

**Azimuth 180.17 with reference 7.98 N, 518.20 E from Installation Centre**



SYSDRILL  
Well Design Combined Report  
Wellbore: HOMESTEAD 20 (PWB)

Wellhead Details							
Name	Latitude	Longitude	Northing	Easting	North	East	Slot Elevation Above Ground
HOMESTEAD 20	40.00720000	-104.75743000	1246340.5504	3208009.2576	7.98N	518.20E	0.00

Declination		
Date	Source	Time
13-Aug-2015	IGRF Model [1900.0-2020.0]	08:38

Installation Details						
Name	Installation Position (Latitude)	Installation Position (Longitude)	Northing	Easting	Coord System Name	North Alignment
Homestead	40.00719000	-104.75928000	1246332.5735	3207491.0767	CO83-NF on NORTH AMERICAN DATUM 1983 datum	Grid

Summary Wellpath									
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	Northing	Easting
23.00	0.00	0.000	23.00	0.00N	0.00E		0.00	1246340.55	3208009.26
14829.86	90.04	179.330	7714.00	6940.08S	20.34W	==>	6940.11	1239400.72	3207988.91

Interpolated Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	All Station Comments
0.00	0.00	0.000	0.00	0.00N	0.00E		0.00	Rig Datum Slot Datum
23.00	0.00	0.000	23.00	0.00N	0.00E	==>	0.00	
100.00	0.00	0.000	100.00	0.00N	0.00E	==>	0.00	
200.00	0.00	0.000	200.00	0.00N	0.00E	==>	0.00	
300.00	0.00	0.000	300.00	0.00N	0.00E	==>	0.00	
400.00	0.00	0.000	400.00	0.00N	0.00E	==>	0.00	
500.00	0.00	0.000	500.00	0.00N	0.00E	==>	0.00	
600.00	0.00	0.000	600.00	0.00N	0.00E	==>	0.00	
700.00	0.00	0.000	700.00	0.00N	0.00E	==>	0.00	
800.00	0.00	0.000	800.00	0.00N	0.00E	==>	0.00	
900.00	0.00	0.000	900.00	0.00N	0.00E	==>	0.00	
1000.00	0.00	0.000	1000.00	0.00N	0.00E	==>	0.00	
1100.00	0.00	0.000	1100.00	0.00N	0.00E	==>	0.00	
1200.00	0.00	0.000	1200.00	0.00N	0.00E	==>	0.00	
1300.00	0.00	0.000	1300.00	0.00N	0.00E	==>	0.00	
1400.00	0.00	0.000	1400.00	0.00N	0.00E	==>	0.00	9 5/8in Surface Casing
1450.00	0.00	0.000	1450.00	0.00N	0.00E	==>	0.00	
1500.00	0.00	0.000	1500.00	0.00N	0.00E	==>	0.00	
1600.00	1.00	348.330	1600.00	0.43N	0.09W	2.00	-0.43	
1700.00	3.00	348.330	1699.93	3.84N	0.79W	2.00	-3.84	
1800.00	5.00	348.330	1799.68	10.68N	2.21W	2.00	-10.67	
1900.00	5.04	348.330	1899.30	19.28N	3.98W	==>	-19.27	
2000.00	5.04	348.330	1998.91	27.88N	5.76W	==>	-27.86	
2100.00	5.04	348.330	2098.52	36.48N	7.54W	==>	-36.46	
2200.00	5.04	348.330	2198.14	45.09N	9.32W	==>	-45.06	
2300.00	5.04	348.330	2297.75	53.69N	11.09W	==>	-53.66	
2400.00	5.04	348.330	2397.36	62.29N	12.87W	==>	-62.25	
2500.00	5.04	348.330	2496.98	70.89N	14.65W	==>	-70.85	
2600.00	5.04	348.330	2596.59	79.50N	16.43W	==>	-79.45	
2700.00	5.04	348.330	2696.20	88.10N	18.20W	==>	-88.04	
2800.00	5.04	348.330	2795.82	96.70N	19.98W	==>	-96.64	
2900.00	5.04	348.330	2895.43	105.30N	21.76W	==>	-105.24	
3000.00	5.04	348.330	2995.04	113.91N	23.54W	==>	-113.84	
3100.00	5.04	348.330	3094.66	122.51N	25.31W	==>	-122.43	
3200.00	5.04	348.330	3194.27	131.11N	27.09W	==>	-131.03	
3300.00	5.04	348.330	3293.88	139.71N	28.87W	==>	-139.63	
3400.00	5.04	348.330	3393.50	148.32N	30.65W	==>	-148.23	
3500.00	5.04	348.330	3493.11	156.92N	32.42W	==>	-156.82	
3600.00	5.04	348.330	3592.72	165.52N	34.20W	==>	-165.42	

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 5155.0ft above Mean Sea Level )  
Vertical Section is from 0.00N 0.00E on azimuth 180.170 degrees  
Bottom hole distance is 6940.11 Feet on azimuth 180.17 degrees from Wellhead  
Calculation method uses Minimum Curvature method  
Prepared by Integrated Petroleum Technologies, Inc.  
Date Printed: 4-Nov-2015



SYSDRILL  
Well Design Combined Report  
Wellbore: HOMESTEAD 20 (PWB)

Interpolated Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	All Station Comments
3700.00	5.04	348.330	3692.34	174.12N	35.98W	==>	-174.02	
3800.00	5.04	348.330	3791.95	182.73N	37.76W	==>	-182.62	
3900.00	5.04	348.330	3891.56	191.33N	39.53W	==>	-191.21	
4000.00	5.04	348.330	3991.18	199.93N	41.31W	==>	-199.81	
4100.00	5.04	348.330	4090.79	208.53N	43.09W	==>	-208.41	
4200.00	5.04	348.330	4190.41	217.14N	44.87W	==>	-217.00	
4300.00	5.04	348.330	4290.02	225.74N	46.64W	==>	-225.60	
4400.00	5.04	348.330	4389.63	234.34N	48.42W	==>	-234.20	
4500.00	5.04	348.330	4489.25	242.94N	50.20W	==>	-242.80	
4600.00	5.04	348.330	4588.86	251.55N	51.98W	==>	-251.39	
4700.00	5.04	348.330	4688.47	260.15N	53.75W	==>	-259.99	
4800.00	5.04	348.330	4788.09	268.75N	55.53W	==>	-268.59	
4900.00	5.04	348.330	4887.70	277.36N	57.31W	==>	-277.19	
5000.00	5.04	348.330	4987.31	285.96N	59.09W	==>	-285.78	
5100.00	5.04	348.330	5086.93	294.56N	60.86W	==>	-294.38	
5200.00	5.04	348.330	5186.54	303.16N	62.64W	==>	-302.98	
5300.00	5.04	348.330	5286.15	311.77N	64.42W	==>	-311.58	
5400.00	5.04	348.330	5385.77	320.37N	66.20W	==>	-320.17	
5500.00	5.04	348.330	5485.38	328.97N	67.97W	==>	-328.77	
5600.00	5.04	348.330	5584.99	337.57N	69.75W	==>	-337.37	
5700.00	5.04	348.330	5684.61	346.18N	71.53W	==>	-345.96	
5800.00	5.04	348.330	5784.22	354.78N	73.31W	==>	-354.56	
5900.00	5.04	348.330	5883.83	363.38N	75.08W	==>	-363.16	
6000.00	5.04	348.330	5983.45	371.98N	76.86W	==>	-371.76	
6100.00	5.04	348.330	6083.06	380.59N	78.64W	==>	-380.35	
6200.00	5.04	348.330	6182.67	389.19N	80.42W	==>	-388.95	
6300.00	5.04	348.330	6282.29	397.79N	82.19W	==>	-397.55	
6400.00	5.04	348.330	6381.90	406.39N	83.97W	==>	-406.15	
6500.00	5.04	348.330	6481.51	415.00N	85.75W	==>	-414.74	
6600.00	5.04	348.330	6581.13	423.60N	87.53W	==>	-423.34	
6700.00	5.04	348.330	6680.74	432.20N	89.30W	==>	-431.94	
6800.00	5.04	348.330	6780.35	440.80N	91.08W	==>	-440.54	
6900.00	5.04	348.330	6879.97	449.41N	92.86W	==>	-449.13	
7000.00	2.10	331.940	6979.65	456.97N	94.63W	8.00	-456.69	
7100.00	6.21	188.220	7079.49	453.22N	96.26W	8.00	-452.94	
7200.00	14.17	183.150	7177.83	435.62N	97.71W	8.00	-435.33	
7300.00	22.16	181.700	7272.77	404.49N	98.95W	8.00	-404.20	
7400.00	30.15	180.990	7362.46	360.46N	99.94W	8.00	-360.16	
7500.00	38.15	180.560	7445.15	304.37N	100.67W	8.00	-304.07	
7600.00	46.15	180.260	7519.23	237.32N	101.14W	8.00	-237.02	
7700.00	54.15	180.030	7583.26	160.62N	101.32W	8.00	-160.32	
7800.00	62.14	179.840	7635.99	75.75N	101.21W	8.00	-75.45	
7900.00	70.14	179.680	7676.41	15.63S	100.82W	8.00	15.93	
8000.00	78.14	179.530	7703.71	111.75S	100.15W	8.00	112.04	
8100.00	86.14	179.390	7717.38	210.72S	99.22W	8.00	211.01	
8148.00	89.98	179.330	7719.00	258.68S	98.69W	8.00	258.97	7.0in Intermediate Casing
8200.00	90.04	179.330	7718.96	310.68S	98.08W	==>	310.97	
8300.00	90.04	179.330	7718.89	410.67S	96.91W	==>	410.96	
8400.00	90.04	179.330	7718.81	510.67S	95.73W	==>	510.94	
8500.00	90.04	179.330	7718.74	610.66S	94.56W	==>	610.93	
8600.00	90.04	179.330	7718.66	710.65S	93.39W	==>	710.92	
8700.00	90.04	179.330	7718.59	810.65S	92.22W	==>	810.91	
8800.00	90.04	179.330	7718.51	910.64S	91.04W	==>	910.90	
8900.00	90.04	179.330	7718.44	1010.63S	89.87W	==>	1010.89	
9000.00	90.04	179.330	7718.36	1110.62S	88.70W	==>	1110.88	
9100.00	90.04	179.330	7718.29	1210.62S	87.53W	==>	1210.87	
9200.00	90.04	179.330	7718.21	1310.61S	86.35W	==>	1310.86	
9300.00	90.04	179.330	7718.14	1410.60S	85.18W	==>	1410.85	
9400.00	90.04	179.330	7718.06	1510.60S	84.01W	==>	1510.84	
9500.00	90.04	179.330	7717.99	1610.59S	82.84W	==>	1610.83	
9600.00	90.04	179.330	7717.91	1710.58S	81.66W	==>	1710.82	

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Bottom hole distance is 6940.11 Feet on azimuth 180.17 degrees from Wellhead  
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Prepared by Integrated Petroleum Technologies, Inc.  
Date Printed: 4-Nov-2015



SYSDRILL  
Well Design Combined Report  
Wellbore: HOMESTEAD 20 (PWB)

Interpolated Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	All Station Comments
9700.00	90.04	179.330	7717.84	1810.58S	80.49W	==>	1810.80	
9800.00	90.04	179.330	7717.76	1910.57S	79.32W	==>	1910.79	
9900.00	90.04	179.330	7717.69	2010.56S	78.15W	==>	2010.78	
10000.00	90.04	179.330	7717.61	2110.56S	76.97W	==>	2110.77	
10100.00	90.04	179.330	7717.54	2210.55S	75.80W	==>	2210.76	
10200.00	90.04	179.330	7717.46	2310.54S	74.63W	==>	2310.75	
10300.00	90.04	179.330	7717.39	2410.54S	73.46W	==>	2410.74	
10400.00	90.04	179.330	7717.32	2510.53S	72.28W	==>	2510.73	
10500.00	90.04	179.330	7717.24	2610.52S	71.11W	==>	2610.72	
10600.00	90.04	179.330	7717.17	2710.51S	69.94W	==>	2710.71	
10700.00	90.04	179.330	7717.09	2810.51S	68.77W	==>	2810.70	
10800.00	90.04	179.330	7717.02	2910.50S	67.59W	==>	2910.69	
10900.00	90.04	179.330	7716.94	3010.49S	66.42W	==>	3010.68	
11000.00	90.04	179.330	7716.87	3110.49S	65.25W	==>	3110.66	
11100.00	90.04	179.330	7716.79	3210.48S	64.08W	==>	3210.65	
11200.00	90.04	179.330	7716.72	3310.47S	62.90W	==>	3310.64	
11300.00	90.04	179.330	7716.64	3410.47S	61.73W	==>	3410.63	
11400.00	90.04	179.330	7716.57	3510.46S	60.56W	==>	3510.62	
11500.00	90.04	179.330	7716.49	3610.45S	59.39W	==>	3610.61	
11600.00	90.04	179.330	7716.42	3710.45S	58.21W	==>	3710.60	
11700.00	90.04	179.330	7716.34	3810.44S	57.04W	==>	3810.59	
11800.00	90.04	179.330	7716.27	3910.43S	55.87W	==>	3910.58	
11900.00	90.04	179.330	7716.19	4010.42S	54.70W	==>	4010.57	
12000.00	90.04	179.330	7716.12	4110.42S	53.52W	==>	4110.56	
12100.00	90.04	179.330	7716.04	4210.41S	52.35W	==>	4210.55	
12200.00	90.04	179.330	7715.97	4310.40S	51.18W	==>	4310.54	
12300.00	90.04	179.330	7715.89	4410.40S	50.01W	==>	4410.52	
12400.00	90.04	179.330	7715.82	4510.39S	48.83W	==>	4510.51	
12500.00	90.04	179.330	7715.74	4610.38S	47.66W	==>	4610.50	
12600.00	90.04	179.330	7715.67	4710.38S	46.49W	==>	4710.49	
12700.00	90.04	179.330	7715.59	4810.37S	45.32W	==>	4810.48	
12800.00	90.04	179.330	7715.52	4910.36S	44.14W	==>	4910.47	
12900.00	90.04	179.330	7715.44	5010.36S	42.97W	==>	5010.46	
13000.00	90.04	179.330	7715.37	5110.35S	41.80W	==>	5110.45	
13100.00	90.04	179.330	7715.29	5210.34S	40.63W	==>	5210.44	
13200.00	90.04	179.330	7715.22	5310.34S	39.45W	==>	5310.43	
13300.00	90.04	179.330	7715.14	5410.33S	38.28W	==>	5410.42	
13400.00	90.04	179.330	7715.07	5510.32S	37.11W	==>	5510.41	
13500.00	90.04	179.330	7715.00	5610.31S	35.94W	==>	5610.40	
13600.00	90.04	179.330	7714.92	5710.31S	34.76W	==>	5710.38	
13700.00	90.04	179.330	7714.85	5810.30S	33.59W	==>	5810.37	
13800.00	90.04	179.330	7714.77	5910.29S	32.42W	==>	5910.36	
13900.00	90.04	179.330	7714.70	6010.29S	31.25W	==>	6010.35	
14000.00	90.04	179.330	7714.62	6110.28S	30.07W	==>	6110.34	
14100.00	90.04	179.330	7714.55	6210.27S	28.90W	==>	6210.33	
14200.00	90.04	179.330	7714.47	6310.27S	27.73W	==>	6310.32	
14300.00	90.04	179.330	7714.40	6410.26S	26.56W	==>	6410.31	
14400.00	90.04	179.330	7714.32	6510.25S	25.38W	==>	6510.30	
14500.00	90.04	179.330	7714.25	6610.25S	24.21W	==>	6610.29	
14600.00	90.04	179.330	7714.17	6710.24S	23.04W	==>	6710.28	
14700.00	90.04	179.330	7714.10	6810.23S	21.87W	==>	6810.27	
14800.00	90.04	179.330	7714.02	6910.22S	20.69W	==>	6910.26	
14829.86	90.04	179.330	7714.00	6940.08S	20.34W	==>	6940.11	4 1/2in Production Liner

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 5155.0ft above Mean Sea Level )  
Vertical Section is from 0.00N 0.00E on azimuth 180.170 degrees  
Bottom hole distance is 6940.11 Feet on azimuth 180.17 degrees from Wellhead  
Calculation method uses Minimum Curvature method  
Prepared by Integrated Petroleum Technologies, Inc.  
Date Printed: 4-Nov-2015



SYSDRILL  
Well Design Combined Report  
Wellbore: HOMESTEAD 20 (PWB)

Hole Sections								
Diameter [in]	Start MD[ft]	Start TVD[ft]	Start North[ft]	Start East[ft]	End MD[ft]	End TVD[ft]	End North[ft]	End East[ft]
13 1/2	23.00	23.00	0.00N	0.00E	1450.00	1450.00	0.00N	0.00E
8 3/4	1450.00	1450.00	0.00N	0.00E	8148.00	7719.00	258.68S	98.69W
6 1/8	8148.00	7719.00	258.68S	98.69W	14829.86	7714.00	6940.08S	20.34W

Casings								
Name	Top MD[ft]	Top TVD[ft]	Top North[ft]	Top East[ft]	Shoe MD[ft]	Shoe TVD[ft]	Shoe North[ft]	Shoe East[ft]
9 5/8in Surface Casing	23.00	23.00	0.00N	0.00E	1450.00	1450.00	0.00N	0.00E
7.0in Intermediate Casing	23.00	23.00	0.00N	0.00E	8148.00	7719.00	258.68S	98.69W
4 1/2in Production Liner	7025.00	7004.64	457.34N	95.05W	14829.86	7714.00	6940.08S	20.34W

Targets							
Name	North[ft]	East[ft]	TVD[ft]	Latitude	Longitude	Northing	Easting
HOMESTEAD 20 BH	6940.08S	20.34W	7714.00	39.98815000	-104.75771000	1239400.72	3207988.91
HOMESTEAD 20 T1	259.48S	98.68W	7719.00	40.00649000	-104.75779000	1246081.08	3207910.58

Survey Tool Program					
Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model
400845	Planned	14829.86	7714.00	ISCWSA MWD	Rev 3 + Fixed Rig + Rotating

Notes



SYSDRILL  
Closest Approach + Clearance Factor Summary Report  
Wellbore: HOMESTEAD 20 (PWB)

Ellipse separations are reported ONLY if BOTH wells have uncertainty data
Only Depth and Magnetic Reference Field error terms are correlated across tie points
Scan limit is calculated on CENTRE to CENTRE distance
Summary data uses Closest Approach clearance calculation for all minima
Hole size/Casings ARE included
Hole size/Casings are NOT subtracted from Centre-Centre distance
Confidence limit of 95.00% / 2.80 SD.

Wellbore		
Name	Created	Last Revised
HOMESTEAD 20 (PWB)	18-Aug-2015	24-Sep-2015

Well		
Name	Government ID	Last Revised
HOMESTEAD 20		18-Aug-2015

Slot						
Name	Latitude	Longitude	Grid Northing	Grid Easting	North	East
HOMESTEAD 20	40.00720000	-104.75743000	1246340.5504	3208009.2576	7.98N	518.20E

Installation						
Name	Installation Position (Latitude)	Installation Position (Longitude)	Easting	Northing	Coord System Name	North Alignment
Homestead	40.00719000	-104.75928000	3207491.0767	1246332.5735	CO83-NF on NORTH AMERICAN DATUM 1983 datum	Grid

Clearance Summary							
Offset WellName	Separation [ft]	MD[ft]	Diverging From[ft]	Ellipse Separation [ft]	Ellipse MD[ft]	Clearance Factor	Clearance MD[ft]
HOMESTEAD 21	14.01	1525.00	8192.29	-41.78	14829.86	0.84	14829.86
HOMESTEAD 19	16.70	1623.07	8152.07	6.56	1663.42	1.18	14829.86
HOMESTEAD 22	30.81	1499.38	1499.38	21.38	1532.19	1.32	14829.86
HOMESTEAD 18	33.59	1575.05	14828.91	23.67	1623.00	1.11	14829.86
HOMESTEAD 23	47.62	1476.00	1476.00	38.33	1499.38	1.36	14829.86
HOMESTEAD 17	50.42	1550.03	1550.03	40.71	1581.40	1.36	14829.86
HOMESTEAD 24	61.63	1451.00	8192.29	52.36	1433.76	1.91	14829.86
HOMESTEAD 16	64.43	1525.00	8192.29	54.92	1550.00	2.02	14829.86
HOMESTEAD 15	81.24	1499.38	14827.31	71.85	1523.00	2.34	14829.86
HOMESTEAD 14	98.05	1474.00	1474.00	88.78	1433.76	2.71	14829.86
HOMESTEAD 13	112.05	1449.00	1449.00	102.69	1449.00	3.28	14829.86
HOMESTEAD 12	339.58	1857.34	14829.24	328.13	1857.34	3.74	14829.86
HOMESTEAD 11	357.05	1786.73	14828.50	345.92	1823.00	4.20	14829.86
HOMESTEAD 10	374.20	1757.51	14828.05	363.25	1794.65	4.79	14829.86
HOMESTEAD 9	391.33	1723.00	14829.86	380.55	1761.85	5.26	14829.86
HOMESTEAD 8	405.82	1685.20	14829.86	395.39	1685.20	5.73	14829.86
HOMESTEAD 7	422.82	1655.64	14829.83	412.55	1655.64	6.30	14829.86
HOMESTEAD 6	439.74	1620.03	14829.15	429.68	1623.00	6.79	14829.86
HOMESTEAD 5	453.82	1544.00	14828.40	444.17	1581.40	7.28	14829.86
HOMESTEAD 4	470.63	1519.00	14829.86	461.14	1550.00	7.82	14829.86
HOMESTEAD 3	487.43	1482.97	14829.86	478.06	1515.78	8.31	14829.86
HOMESTEAD 2	504.25	1468.00	14829.86	494.97	1433.76	8.81	14829.86
HOMESTEAD 1	518.26	1443.00	14829.71	508.92	1443.00	9.34	14829.86

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 5155.0ft above Mean Sea Level )  
Vertical Section is from 0.00N 0.00E on azimuth 180.170 degrees  
Prepared by Integrated Petroleum Technologies, Inc.  
Date Printed: 4-Nov-2015

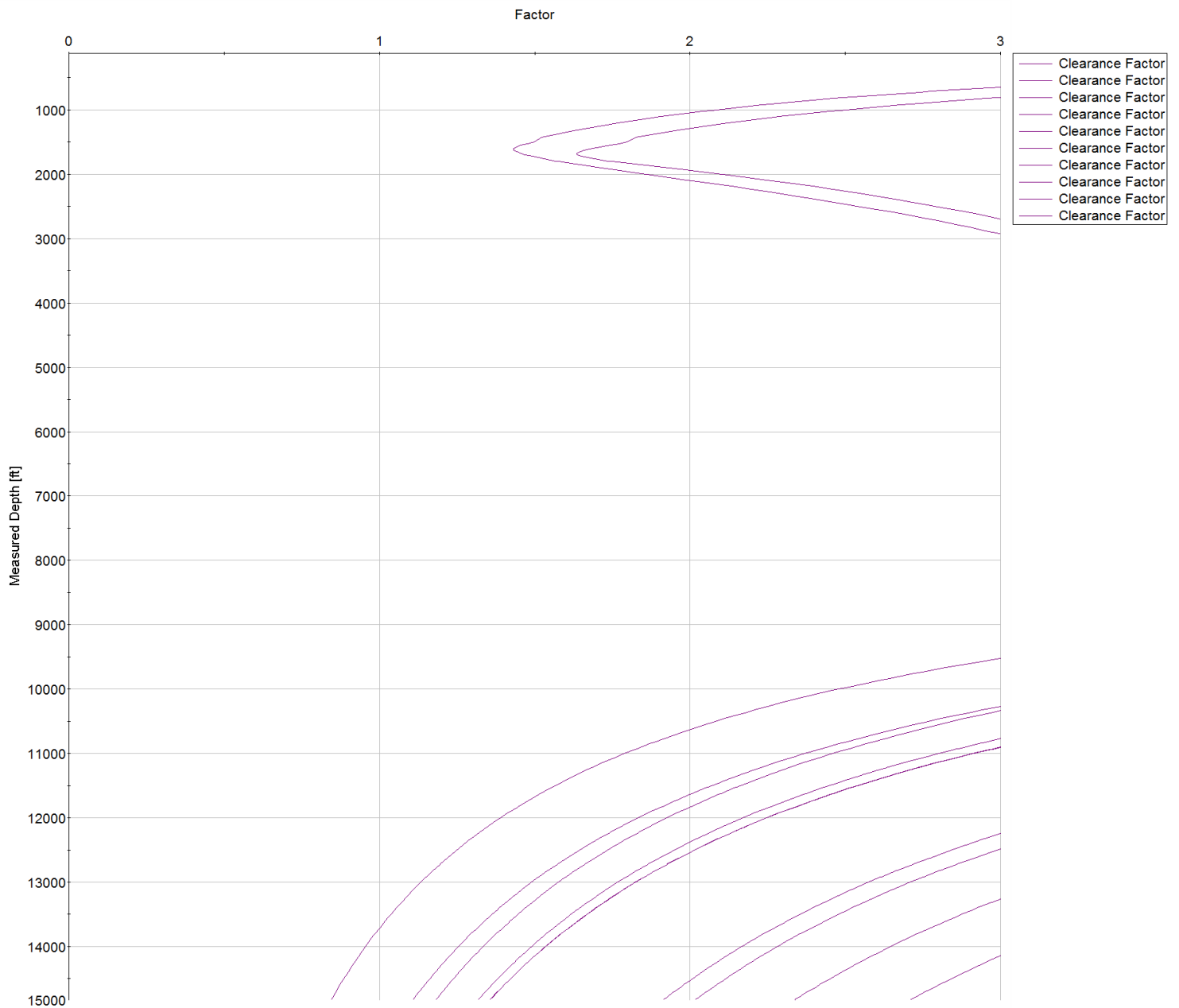


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Closest Approach + Clearance Factor Summary Report  
Wellbore: HOMESTEAD 20 (PWB)

Clearance Summary							
Offset WellName	Separation [ft]	MD[ft]	Diverging From[ft]	Ellipse Separation [ft]	Ellipse MD[ft]	Clearance Factor	Clearance MD[ft]
BERGMAN #1	797.25	11023.00	11023.00	689.80	11030.22	7.38	11095.83
WILLARD, JOHN W. GAS UNIT #1	931.34	7027.59	7027.59	885.16	7044.00	20.10	7109.61
UPRR 50 PAN AM M #1	2086.83	9324.18	9324.18	2017.97	9373.39	27.22	10095.18
BEN STEVENSON GAS UNIT #1	2130.32	14829.86	14829.86	2075.06	14829.86	38.55	14829.86
BERGMAN #2	2510.47	13950.17	13950.17	2330.72	14015.78	13.56	14425.89
BRIGHTON COMPANY #1	3143.02	13656.63	13656.63	2970.58	13723.00	17.45	14376.67
VISTA USX #WW33-08D	4909.47	7208.04	7208.04	4849.32	7224.44	64.72	11768.41
SHAW A #1	5178.69	14829.86	14829.86	5067.44	14829.86	46.55	14829.86



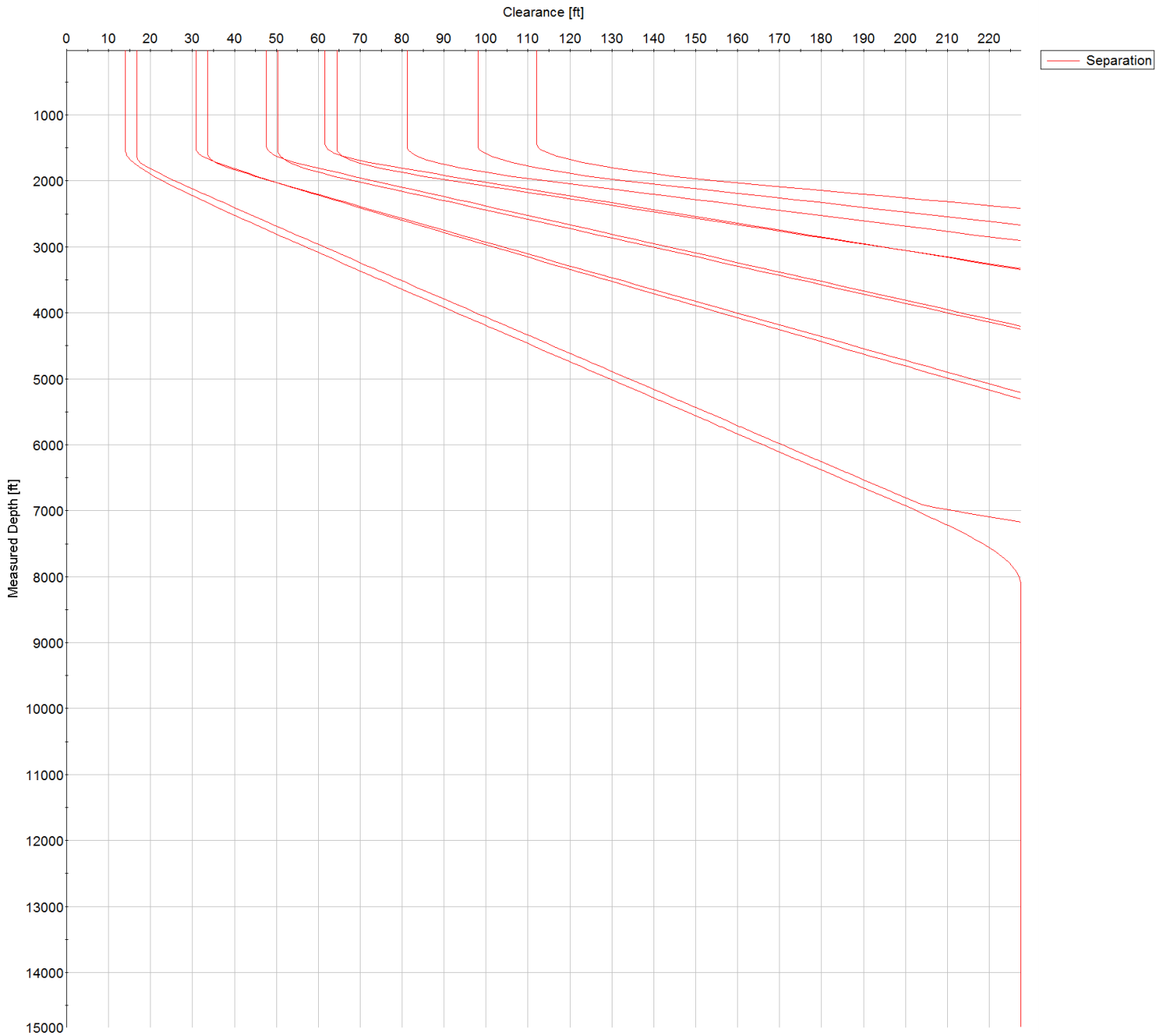
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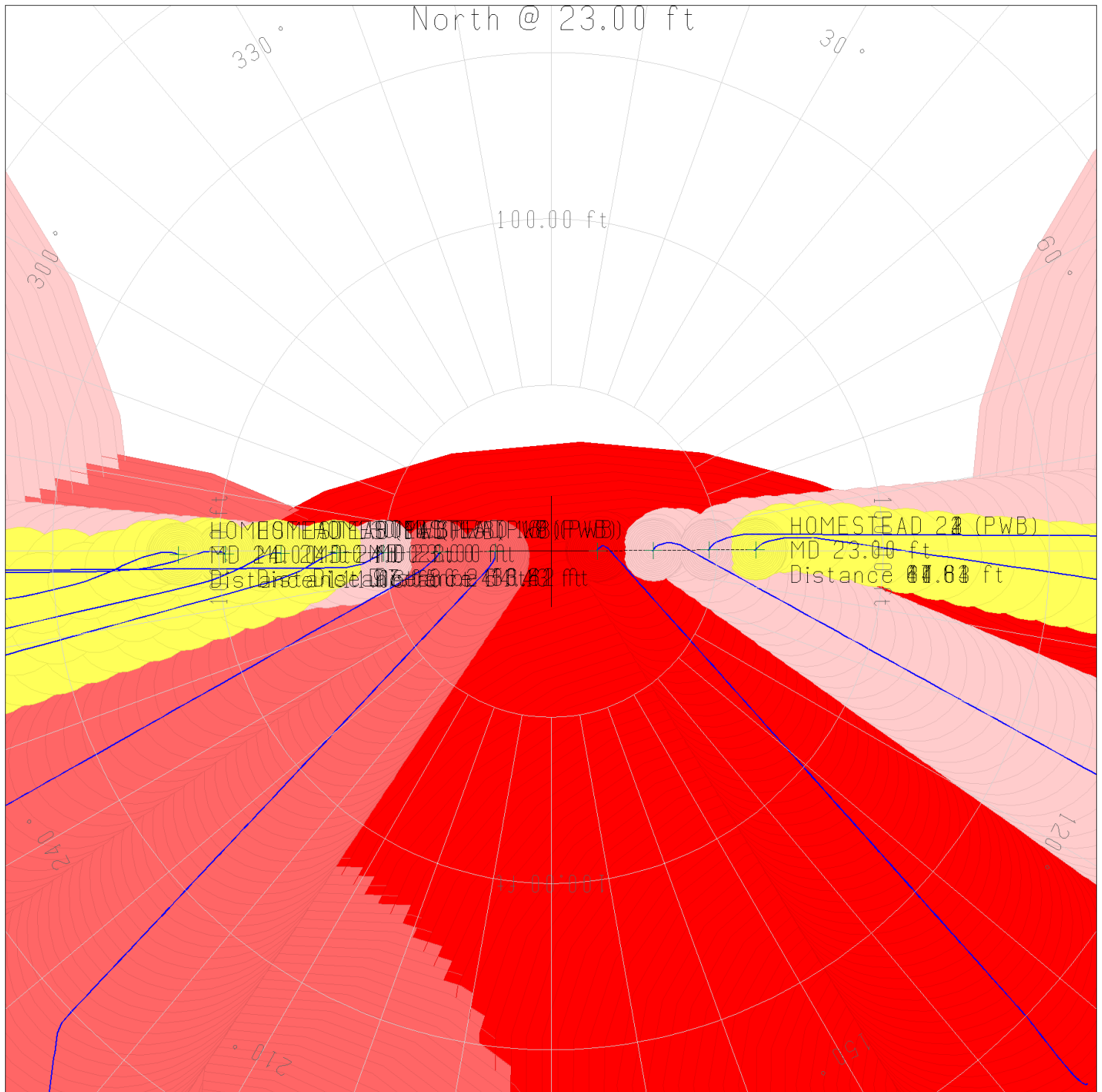
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