EAST COAST
Directional Drilling Specialists

Tug Hill Operating LLC

Ness County, Kansas
Sec 32, T17S, R23W
Nichepor #1-32H

Original Wellbore

Survey: MWD Survey

Standard Survey Report

19 October, 2012

TUG HILL OPERATING

Company:	Tug Hill Operating LLC	**Local Co-ordinate Reference:**	Well Nichepor #1-32H
Project:	Ness County, Kansas	**TVD Reference:**	WELL @ 2367.0usft (Original Well Elev)
Site:	Sec 32, T17S, R23W	**MD Reference:**	WELL @ 2367.0usft (Original Well Elev)
Well:	Nichepor #1-32H	**North Reference:**	True
Wellbore:	Original Wellbore	**Survey Calculation Method:**	Minimum Curvature
Design:	Original Wellbore	**Database:**	EDM 5000.1 Single User Db

Project Ness County, Kansas

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Kansas Southern Zone		

Site Sec 32, T17S, R23W

Site Position:		**Northing:**	1,991,401.37 usft	**Latitude:**	38° 31' 24.545 N
From:	Map	**Easting:**	916,495.95 usft	**Longitude:**	99° 53' 0.995 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	-0.85 °

Well Nichepor #1-32H

Well Position	**+N/-S**	0.0 usft	**Northing:**	1,991,401.37 usft	**Latitude:**	38° 31' 24.545 N
	+E/-W	0.0 usft	**Easting:**	916,495.95 usft	**Longitude:**	99° 53' 0.995 W
Position Uncertainty		0.0 usft	**Wellhead Elevation:**	usft	**Ground Level:**	2,344.0 usft

Wellbore Original Wellbore

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/4/2012	5.74	66.19	52,462

Design Original Wellbore

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	359.12

Survey Program **Date** 10/19/2012

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	860.0	Gyro Survey (Original Wellbore)	NS-GYRO-SS	NS Gyro single shots
986.0	8,933.0	MWD Survey (Original Wellbore)	MWD	MWD - Standard

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)
860.0	0.13	194.32	859.9	7.6	1.9	7.6	0.00	0.00	0.00
986.0	0.70	246.50	985.9	7.2	1.1	7.2	0.50	0.45	41.41
First MWD Survey									
1,079.0	0.50	104.10	1,078.9	6.8	1.0	6.8	1.22	-0.22	-153.12
1,171.0	0.90	102.20	1,170.9	6.6	2.1	6.6	0.44	0.43	-2.07
1,263.0	0.80	92.50	1,262.9	6.4	3.5	6.4	0.19	-0.11	-10.54
1,354.0	1.10	112.40	1,353.9	6.1	4.9	6.0	0.49	0.33	21.87
1,446.0	1.10	108.90	1,445.9	5.4	6.6	5.3	0.07	0.00	-3.80
1,538.0	0.90	114.70	1,537.9	4.8	8.1	4.7	0.24	-0.22	6.30
1,631.0	0.90	268.20	1,630.8	4.5	8.0	4.4	1.88	0.00	165.05

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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)
1,723.0	0.70	265.20	1,722.8	4.4	6.7	4.3	0.22	-0.22	-3.26
1,815.0	0.50	270.40	1,814.8	4.4	5.7	4.3	0.23	-0.22	5.65
1,907.0	0.40	253.00	1,906.8	4.3	5.0	4.2	0.18	-0.11	-18.91
1,995.0	0.40	248.50	1,994.8	4.1	4.5	4.0	0.04	0.00	-5.11
2,092.0	0.30	203.60	2,091.8	3.8	4.0	3.7	0.29	-0.10	-46.29
2,184.0	0.40	232.60	2,183.8	3.3	3.7	3.3	0.22	0.11	31.52
2,277.0	0.40	242.80	2,276.8	3.0	3.1	2.9	0.08	0.00	10.97
2,369.0	0.40	184.70	2,368.8	2.5	2.8	2.5	0.42	0.00	-63.15
2,462.0	0.40	83.90	2,461.8	2.2	3.1	2.2	0.66	0.00	-108.39
2,552.0	0.50	113.60	2,551.8	2.1	3.8	2.1	0.28	0.11	33.00
2,645.0	0.60	120.30	2,644.8	1.7	4.6	1.6	0.13	0.11	7.20
2,739.0	0.60	124.00	2,738.8	1.2	5.4	1.1	0.04	0.00	3.94
2,833.0	0.60	93.80	2,832.8	0.9	6.3	0.8	0.33	0.00	-32.13
2,928.0	0.60	115.90	2,927.8	0.6	7.3	0.5	0.24	0.00	23.26
3,023.0	0.10	247.80	3,022.8	0.4	7.6	0.3	0.71	-0.53	138.84
3,117.0	0.10	101.00	3,116.8	0.3	7.6	0.2	0.20	0.00	-156.17
3,212.0	0.10	93.60	3,211.8	0.3	7.8	0.2	0.01	0.00	-7.79
3,306.0	0.20	67.80	3,305.8	0.4	8.0	0.2	0.13	0.11	-27.45
3,401.0	0.30	76.20	3,400.8	0.5	8.4	0.4	0.11	0.11	8.84
3,495.0	0.40	62.10	3,494.8	0.7	9.0	0.6	0.14	0.11	-15.00
3,589.0	1.10	18.00	3,588.8	1.7	9.5	1.6	0.91	0.74	-46.91
3,684.0	1.20	12.70	3,683.8	3.5	10.0	3.4	0.15	0.11	-5.58
3,779.0	2.40	1.50	3,778.7	6.5	10.3	6.3	1.31	1.26	-11.79
3,810.0	5.30	354.80	3,809.6	8.6	10.2	8.4	9.45	9.35	-21.61
3,842.0	8.40	354.30	3,841.4	12.4	9.8	12.2	9.69	9.69	-1.56
3,873.0	10.60	356.20	3,872.0	17.5	9.4	17.3	7.17	7.10	6.13
3,905.0	14.10	358.50	3,903.2	24.3	9.1	24.2	11.04	10.94	7.19
3,937.0	17.20	358.90	3,934.1	32.9	8.9	32.8	9.69	9.69	1.25
3,968.0	20.00	358.20	3,963.4	42.8	8.7	42.7	9.06	9.03	-2.26
4,000.0	23.00	357.80	3,993.2	54.5	8.3	54.4	9.39	9.38	-1.25
4,031.0	25.90	357.30	4,021.4	67.4	7.7	67.2	9.38	9.35	-1.61
4,063.0	28.70	357.80	4,049.8	82.0	7.1	81.9	8.78	8.75	1.56
4,095.0	31.70	357.60	4,077.5	98.1	6.4	98.0	9.38	9.38	-0.63
4,126.0	34.20	358.90	4,103.5	115.0	5.9	114.9	8.38	8.06	4.19
4,158.0	37.00	359.60	4,129.5	133.6	5.7	133.5	8.84	8.75	2.19
4,189.0	40.00	359.20	4,153.8	152.9	5.5	152.8	9.71	9.68	-1.29
4,221.0	43.10	358.50	4,177.7	174.1	5.0	174.0	9.80	9.69	-2.19
4,252.0	46.30	358.70	4,199.8	195.9	4.5	195.8	10.33	10.32	0.65
4,284.0	50.00	358.30	4,221.1	219.7	3.9	219.6	11.60	11.56	-1.25
4,315.0	53.20	358.90	4,240.4	244.0	3.3	243.9	10.43	10.32	1.94
4,347.0	55.70	358.90	4,259.0	270.0	2.8	270.0	7.81	7.81	0.00
4,378.0	59.40	358.70	4,275.6	296.2	2.2	296.1	11.95	11.94	-0.65
4,410.0	59.30	359.00	4,291.9	323.7	1.7	323.6	0.86	-0.31	0.94

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Survey

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4,441.0	59.50	358.90	4,307.7	350.4	1.2	350.3	0.70	0.65	-0.32
4,473.0	59.90	358.90	4,323.8	378.0	0.7	377.9	1.25	1.25	0.00
4,504.0	61.20	358.90	4,339.1	405.0	0.2	404.9	4.19	4.19	0.00
4,535.0	64.50	358.50	4,353.2	432.6	-0.5	432.5	10.71	10.65	-1.29
4,567.0	67.90	358.50	4,366.1	461.8	-1.2	461.8	10.63	10.63	0.00
4,598.0	70.70	358.50	4,377.1	490.8	-2.0	490.8	9.03	9.03	0.00
4,630.0	73.20	358.20	4,387.0	521.2	-2.9	521.2	7.86	7.81	-0.94
4,662.0	75.80	358.00	4,395.6	552.0	-3.9	552.0	8.15	8.13	-0.63
4,693.0	78.30	357.60	4,402.5	582.2	-5.1	582.2	8.16	8.06	-1.29
4,724.0	81.30	357.40	4,408.0	612.7	-6.4	612.7	9.70	9.68	-0.65
4,756.0	83.80	357.60	4,412.1	644.4	-7.8	644.4	7.84	7.81	0.63
4,787.0	86.30	357.40	4,414.8	675.3	-9.1	675.3	8.09	8.06	-0.65
4,819.0	86.90	358.00	4,416.7	707.2	-10.4	707.3	2.65	1.88	1.88
4,850.0	87.60	357.80	4,418.2	738.1	-11.5	738.2	2.35	2.26	-0.65
4,882.0	88.30	357.80	4,419.3	770.1	-12.8	770.2	2.19	2.19	0.00
4,984.0	89.50	357.40	4,421.3	872.0	-17.0	872.1	1.24	1.18	-0.39
5,079.0	90.40	356.20	4,421.4	966.8	-22.3	967.0	1.58	0.95	-1.26
5,173.0	90.80	356.90	4,420.4	1,060.6	-28.0	1,060.9	0.86	0.43	0.74
5,265.0	89.90	358.30	4,419.8	1,152.5	-31.8	1,152.9	1.81	-0.98	1.52
5,358.0	90.50	359.90	4,419.5	1,245.5	-33.3	1,245.9	1.84	0.65	1.72
5,450.0	91.70	359.60	4,417.8	1,337.5	-33.7	1,337.9	1.34	1.30	-0.33
5,542.0	91.20	1.70	4,415.4	1,429.5	-32.7	1,429.8	2.35	-0.54	2.28
5,634.0	89.70	1.00	4,414.7	1,521.4	-30.5	1,521.7	1.80	-1.63	-0.76
5,726.0	88.00	0.10	4,416.5	1,613.4	-29.6	1,613.7	2.09	-1.85	-0.98
5,817.0	88.50	0.40	4,419.3	1,704.4	-29.2	1,704.6	0.64	0.55	0.33
5,910.0	89.10	359.60	4,421.3	1,797.3	-29.2	1,797.6	1.08	0.65	-0.86
6,002.0	90.70	359.00	4,421.4	1,889.3	-30.3	1,889.6	1.86	1.74	-0.65
6,094.0	91.50	0.10	4,419.7	1,981.3	-31.1	1,981.6	1.48	0.87	1.20
6,186.0	89.50	358.90	4,418.9	2,073.3	-31.9	2,073.5	2.54	-2.17	-1.30
6,279.0	88.50	358.70	4,420.5	2,166.3	-33.8	2,166.5	1.10	-1.08	-0.22
6,372.0	89.00	359.00	4,422.5	2,259.2	-35.7	2,259.5	0.63	0.54	0.32
6,463.0	90.70	359.00	4,422.8	2,350.2	-37.3	2,350.5	1.87	1.87	0.00
6,555.0	89.60	358.70	4,422.5	2,442.2	-39.1	2,442.5	1.24	-1.20	-0.33
6,647.0	90.60	358.20	4,422.4	2,534.2	-41.6	2,534.5	1.22	1.09	-0.54
6,740.0	89.50	359.20	4,422.3	2,627.1	-43.7	2,627.5	1.60	-1.18	1.08
6,831.0	91.50	359.40	4,421.5	2,718.1	-44.8	2,718.5	2.21	2.20	0.22
6,924.0	91.50	359.70	4,419.0	2,811.1	-45.5	2,811.4	0.32	0.00	0.32
7,017.0	90.60	359.40	4,417.3	2,904.1	-46.3	2,904.4	1.02	-0.97	-0.32
7,112.0	86.90	359.60	4,419.4	2,999.0	-47.1	2,999.4	3.90	-3.89	0.21
7,206.0	86.00	358.70	4,425.2	3,092.8	-48.5	3,093.2	1.35	-0.96	-0.96
7,300.0	88.00	358.30	4,430.2	3,186.7	-51.0	3,187.1	2.17	2.13	-0.43
7,395.0	89.40	358.30	4,432.3	3,281.6	-53.8	3,282.0	1.47	1.47	0.00
7,490.0	89.60	357.40	4,433.1	3,376.5	-57.3	3,377.0	0.97	0.21	-0.95

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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)
7,584.0	91.20	358.00	4,432.5	3,470.4	-61.1	3,471.0	1.82	1.70	0.64
7,679.0	92.10	357.60	4,429.7	3,565.3	-64.8	3,565.9	1.04	0.95	-0.42
7,774.0	90.70	359.40	4,427.4	3,660.3	-67.2	3,660.9	2.40	-1.47	1.89
7,868.0	90.50	357.40	4,426.4	3,754.2	-69.9	3,754.8	2.14	-0.21	-2.13
7,962.0	89.60	359.40	4,426.4	3,848.2	-72.5	3,848.8	2.33	-0.96	2.13
8,057.0	90.00	0.60	4,426.7	3,943.2	-72.5	3,943.8	1.33	0.42	1.26
8,151.0	90.70	1.10	4,426.1	4,037.2	-71.1	4,037.8	0.92	0.74	0.53
8,246.0	89.20	1.00	4,426.2	4,132.1	-69.4	4,132.7	1.58	-1.58	-0.11
8,339.0	90.50	1.80	4,426.4	4,225.1	-67.1	4,225.6	1.64	1.40	0.86
8,434.0	91.20	1.30	4,425.0	4,320.1	-64.5	4,320.5	0.91	0.74	-0.53
8,529.0	90.90	359.90	4,423.3	4,415.0	-63.5	4,415.5	1.51	-0.32	-1.47
8,623.0	91.10	359.20	4,421.6	4,509.0	-64.3	4,509.5	0.77	0.21	-0.74
8,718.0	91.20	358.90	4,419.7	4,604.0	-65.8	4,604.5	0.33	0.11	-0.32
8,812.0	90.30	358.70	4,418.5	4,698.0	-67.8	4,698.4	0.98	-0.96	-0.21
Last MWD Survey									
8,933.0	90.30	358.70	4,417.9	4,818.9	-70.5	4,819.4	0.00	0.00	0.00
PTB									

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
986.0	985.9	7.2	1.1	First MWD Survey
8,812.0	4,418.5	4,698.0	-67.8	Last MWD Survey
8,933.0	4,417.9	4,818.9	-70.5	PTB

Checked By: _____ Approved By: _____ Date: _____