>	1356.44	39.99830614	-104.73847702
8800.00	90.40	269.350	7461.56	1248.74N	1169.03W	==>	1452.72	39.99830540	-104.73883393
8900.00	90.40	269.350	7460.86	1247.61N	1269.02W	==>	1549.00	39.99830466	-104.73919085
9000.00	90.40	269.350	7460.15	1246.48N	1369.01W	==>	1645.28	39.99830392	-104.73954776
9100.00	90.40	269.350	7459.45	1245.36N	1469.00W	==>	1741.57	39.99830317	-104.73990468
9200.00	90.40	269.350	7458.74	1244.23N	1568.99W	==>	1837.85	39.99830243	-104.74026159
9300.00	90.40	269.350	7458.04	1243.10N	1668.98W	==>	1934.13	39.99830168	-104.74061851
9400.00	90.40	269.350	7457.33	1241.97N	1768.97W	==>	2030.41	39.99830094	-104.74097542
9500.00	90.40	269.350	7456.63	1240.84N	1868.96W	==>	2126.69	39.99830019	-104.74133234
9600.00	90.40	269.350	7455.92	1239.71N	1968.96W	==>	2222.98	39.99829944	-104.74168926
9700.00	90.40	269.350	7455.22	1238.59N	2068.95W	==>	2319.26	39.99829869	-104.74204617
9800.00	90.40	269.350	7454.51	1237.46N	2168.94W	==>	2415.54	39.99829794	-104.74240309
9900.00	90.40	269.350	7453.81	1236.33N	2268.93W	==>	2511.82	39.99829718	-104.74276000
10000.00	90.40	269.350	7453.11	1235.20N	2368.92W	==>	2608.11	39.99829643	-104.74311692
10100.00	90.40	269.350	7452.40	1234.07N	2468.91W	==>	2704.39	39.99829567	-104.74347383
10200.00	90.40	269.350	7451.70	1232.94N	2568.90W	==>	2800.67	39.99829492	-104.74383075
10300.00	90.40	269.350	7450.99	1231.82N	2668.89W	==>	2896.95	39.99829416	-104.74418766
10400.00	90.40	269.350	7450.29	1230.69N	2768.88W	==>	2993.23	39.99829340	-104.74454458
10500.00	90.40	269.350	7449.58	1229.56N	2868.88W	==>	3089.52	39.99829264	-104.74490149
10600.00	90.40	269.350	7448.88	1228.43N	2968.87W	==>	3185.80	39.99829188	-104.74525841
10700.00	90.40	269.350	7448.17	1227.30N	3068.86W	==>	3282.08	39.99829112	-104.74561532
10800.00	90.40	269.350	7447.47	1226.17N	3168.85W	==>	3378.36	39.99829036	-104.74597224
10900.00	90.40	269.350	7446.77	1225.05N	3268.84W	==>	3474.65	39.99828960	-104.74632915
11000.00	90.40	269.350	7446.06	1223.92N	3368.83W	==>	3570.93	39.99828883	-104.74668607
11100.00	90.40	269.350	7445.36	1222.79N	3468.82W	==>	3667.21	39.99828806	-104.74704299
11200.00	90.40	269.350	7444.65	1221.66N	3568.81W	==>	3763.49	39.99828730	-104.74739990
11300.00	90.40	269.350	7443.95	1220.53N	3668.80W	==>	3859.77	39.99828653	-104.74775682
11400.00	90.40	269.350	7443.24	1219.41N	3768.80W	==>	3956.06	39.99828576	-104.74811373
11500.00	90.40	269.350	7442.54	1218.28N	3868.79W	==>	4052.34	39.99828499	-104.74847065
11600.00	90.40	269.350	7441.83	1217.15N	3968.78W	==>	4148.62	39.99828422	-104.74882756
11700.00	90.40	269.350	7441.13	1216.02N	4068.77W	==>	4244.90	39.99828345	-104.74918448
11800.00	90.40	269.350	7440.43	1214.89N	4168.76W	==>	4341.18	39.99828267	-104.74954139
11900.00	90.40	269.350	7439.72	1213.76N	4268.75W	==>	4437.47	39.99828190	-104.74989831
12000.00	90.40	269.350	7439.02	1212.64N	4368.74W	==>	4533.75	39.99828112	-104.75025522
12100.00	90.40	269.350	7438.31	1211.51N	4468.73W	==>	4630.03	39.99828034	-104.75061214
12144.23	90.40	269.350	7438.00	1211.01N	4512.96W	==>	4672.62	39.99828000	-104.75077000

All data is in Feet unless otherwise stated  
Coordinates are from Slot MD's are from Rig and TVD's are from Rig ( Planned Datum #1 5068.0ft above Mean Sea Level )  
Vertical Section is from 0.00N 0.00E on azimuth 285.020 degrees  
Bottom hole distance is 4672.62 Feet on azimuth 285.02 degrees from Wellhead  
Calculation method uses Minimum Curvature method  
Prepared by IPT  
Date Printed: 12-Nov-2018



Targets							
Name	North[ft]	East[ft]	TVD[ft]	Latitude	Longitude	Northing	Easting
BEF WEST 20 BHL	1211.01N	4512.96W	7438.00	39.99828000	-104.75077000	1243107.04	3209902.27
BEF WEST 20 EP	1259.06N	164.97W	7468.00	39.99831000	-104.73525000	1243155.08	3214250.11

Survey Tool Program						
Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model	
577689	Planned	2000.00	1997.47	WdW Rate Gyro	Standard	
577688	Planned	12144.23	7438.00	ISCWSA MWD	Rev 4 + SAG + FLT	

Notes