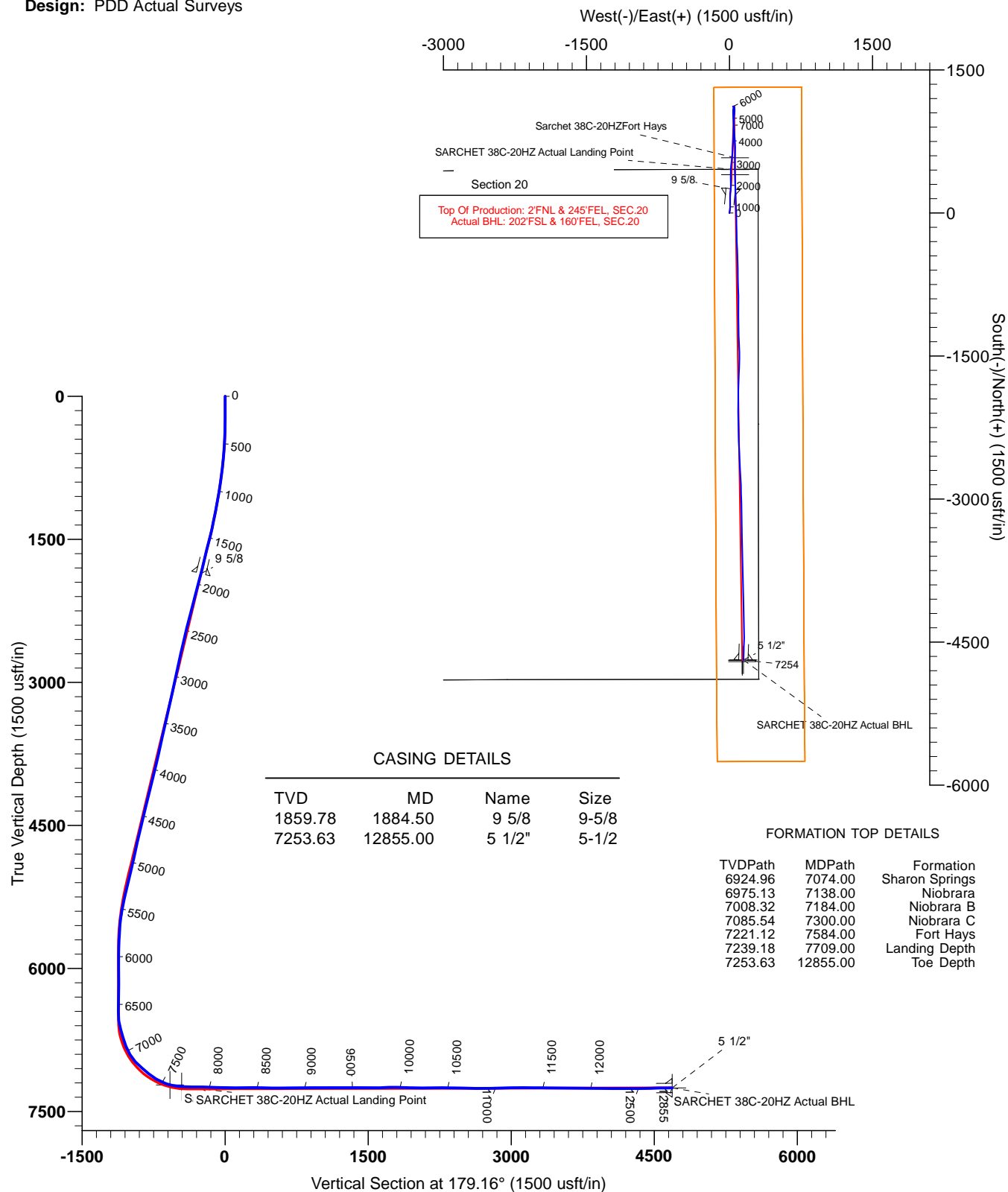


US ROCKIES WATTENBERG PLANNING



Project: WELD-NAD83-UTMFT13N
 Site: 2N-65W-20 Sarchet 1-20HZ Pad
 Well: SARCHET 38C-20HZ
 Wellbore: SARCHET 38C-20HZ
 Design: PDD Actual Surveys



TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Sarchet 38C-20HZFort Hays	7221.12	579.30	57.68	14574885.73	1730058.24	40.131790	-104.679293	Point
SARCHET 38C-20HZ Actual Landing Point	7239.18	455.93	55.57	14574762.35	1730056.58	40.131451	-104.679300	Point
SARCHET 38C-20HZ Actual BHL	7253.63	-4686.95	146.07	14569619.82	1730165.62	40.117328	-104.678976	Point



US ROCKIES WATTENBERG PLANNING

WELD-NAD83-UTMFT13N

2N-65W-20 Sarchet 1-20HZ Pad

SARCHET 38C-20HZ

SARCHET 38C-20HZ

Design: PDD Actual Surveys

Standard Survey Report

07 October, 2015

PDD

Survey Report

Company:	US ROCKIES WATTENBERG PLANNING	Local Co-ordinate Reference:	Well SARCHET 38C-20HZ
Project:	WELD-NAD83-UTMFT13N	TVD Reference:	4897+25 @ 4922.00usft (hp307)
Site:	2N-65W-20 Sarchet 1-20HZ Pad	MD Reference:	4897+25 @ 4922.00usft (hp307)
Well:	SARCHET 38C-20HZ	North Reference:	True
Wellbore:	SARCHET 38C-20HZ	Survey Calculation Method:	Minimum Curvature
Design:	PDD Actual Surveys	Database:	EDM 5000.1 Single User Db

Project	WELD-NAD83-UTMFT13N		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Zone 13N (108 W to 102 W)		

Site	2N-65W-20 Sarchet 1-20HZ Pad, centered on 16-20				
Site Position:		Northing:	14,574,315.58 usft	Latitude:	40.130225
From:	Lat/Long	Easting:	1,729,974.11 usft	Longitude:	-104.679601
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.21 °

Well		SARCHET 38C-20HZ				
Well Position	+N/-S	0.00 usft	Northing:	14,574,306.22 usft	Latitude:	40.130199
	+E/-W	0.00 usft	Easting:	1,730,002.65 usft	Longitude:	-104.679499
Position Uncertainty		3.28 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,897.00 usft

Wellbore	SARCHET 38C-20HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/2/2015	8.31	66.72	52,615

Design	PDD Actual Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	179.16	

Survey Program	Date	10/7/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
133.00	1,835.00	SDI MWD Surface (SARCHET 38C-20HZ)	APC_ISCWSA REV 2 MWD	Fixed:v2:standard declination	
1,946.00	12,782.00	PDD MWD+IFR SURVEY CURVE/LATER	APC_ISCWSA REV 2 MWD+	Fixed:v2:crustal field declination	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
133.00	0.45	211.66	133.00	-0.44	-0.27	0.44	0.34	0.34	0.00	
224.00	0.64	334.92	224.00	-0.29	-0.68	0.28	1.06	0.21	135.45	
314.00	0.87	19.08	313.99	0.81	-0.67	-0.82	0.67	0.26	49.07	
392.00	1.81	10.18	391.97	2.58	-0.26	-2.59	1.23	1.21	-11.41	
482.00	2.98	6.27	481.89	6.31	0.25	-6.30	1.31	1.30	-4.34	
573.00	4.77	8.30	572.68	12.40	1.06	-12.39	1.97	1.97	2.23	
662.00	5.20	16.25	661.34	19.94	2.72	-19.90	0.91	0.48	8.93	
752.00	5.80	10.00	750.93	28.33	4.65	-28.26	0.94	0.67	-6.94	
842.00	7.38	2.69	840.33	38.59	5.71	-38.50	1.98	1.76	-8.12	

PDD Survey Report

Company:	US ROCKIES WATTENBERG PLANNING	Local Co-ordinate Reference:	Well SARCHET 38C-20HZ
Project:	WELD-NAD83-UTMFT13N	TVD Reference:	4897+25 @ 4922.00usft (hp307)
Site:	2N-65W-20 Sarchet 1-20HZ Pad	MD Reference:	4897+25 @ 4922.00usft (hp307)
Well:	SARCHET 38C-20HZ	North Reference:	True
Wellbore:	SARCHET 38C-20HZ	Survey Calculation Method:	Minimum Curvature
Design:	PDD Actual Surveys	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
977.00	9.99	0.36	973.77	58.96	6.19	-58.86	1.95	1.93	-1.73
1,067.00	10.49	0.92	1,062.34	74.96	6.37	-74.86	0.57	0.56	0.62
1,157.00	10.80	0.50	1,150.79	91.58	6.58	-91.48	0.36	0.34	-0.47
1,247.00	10.48	0.68	1,239.24	108.20	6.75	-108.09	0.36	-0.36	0.20
1,337.00	11.53	357.83	1,327.58	125.37	6.50	-125.26	1.31	1.17	-3.17
1,518.00	14.42	1.29	1,503.95	165.99	6.33	-165.88	1.65	1.60	1.91
1,607.00	13.99	3.70	1,590.23	187.80	7.27	-187.68	0.82	-0.48	2.71
1,698.00	13.76	5.26	1,678.57	209.56	8.97	-209.40	0.48	-0.25	1.71
1,788.00	13.55	6.20	1,766.03	230.70	11.09	-230.51	0.34	-0.23	1.04
1,835.00	13.56	6.46	1,811.72	241.65	12.31	-241.44	0.13	0.02	0.55
1,946.00	14.90	4.00	1,919.31	268.81	14.77	-268.57	1.32	1.21	-2.22
2,135.00	14.80	356.00	2,102.02	317.14	14.78	-316.89	1.09	-0.05	-4.23
2,324.00	14.20	358.50	2,285.00	364.39	12.49	-364.17	0.46	-0.32	1.32
2,512.00	14.10	1.90	2,467.30	410.33	12.64	-410.10	0.45	-0.05	1.81
2,701.00	12.90	3.50	2,651.07	454.40	14.69	-454.14	0.66	-0.63	0.85
2,890.00	12.50	4.80	2,835.45	495.84	17.69	-495.53	0.26	-0.21	0.69
3,079.00	12.00	5.00	3,020.15	535.80	21.12	-535.43	0.27	-0.26	0.11
3,268.00	12.60	4.90	3,204.81	575.91	24.59	-575.49	0.32	0.32	-0.05
3,457.00	12.90	5.90	3,389.15	617.43	28.52	-616.95	0.20	0.16	0.53
3,646.00	13.00	6.30	3,573.34	659.55	33.02	-658.99	0.07	0.05	0.21
3,835.00	12.40	2.70	3,757.72	700.95	36.31	-700.34	0.53	-0.32	-1.90
4,024.00	13.50	359.70	3,941.91	743.28	37.15	-742.66	0.68	0.58	-1.59
4,213.00	14.60	4.90	4,125.26	789.08	39.07	-788.42	0.89	0.58	2.75
4,401.00	12.80	2.10	4,307.91	833.50	41.86	-832.80	1.02	-0.96	-1.49
4,590.00	13.80	1.70	4,491.83	876.96	43.29	-876.23	0.53	0.53	-0.21
4,779.00	13.10	359.30	4,675.65	920.91	43.70	-920.17	0.47	-0.37	-1.27
4,968.00	11.80	353.70	4,860.21	961.53	41.32	-960.83	0.94	-0.69	-2.96
5,157.00	14.50	359.80	5,044.25	1,004.41	39.11	-1,003.73	1.60	1.43	3.23
5,346.00	12.60	358.40	5,227.98	1,048.69	38.46	-1,048.01	1.02	-1.01	-0.74
5,535.00	9.90	5.80	5,413.34	1,085.46	39.52	-1,084.77	1.62	-1.43	3.92
5,630.00	6.80	7.40	5,507.32	1,099.17	41.07	-1,098.45	3.27	-3.26	1.68
5,724.00	3.60	346.40	5,600.93	1,107.56	41.09	-1,106.84	3.91	-3.40	-22.34
5,913.00	2.00	329.30	5,789.70	1,116.16	38.02	-1,115.49	0.95	-0.85	-9.05
6,102.00	0.90	163.50	5,978.67	1,117.58	36.75	-1,116.92	1.52	-0.58	-87.72
6,291.00	1.50	77.80	6,167.64	1,116.68	39.59	-1,115.98	0.89	0.32	-45.34
6,386.00	1.80	71.10	6,262.60	1,117.42	42.22	-1,116.68	0.37	0.32	-7.05
6,480.00	1.60	51.80	6,356.56	1,118.71	44.65	-1,117.94	0.64	-0.21	-20.53
6,575.00	1.10	41.60	6,451.53	1,120.21	46.30	-1,119.41	0.58	-0.53	-10.74
6,670.00	6.80	162.00	6,546.32	1,115.54	48.64	-1,114.71	7.81	6.00	126.74
6,764.00	17.20	169.00	6,638.15	1,096.55	53.03	-1,095.66	11.15	11.06	7.45
6,859.00	15.80	183.60	6,729.27	1,069.84	54.89	-1,068.92	4.59	-1.47	15.37
6,953.00	21.50	188.50	6,818.30	1,040.01	51.54	-1,039.14	6.28	6.06	5.21
7,048.00	31.60	185.60	6,903.18	997.91	46.53	-997.12	10.72	10.63	-3.05

PDD

Survey Report

Company:	US ROCKIES WATTENBERG PLANNING	Local Co-ordinate Reference:	Well SARCHET 38C-20HZ
Project:	WELD-NAD83-UTMFT13N	TVD Reference:	4897+25 @ 4922.00usft (hp307)
Site:	2N-65W-20 Sarchet 1-20HZ Pad	MD Reference:	4897+25 @ 4922.00usft (hp307)
Well:	SARCHET 38C-20HZ	North Reference:	True
Wellbore:	SARCHET 38C-20HZ	Survey Calculation Method:	Minimum Curvature
Design:	PDD Actual Surveys	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,142.00	42.60	177.30	6,978.08	941.41	45.62	-940.64	12.83	11.70	-8.83
7,237.00	48.70	176.60	7,044.46	873.61	49.25	-872.79	6.44	6.42	-0.74
7,331.00	50.50	176.80	7,105.38	802.15	53.37	-801.28	1.92	1.91	0.21
7,426.00	60.00	177.60	7,159.47	724.27	57.15	-723.36	10.02	10.00	0.84
7,520.00	67.90	180.30	7,200.73	639.91	58.63	-638.98	8.79	8.40	2.87
7,615.00	78.30	182.00	7,228.31	549.16	56.77	-548.27	11.08	10.95	1.79
7,709.00	88.40	179.50	7,239.18	455.93	55.57	-455.07	11.06	10.74	-2.66
7,804.00	88.20	176.90	7,242.00	361.03	58.55	-360.13	2.74	-0.21	-2.74
7,898.00	88.60	178.00	7,244.62	267.16	62.73	-266.21	1.24	0.43	1.17
7,993.00	89.40	178.90	7,246.28	172.21	65.30	-171.24	1.27	0.84	0.95
8,088.00	88.30	178.60	7,248.19	77.25	67.37	-76.26	1.20	-1.16	-0.32
8,182.00	88.40	177.70	7,250.89	-16.66	70.41	17.69	0.96	0.11	-0.96
8,277.00	90.50	178.90	7,251.81	-111.60	73.23	112.67	2.55	2.21	1.26
8,371.00	91.60	178.80	7,250.08	-205.57	75.11	206.65	1.18	1.17	-0.11
8,466.00	88.60	178.30	7,249.92	-300.53	77.52	301.63	3.20	-3.16	-0.53
8,560.00	88.30	177.40	7,252.46	-394.42	81.04	395.57	1.01	-0.32	-0.96
8,655.00	88.70	178.10	7,254.95	-489.32	84.77	490.51	0.85	0.42	0.74
8,749.00	90.90	179.30	7,255.27	-583.29	86.90	584.50	2.67	2.34	1.28
8,844.00	92.00	179.00	7,252.87	-678.24	88.31	679.46	1.20	1.16	-0.32
8,938.00	90.10	178.50	7,251.15	-772.20	90.36	773.44	2.09	-2.02	-0.53
9,033.00	89.90	178.20	7,251.15	-867.16	93.10	868.43	0.38	-0.21	-0.32
9,127.00	90.20	180.20	7,251.07	-961.15	94.41	962.43	2.15	0.32	2.13
9,222.00	90.10	180.20	7,250.82	-1,056.15	94.08	1,057.41	0.11	-0.11	0.00
9,316.00	90.20	179.50	7,250.57	-1,150.14	94.32	1,151.40	0.75	0.11	-0.74
9,411.00	90.70	178.70	7,249.83	-1,245.13	95.81	1,246.40	0.99	0.53	-0.84
9,506.00	90.10	177.10	7,249.16	-1,340.06	99.30	1,341.37	1.80	-0.63	-1.68
9,600.00	88.00	177.90	7,250.72	-1,433.95	103.39	1,435.31	2.39	-2.23	0.85
9,694.00	89.20	181.20	7,253.02	-1,527.90	104.13	1,529.27	3.73	1.28	3.51
9,789.00	92.40	183.00	7,251.69	-1,622.82	100.65	1,624.12	3.86	3.37	1.89
9,884.00	92.10	181.50	7,247.96	-1,717.67	96.93	1,718.90	1.61	-0.32	-1.58
9,978.00	88.80	180.80	7,247.22	-1,811.63	95.04	1,812.83	3.59	-3.51	-0.74
10,073.00	87.60	180.70	7,250.21	-1,906.57	93.80	1,907.74	1.27	-1.26	-0.11
10,167.00	88.60	180.50	7,253.32	-2,000.52	92.81	2,001.66	1.08	1.06	-0.21
10,262.00	91.40	180.50	7,253.32	-2,095.50	91.98	2,096.63	2.95	2.95	0.00
10,357.00	91.20	179.90	7,251.17	-2,190.48	91.65	2,191.59	0.67	-0.21	-0.63
10,451.00	89.00	178.10	7,251.00	-2,284.45	93.29	2,285.58	3.02	-2.34	-1.91
10,546.00	88.60	177.60	7,252.99	-2,379.37	96.86	2,380.53	0.67	-0.42	-0.53
10,640.00	89.00	177.20	7,254.96	-2,473.25	101.12	2,474.46	0.60	0.43	-0.43
10,735.00	89.30	177.20	7,256.37	-2,568.12	105.76	2,569.40	0.32	0.32	0.00
10,830.00	89.50	177.20	7,257.37	-2,663.01	110.40	2,664.34	0.21	0.21	0.00
10,924.00	90.80	176.50	7,257.12	-2,756.86	115.57	2,758.26	1.57	1.38	-0.74
11,019.00	90.90	178.10	7,255.71	-2,851.74	120.04	2,853.19	1.69	0.11	1.68
11,113.00	92.40	178.40	7,253.00	-2,945.66	122.91	2,947.14	1.63	1.60	0.32

PDD Survey Report

Company:	US ROCKIES WATTENBERG PLANNING	Local Co-ordinate Reference:	Well SARCHET 38C-20HZ
Project:	WELD-NAD83-UTMFT13N	TVD Reference:	4897+25 @ 4922.00usft (hp307)
Site:	2N-65W-20 Sarchet 1-20HZ Pad	MD Reference:	4897+25 @ 4922.00usft (hp307)
Well:	SARCHET 38C-20HZ	North Reference:	True
Wellbore:	SARCHET 38C-20HZ	Survey Calculation Method:	Minimum Curvature
Design:	PDD Actual Surveys	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
11,208.00	90.20	179.40	7,250.85	-3,040.61	124.73	3,042.11	2.54	-2.32	1.05	
11,302.00	89.70	179.50	7,250.93	-3,134.60	125.63	3,136.11	0.54	-0.53	0.11	
11,396.00	89.50	178.60	7,251.59	-3,228.59	127.19	3,230.10	0.98	-0.21	-0.96	
11,491.00	89.60	177.80	7,252.33	-3,323.54	130.18	3,325.09	0.85	0.11	-0.84	
11,585.00	88.60	179.10	7,253.81	-3,417.49	132.72	3,419.06	1.74	-1.06	1.38	
11,680.00	89.60	179.50	7,255.30	-3,512.47	133.88	3,514.05	1.13	1.05	0.42	
11,774.00	89.90	179.30	7,255.71	-3,606.46	134.86	3,608.05	0.38	0.32	-0.21	
11,869.00	89.90	178.40	7,255.88	-3,701.44	136.77	3,703.05	0.95	0.00	-0.95	
11,963.00	89.80	178.00	7,256.12	-3,795.39	139.72	3,797.03	0.44	-0.11	-0.43	
12,058.00	88.60	178.60	7,257.45	-3,890.34	142.54	3,892.01	1.41	-1.26	0.63	
12,152.00	89.80	179.60	7,258.76	-3,984.32	144.02	3,986.00	1.66	1.28	1.06	
12,247.00	89.10	178.10	7,259.68	-4,079.29	145.92	4,080.99	1.74	-0.74	-1.58	
12,341.00	89.50	178.90	7,260.82	-4,173.25	148.38	4,174.98	0.95	0.43	0.85	
12,436.00	90.70	178.00	7,260.66	-4,268.21	150.95	4,269.97	1.58	1.26	-0.95	
12,530.00	91.20	178.40	7,259.10	-4,362.15	153.91	4,363.94	0.68	0.53	0.43	
12,625.00	91.30	181.60	7,257.03	-4,457.12	153.91	4,458.89	3.37	0.11	3.37	
12,720.00	90.90	182.10	7,255.20	-4,552.05	150.84	4,553.77	0.67	-0.42	0.53	
12,782.00	90.60	182.00	7,254.39	-4,614.00	148.62	4,615.69	0.51	-0.48	-0.16	
12,855.00	90.60	182.00	7,253.63	-4,686.95	146.07	4,688.59	0.00	0.00	0.00	

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
Sarchet 38C-20HZFort H - hit/miss target - Shape - Point	0.00	0.00	7,221.12	579.30	57.68	14,574,885.72	1,730,058.24	40.131790	-104.679293	- actual wellpath misses target center by 0.02usft at 7584.02usft MD (7221.13 TVD, 579.28 N, 57.68 E)
SARCHET 38C-20HZ Aα - actual wellpath hits target center - Point	0.00	0.00	7,239.18	455.93	55.57	14,574,762.35	1,730,056.58	40.131451	-104.679300	
SARCHET 38C-20HZ Aα - actual wellpath hits target center - Point	0.00	0.00	7,253.63	-4,686.95	146.07	14,569,619.82	1,730,165.62	40.117328	-104.678977	

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
1,884.50	1,859.78	9 5/8	9-5/8	13-1/2	
12,855.00	7,253.63	5 1/2"	5-1/2	8-1/2	

PDD

Survey Report

Company:	US ROCKIES WATTENBERG PLANNING	Local Co-ordinate Reference:	Well SARCHET 38C-20HZ
Project:	WELD-NAD83-UTMFT13N	TVD Reference:	4897+25 @ 4922.00usft (hp307)
Site:	2N-65W-20 Sarchet 1-20HZ Pad	MD Reference:	4897+25 @ 4922.00usft (hp307)
Well:	SARCHET 38C-20HZ	North Reference:	True
Wellbore:	SARCHET 38C-20HZ	Survey Calculation Method:	Minimum Curvature
Design:	PDD Actual Surveys	Database:	EDM 5000.1 Single User Db

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
7,074.00	6,924.96	Sharon Springs		0.00		
7,138.00	6,975.13	Niobrara		0.00		
7,184.00	7,008.32	Niobrara B		0.00		
7,300.00	7,085.54	Niobrara C		0.00		
7,584.00	7,221.12	Fort Hays		0.00		
7,709.00	7,239.18	Landing Depth		0.00		
12,855.00	7,253.63	Toe Depth		0.00		

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
12,855.00	7,253.63	-4,686.95	146.07	Projection to Bit	

Checked By: _____ Approved By: _____ Date: _____