



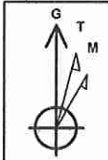
Company: Tug Hill Operating, LLC
 Site: Donovan
 Well: 1-11H
 Project: Barber County, Kansas (NAD 83)
 Rig Name: Patterson 421



Planning: 936.442.2510 Fax: 936.442.2515
 Operations: 936.442.2500 Fax: 936.442.2599

ANNOTATIONS

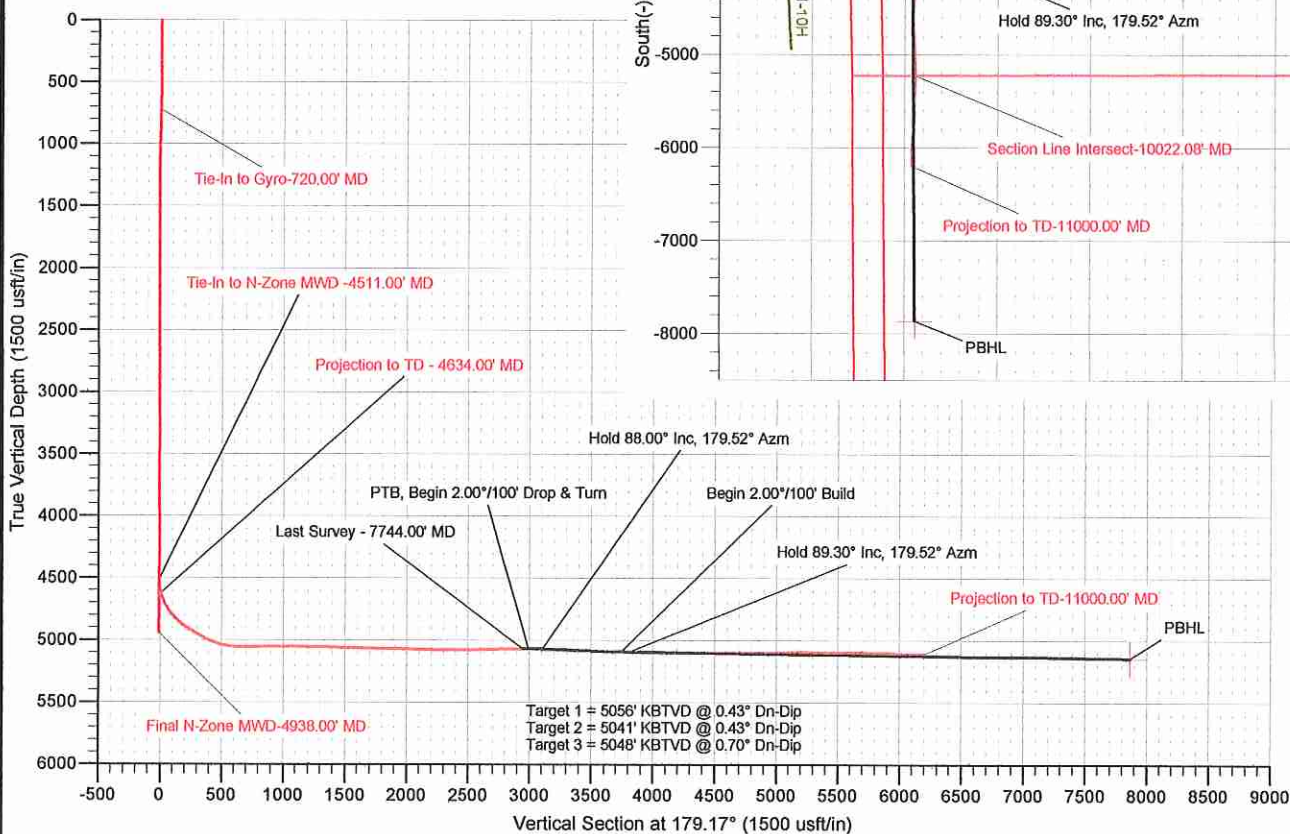
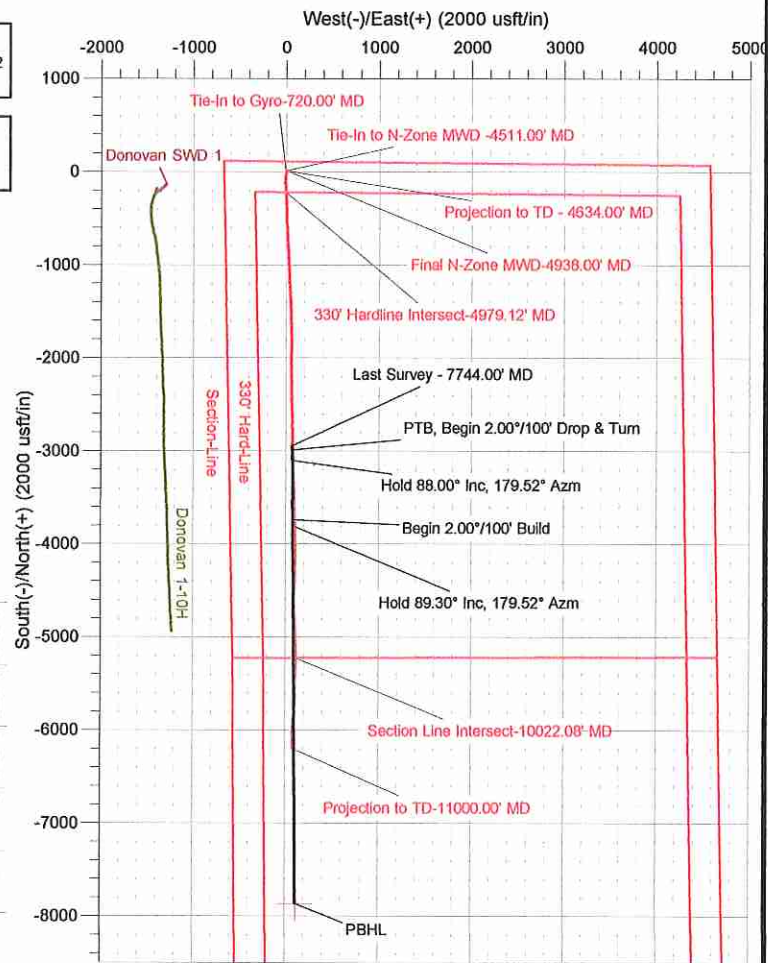
MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
7744.00	90.10	178.70	5068.89	-2943.63	70.83	2944.35	0.00	Last Survey - 7744.00' MD
7791.00	90.10	178.70	5068.81	-2990.62	71.90	2991.35	47.00	PTB, Begin 2.00°/100' Drop & Turn
7903.93	88.00	179.52	5070.69	-3103.61	73.65	3104.25	159.91	Hold 88.00° Inc, 179.52° Azm
8541.22	88.00	179.52	5092.97	-3740.39	78.95	3741.14	786.81	Begin 2.00°/100' Build
8606.39	89.30	179.52	5094.50	-3805.54	79.49	3806.29	861.95	Hold 89.30° Inc, 179.52° Azm
12661.39	89.30	179.52	5144.04	-7860.09	113.28	7860.91	4916.65	PBHL



Azimuths to Grid North
 True North: 0.13°
 Magnetic North: 5.10°
 Magnetic Field
 Strength: 51759.2nT
 Dip Angle: 65.16°
 Date: 11/30/2012
 Model: WMM_2010

Created By: HLH
 Date: 10:43, December 26 2012
 Plan: Design #12

US State Plane 1983
 Kansas Southern Zone



The customer should only rely on this document after independently verifying all paths, targets, coordinates, lease and hard lines represented. Any decisions made or wells drilled utilizing this or any other information supplied by MS Energy are at the sole risk and responsibility of the customer. MS Energy is not responsible for the accuracy of this schematic or the information contained herein.



MS Energy Services
Survey Report



Company:	Tug Hill Operating, LLC	Local Co-ordinate Reference:	Well 1-11H
Project:	Barber County, Kansas (NAD 83)	TVD Reference:	WELL @ 1678.00usft (Patterson 421)
Site:	Donovan	MD Reference:	WELL @ 1678.00usft (Patterson 421)
Well:	1-11H	North Reference:	Grid
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

Project	Barber County, Kansas (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Kansas Southern Zone		

Well	1-11H				
Well Position	+N/-S	0.00 usft	Northing:	1,473,293.82 usft	Latitude: 37° 6' 30.6675 N
	+E/-W	0.00 usft	Easting:	1,250,763.47 usft	Longitude: 98° 42' 40.052 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level: 1,654.50 usft

Wellbore	Pilot Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	11/30/12	4.97	65.16	51,759

Design	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	179.17	

Survey Program	Date	12/26/12			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	720.00	N-Zone Gyro (Pilot Hole)	NS-GYRO-SS	NS Gyro single shots	
889.00	4,938.00	N-Zone MWD (Pilot Hole)	MWD	MWD - Standard	

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)	
720.00	0.74	331.68	719.97	3.59	-4.46	-3.65	0.00	0.00	0.00	
Tie-In to Gyro-720.00' MD										
889.00	1.10	35.10	888.95	5.88	-4.04	-5.94	0.60	0.21	37.53	
985.00	1.00	42.20	984.94	7.25	-2.95	-7.29	0.17	-0.10	7.40	
1,081.00	0.60	14.00	1,080.93	8.36	-2.27	-8.39	0.57	-0.42	-29.38	
1,176.00	1.00	48.70	1,175.92	9.39	-1.52	-9.41	0.64	0.42	36.53	
1,272.00	0.40	65.90	1,271.91	10.08	-0.59	-10.09	0.66	-0.63	17.92	
1,368.00	0.10	262.80	1,367.91	10.21	-0.37	-10.21	0.52	-0.31	-169.90	
1,463.00	0.50	37.90	1,462.91	10.52	-0.19	-10.53	0.61	0.42	142.21	
1,557.00	0.30	141.80	1,556.91	10.65	0.21	-10.65	0.68	-0.21	110.53	
1,653.00	0.30	163.40	1,652.91	10.22	0.44	-10.21	0.12	0.00	22.50	
1,748.00	0.70	256.40	1,747.90	9.84	-0.06	-9.84	0.82	0.42	97.89	
1,844.00	0.20	193.00	1,843.90	9.54	-0.66	-9.55	0.66	-0.52	-66.04	
1,940.00	0.50	284.00	1,939.90	9.48	-1.11	-9.49	0.56	0.31	94.79	
2,035.00	0.30	98.80	2,034.90	9.54	-1.26	-9.56	0.84	-0.21	184.00	



MS Energy Services
Survey Report



Company:	Tug Hill Operating, LLC	Local Co-ordinate Reference:	Well 1-11H
Project:	Barber County, Kansas (NAD 83)	TVD Reference:	WELL @ 1678.00usft (Patterson 421)
Site:	Donovan	MD Reference:	WELL @ 1678.00usft (Patterson 421)
Well:	1-11H	North Reference:	Grid
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

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)
2,131.00	0.40	72.90	2,130.90	9.60	-0.70	-9.61	0.19	0.10	-26.98
2,226.00	0.60	91.40	2,225.89	9.68	0.12	-9.68	0.27	0.21	19.47
2,321.00	0.10	356.30	2,320.89	9.76	0.61	-9.75	0.65	-0.53	-100.11
2,417.00	0.60	50.80	2,416.89	10.16	0.99	-10.14	0.57	0.52	56.77
2,513.00	0.40	124.80	2,512.89	10.28	1.66	-10.26	0.65	-0.21	77.08
2,608.00	0.50	66.20	2,607.88	10.26	2.31	-10.23	0.47	0.11	-61.68
2,701.00	0.70	76.40	2,700.88	10.56	3.23	-10.51	0.24	0.22	10.97
2,797.00	0.30	114.40	2,796.88	10.59	4.03	-10.53	0.52	-0.42	39.58
2,892.00	0.40	183.70	2,891.87	10.16	4.24	-10.10	0.43	0.11	72.95
2,987.00	0.60	170.30	2,986.87	9.34	4.30	-9.27	0.24	0.21	-14.11
3,082.00	0.40	208.30	3,081.87	8.56	4.23	-8.49	0.40	-0.21	40.00
3,178.00	0.40	239.20	3,177.87	8.09	3.78	-8.03	0.22	0.00	32.19
3,272.00	0.30	123.00	3,271.86	7.79	3.71	-7.73	0.63	-0.11	-123.62
3,367.00	0.40	308.10	3,366.86	7.86	3.65	-7.80	0.74	0.11	-184.11
3,462.00	0.40	15.10	3,461.86	8.38	3.48	-8.33	0.46	0.00	70.53
3,558.00	0.50	83.30	3,557.86	8.75	3.98	-8.69	0.53	0.10	71.04
3,654.00	0.40	109.80	3,653.86	8.69	4.71	-8.62	0.24	-0.10	27.60
3,750.00	0.20	248.00	3,749.86	8.51	4.87	-8.44	0.59	-0.21	143.96
3,845.00	0.40	321.80	3,844.85	8.71	4.51	-8.64	0.41	0.21	77.68
3,939.00	0.70	253.40	3,938.85	8.80	3.76	-8.75	0.71	0.32	-72.77
4,033.00	1.10	223.40	4,032.84	7.98	2.59	-7.95	0.64	0.43	-31.91
4,128.00	1.10	283.30	4,127.83	7.53	1.08	-7.52	1.16	0.00	63.05
4,224.00	0.60	259.40	4,223.81	7.65	-0.31	-7.66	0.63	-0.52	-24.90
4,320.00	0.80	304.40	4,319.81	7.94	-1.36	-7.96	0.59	0.21	46.88
4,416.00	0.80	293.20	4,415.80	8.58	-2.53	-8.62	0.16	0.00	-11.67
4,511.00	0.50	279.60	4,510.79	8.91	-3.55	-8.96	0.35	-0.32	-14.32
4,606.00	0.30	285.30	4,605.79	9.05	-4.20	-9.11	0.21	-0.21	6.00
4,700.00	0.80	310.40	4,699.79	9.54	-4.93	-9.61	0.58	0.53	26.70
4,732.00	0.50	309.70	4,731.78	9.77	-5.21	-9.84	0.94	-0.94	-2.19
4,764.00	1.00	336.10	4,763.78	10.11	-5.43	-10.19	1.86	1.56	82.50
4,795.00	0.80	3.80	4,794.78	10.58	-5.53	-10.66	1.52	-0.65	89.35
4,827.00	0.60	357.30	4,826.77	10.97	-5.52	-11.05	0.67	-0.63	-20.31
4,858.00	0.70	4.40	4,857.77	11.32	-5.51	-11.40	0.41	0.32	22.90
4,890.00	1.10	349.40	4,889.77	11.82	-5.56	-11.89	1.44	1.25	-46.88
4,921.00	0.70	342.70	4,920.76	12.29	-5.67	-12.37	1.33	-1.29	-21.61
4,938.00	1.10	342.70	4,937.76	12.54	-5.75	-12.63	2.35	2.35	0.00

Final N-Zone MWD-4938.00' MD



Company:	Tug Hill Operating, LLC	Local Co-ordinate Reference:	Well 1-11H
Project:	Barber County, Kansas (NAD 83)	TVD Reference:	WELL @ 1678.00usft (Patterson 421)
Site:	Donovan	MD Reference:	WELL @ 1678.00usft (Patterson 421)
Well:	1-11H	North Reference:	Grid
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
720.00	719.97	3.59	-4.46	Tie-In to Gyro-720.00' MD
4,938.00	4,937.76	12.54	-5.75	Final N-Zone MWD-4938.00' MD



MS Energy Services
Survey Report



Company:	Tug Hill Operating, LLC	Local Co-ordinate Reference:	Well 1-11H
Project:	Barber County, Kansas (NAD 83)	TVD Reference:	WELL @ 1678.00usft (Patterson 421)
Site:	Donovan	MD Reference:	WELL @ 1678.00usft (Patterson 421)
Well:	1-11H	North Reference:	Grid
Wellbore:	Wellbore #3	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

Project	Barber County, Kansas (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Kansas Southern Zone		

Well	1-11H				
Well Position	+N/-S	0.00 usft	Northing:	1,473,293.82 usft	Latitude: 37° 6' 30.6675 N
	+E/-W	0.00 usft	Easting:	1,250,763.47 usft	Longitude: 98° 42' 40.052 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level: 1,654.50 usft

Wellbore	Wellbore #3				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	11/30/12	4.97	65.16	51,759

Design	Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	4,511.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	179.17	

Survey Program	Date	12/26/12			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	720.00	N-Zone Gyro (Pilot Hole)	NS-GYRO-SS	NS Gyro single shots	
889.00	4,511.00	N-Zone MWD (Pilot Hole)	MWD	MWD - Standard	
4,511.00	11,000.00	MS MWD (Wellbore #3)	MWD	MWD - Standard	

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)
4,511.00	0.50	279.60	4,510.78	8.91	-3.55	-8.96	0.00	0.00	0.00
Tie-In to N-Zone MWD -4511.00' MD									
4,521.00	1.00	199.30	4,520.78	8.84	-3.62	-8.89	10.40	5.00	-803.00
4,553.00	4.00	195.30	4,552.75	7.50	-4.01	-7.55	9.39	9.38	-12.50
4,584.00	8.80	190.10	4,583.54	4.12	-4.71	-4.18	15.58	15.48	-16.77
4,616.00	14.00	189.40	4,614.90	-2.12	-5.77	2.03	16.26	16.25	-2.19
4,647.00	18.70	189.10	4,644.64	-10.73	-7.17	10.62	15.16	15.16	-0.97
4,679.00	23.30	188.60	4,674.51	-22.06	-8.93	21.93	14.39	14.38	-1.56
4,711.00	27.50	188.50	4,703.41	-35.63	-10.97	35.46	13.13	13.13	-0.31
4,742.00	31.20	184.70	4,730.42	-50.71	-12.68	50.53	13.36	11.94	-12.26
4,774.00	35.00	184.10	4,757.23	-68.14	-14.02	67.93	11.92	11.88	-1.88
4,806.00	37.60	180.30	4,783.02	-87.06	-14.73	86.83	10.74	8.13	-11.88
4,838.00	41.80	176.70	4,807.64	-107.48	-14.17	107.26	14.96	13.13	-11.25
4,869.00	45.50	176.50	4,830.06	-128.83	-12.89	128.63	11.94	11.94	-0.65



MS Energy Services
Survey Report



Company:	Tug Hill Operating, LLC	Local Co-ordinate Reference:	Well 1-11H
Project:	Barber County, Kansas (NAD 83)	TVD Reference:	WELL @ 1678.00usft (Patterson 421)
Site:	Donovan	MD Reference:	WELL @ 1678.00usft (Patterson 421)
Well:	1-11H	North Reference:	Grid
Wellbore:	Wellbore #3	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

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)
4,899.00	48.80	176.80	4,850.46	-150.79	-11.61	150.60	11.02	11.00	1.00
4,929.00	52.40	177.20	4,869.50	-173.93	-10.40	173.77	12.04	12.00	1.33
4,961.00	56.00	177.70	4,888.22	-199.86	-9.25	199.70	11.32	11.25	1.56
4,979.12	56.76	177.82	4,898.25	-214.94	-8.66	214.79	4.23	4.19	0.65
330' Hardline Intersect-4979.12' MD									
4,992.00	57.30	177.90	4,905.26	-225.73	-8.25	225.59	4.23	4.19	0.64
5,025.00	59.50	177.50	4,922.55	-253.82	-7.13	253.69	6.75	6.67	-1.21
5,056.00	60.80	177.50	4,937.98	-280.68	-5.95	280.56	4.19	4.19	0.00
5,089.00	60.50	177.70	4,954.15	-309.42	-4.75	309.32	1.05	-0.91	0.61
5,120.00	60.50	177.90	4,969.42	-336.38	-3.71	336.29	0.56	0.00	0.65
5,151.00	62.30	178.10	4,984.26	-363.58	-2.76	363.50	5.83	5.81	0.65
5,182.00	66.50	178.40	4,997.65	-391.51	-1.91	391.45	13.58	13.55	0.97
5,214.00	70.50	179.00	5,009.38	-421.27	-1.24	421.21	12.62	12.50	1.88
5,245.00	71.30	178.80	5,019.52	-450.56	-0.68	450.51	2.65	2.58	-0.65
5,276.00	73.60	178.80	5,028.87	-480.11	-0.06	480.06	7.42	7.42	0.00
5,307.00	76.30	178.20	5,036.91	-510.03	0.73	509.99	8.91	8.71	-1.94
5,339.00	79.40	178.20	5,043.65	-541.30	1.71	541.27	9.69	9.69	0.00
5,371.00	82.80	177.80	5,048.60	-572.89	2.81	572.87	10.70	10.63	-1.25
5,401.00	84.80	177.40	5,051.84	-602.69	4.06	602.68	6.80	6.67	-1.33
5,433.00	85.50	177.30	5,054.54	-634.54	5.54	634.55	2.21	2.19	-0.31
5,464.00	89.30	176.90	5,055.95	-665.46	7.10	665.49	12.33	12.26	-1.29
5,496.00	91.50	176.90	5,055.73	-697.41	8.83	697.46	6.88	6.88	0.00
5,526.00	92.00	177.70	5,054.81	-727.36	10.25	727.43	3.14	1.67	2.67
5,618.00	91.50	177.00	5,052.00	-819.22	14.50	819.34	0.93	-0.54	-0.76
5,711.00	89.80	177.00	5,050.95	-912.08	19.37	912.27	1.83	-1.83	0.00
5,803.00	89.10	177.70	5,051.83	-1,003.98	23.62	1,004.22	1.08	-0.76	0.76
5,895.00	90.10	177.50	5,052.47	-1,095.90	27.47	1,096.18	1.11	1.09	-0.22
5,987.00	89.30	177.40	5,052.95	-1,187.80	31.56	1,188.14	0.88	-0.87	-0.11
6,079.00	89.00	175.50	5,054.32	-1,279.61	37.26	1,280.02	2.09	-0.33	-2.07
6,171.00	88.70	177.50	5,056.16	-1,371.42	42.88	1,371.89	2.20	-0.33	2.17
6,263.00	88.30	177.90	5,058.57	-1,463.31	46.57	1,463.83	0.61	-0.43	0.43
6,355.00	88.50	178.60	5,061.14	-1,555.23	49.37	1,555.78	0.79	0.22	0.76
6,447.00	88.70	179.00	5,063.39	-1,647.18	51.30	1,647.75	0.49	0.22	0.43
6,540.00	89.20	178.50	5,065.09	-1,740.15	53.33	1,740.74	0.76	0.54	-0.54
6,632.00	88.90	180.10	5,066.62	-1,832.12	54.45	1,832.72	1.77	-0.33	1.74
6,724.00	89.70	180.70	5,067.74	-1,924.11	53.81	1,924.69	1.09	0.87	0.65
6,816.00	87.40	180.30	5,070.07	-2,016.07	53.01	2,016.63	2.54	-2.50	-0.43
6,908.00	88.10	179.90	5,073.68	-2,108.00	52.85	2,108.55	0.88	0.76	-0.43
7,000.00	89.10	179.80	5,075.93	-2,199.97	53.09	2,200.51	1.09	1.09	-0.11
7,092.00	88.90	178.90	5,077.54	-2,291.95	54.13	2,292.49	1.00	-0.22	-0.98
7,183.00	90.40	178.50	5,078.09	-2,382.92	56.20	2,383.49	1.71	1.65	-0.44
7,275.00	90.90	178.00	5,077.05	-2,474.87	59.01	2,475.47	0.77	0.54	-0.54
7,367.00	91.40	178.20	5,075.20	-2,566.80	62.06	2,567.43	0.59	0.54	0.22



Company:	Tug Hill Operating, LLC	Local Co-ordinate Reference:	Well 1-11H
Project:	Barber County, Kansas (NAD 83)	TVD Reference:	WELL @ 1678.00usft (Patterson 421)
Site:	Donovan	MD Reference:	WELL @ 1678.00usft (Patterson 421)
Well:	1-11H	North Reference:	Grid
Wellbore:	Wellbore #3	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

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)
7,459.00	91.50	178.20	5,072.87	-2,658.73	64.94	2,659.39	0.11	0.11	0.00
7,554.00	90.40	178.90	5,071.30	-2,753.68	67.35	2,754.37	1.37	-1.16	0.74
7,649.00	91.20	179.10	5,069.97	-2,848.66	69.01	2,849.36	0.87	0.84	0.21
7,744.00	90.10	178.70	5,068.90	-2,943.63	70.83	2,944.35	1.23	-1.16	-0.42
7,839.00	88.30	178.90	5,070.22	-3,038.60	72.82	3,039.34	1.91	-1.89	0.21
7,933.00	86.80	179.20	5,074.24	-3,132.50	74.38	3,133.25	1.63	-1.60	0.32
8,024.00	87.50	178.30	5,078.76	-3,223.36	76.36	3,224.13	1.25	0.77	-0.99
8,117.00	89.10	178.00	5,081.52	-3,316.27	79.36	3,317.07	1.75	1.72	-0.32
8,209.00	88.10	178.60	5,083.77	-3,408.20	82.09	3,409.03	1.27	-1.09	0.65
8,301.00	89.50	178.50	5,085.70	-3,500.15	84.42	3,501.00	1.53	1.52	-0.11
8,393.00	87.90	178.30	5,087.78	-3,592.09	86.98	3,592.97	1.75	-1.74	-0.22
8,485.00	88.50	178.20	5,090.67	-3,684.00	89.79	3,684.91	0.66	0.65	-0.11
8,577.00	89.40	178.20	5,092.36	-3,775.94	92.68	3,776.88	0.98	0.98	0.00
8,669.00	87.40	179.10	5,094.93	-3,867.87	94.85	3,868.84	2.38	-2.17	0.98
8,761.00	88.00	177.70	5,098.62	-3,959.76	97.41	3,960.75	1.65	0.65	-1.52
8,853.00	88.70	179.60	5,101.27	-4,051.69	99.58	4,052.71	2.20	0.76	2.07
8,945.00	90.00	181.20	5,102.31	-4,143.67	98.94	4,144.67	2.24	1.41	1.74
9,037.00	91.00	181.70	5,101.51	-4,235.64	96.61	4,236.60	1.22	1.09	0.54
9,129.00	92.00	181.20	5,099.10	-4,327.58	94.28	4,328.49	1.22	1.09	-0.54
9,222.00	89.70	180.90	5,097.72	-4,420.55	92.58	4,421.42	2.49	-2.47	-0.32
9,319.00	90.70	181.20	5,097.39	-4,517.53	90.80	4,518.37	1.08	1.03	0.31
9,411.00	90.50	179.70	5,096.42	-4,609.52	90.08	4,610.34	1.64	-0.22	-1.63
9,503.00	88.60	178.90	5,097.14	-4,701.50	91.20	4,702.33	2.24	-2.07	-0.87
9,595.00	89.60	178.00	5,098.59	-4,793.45	93.69	4,794.31	1.46	1.09	-0.98
9,687.00	89.90	178.00	5,098.99	-4,885.40	96.90	4,886.29	0.33	0.33	0.00
9,779.00	92.00	177.80	5,097.47	-4,977.32	100.27	4,978.25	2.29	2.28	-0.22
9,871.00	91.40	178.10	5,094.74	-5,069.22	103.56	5,070.19	0.73	-0.65	0.33
9,963.00	90.50	179.90	5,093.21	-5,161.19	105.17	5,162.17	2.19	-0.98	1.96
10,022.08	89.60	180.86	5,093.16	-5,220.26	104.77	5,221.23	2.23	-1.52	1.63
Section Line Intersect-10022.08' MD									
10,055.00	89.10	181.40	5,093.53	-5,253.18	104.12	5,254.13	2.23	-1.52	1.63
10,147.00	87.90	181.00	5,095.94	-5,345.12	102.20	5,346.04	1.37	-1.30	-0.43
10,240.00	89.70	180.40	5,097.89	-5,438.09	101.06	5,438.98	2.04	1.94	-0.65
10,349.00	92.00	179.50	5,096.27	-5,547.07	101.16	5,547.95	2.27	2.11	-0.83
10,441.00	90.20	182.50	5,094.50	-5,639.02	99.55	5,639.88	3.80	-1.96	3.26
10,534.00	88.40	183.80	5,095.64	-5,731.87	94.44	5,732.64	2.39	-1.94	1.40
10,627.00	88.00	183.30	5,098.56	-5,824.65	88.69	5,825.32	0.69	-0.43	-0.54
10,720.00	88.50	183.50	5,101.40	-5,917.44	83.17	5,918.02	0.58	0.54	0.22
10,813.00	86.60	181.90	5,105.38	-6,010.24	78.80	6,010.75	2.67	-2.04	-1.72
10,906.00	89.40	179.50	5,108.62	-6,103.16	77.66	6,103.65	3.96	3.01	-2.58
11,000.00	89.40	179.50	5,109.61	-6,197.16	78.48	6,197.64	0.00	0.00	0.00
Projection to TD-11000.00' MD									



Company:	Tug Hill Operating, LLC	Local Co-ordinate Reference:	Well 1-11H
Project:	Barber County, Kansas (NAD 83)	TVD Reference:	WELL @ 1678.00usft (Patterson 421)
Site:	Donovan	MD Reference:	WELL @ 1678.00usft (Patterson 421)
Well:	1-11H	North Reference:	Grid
Wellbore:	Wellbore #3	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,511.00	4,510.78	8.91	-3.55	Tie-In to N-Zone MWD -4511.00' MD
4,979.12	4,898.25	-214.94	-8.66	330' Hardline Intersect-4979.12' MD
10,022.08	5,093.16	-5,220.26	104.77	Section Line Intersect-10022.08' MD
11,000.00	5,109.61	-6,197.16	78.48	Projection to TD-11000.00' MD