

HALLIBURTON

Sperry Drilling

Statoil

Wetzel County WV (NAD 83 UTM 17N)

Joe Jolliffe Unit

Joe Jolliffe Unit 4H

Wellbore #1

Design: Surveys

Standard Survey Report

27 October, 2014

Received
Office of Oil & Gas
MAY 26 2015

06/05/2015

Survey Report

Company: Statoil	Local Co-ordinate Reference: Well Joe Jolliffe Unit 4H
Project: Wetzel County WV (NAD 83 UTM 17N)	TVD Reference: GL 1358' + KB 22' @ 1380.00usft (Orion Polaris)
Site: Joe Jolliffe Unit	MD Reference: GL 1358' + KB 22' @ 1380.00usft (Orion Polaris)
Well: Joe Jolliffe Unit 4H	North Reference: Grid
Wellbore: Wellbore #1	Survey Calculation Method: Minimum Curvature
Design: Surveys	Database: EDM 5000.1 Single User Db

Project	Wetzel County WV (NAD 83 UTM 17N)		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 West Virginia - HARN		
Map Zone:	Zone 17N (84 W to 78 W)		

Site	Joe Jolliffe Unit				
Site Position:	Northing:	4,388,679.10 m	Latitude:	39.647054	
From: Map	Easting:	538,102.00 m	Longitude:	-80.555909	
Position Uncertainty:	0.00 usft	Slot Radius:	13.200 in	Grtd Convergence:	0.28 °

Well	Joe Jolliffe Unit 4H				
Well Position	+N-S	0.00 usft	Northing:	4,388,679.10 m	
	+E-W	0.00 usft	Easting:	538,102.00 m	
Position Uncertainty	0.00 usft	Wellhead Elevation:	1,380.00 usft	Ground Level:	1,358.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	2/24/2014	-8.69	67.14	52,446

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	133.90	

Survey Program	Date 10/20/2014				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
70.00	625.00	MS Gyro (Wellbore #1)	SR-Gyro-MS	Fixed:v2:surface readout gyro multishot	
709.00	13,530.00	Sperry MWD (Wellbore #1)	MWD	Fixed:v2:standard declination	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Bulld Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70.00	0.10	84.17	70.00	0.01	0.06	0.04	0.14	0.14	0.00
163.00	0.40	124.28	163.00	-0.17	0.41	0.41	0.35	0.32	43.13
255.00	0.52	114.88	255.00	-0.52	1.05	1.12	0.15	0.13	-10.22
348.00	0.31	135.27	347.99	-0.88	1.61	1.77	0.27	-0.23	21.92
440.00	0.32	132.41	439.99	-1.23	1.98	2.28	0.02	0.01	-0.01
533.00	0.63	110.35	532.99	-1.58	2.65	3.01	0.35	0.33	-23.72
625.00	1.04	96.73	624.98	-1.86	3.95	4.14	0.49	0.45	14.80
709.00	1.65	70.81	708.96	-1.55	5.85	5.29	1.01	0.77	-30.86
802.00	2.22	71.85	801.90	-0.55	8.83	6.74	0.61	0.61	1.12

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Company: Statoil
 Project: Wetzel County WW (NAD 83 UTM 17N)
 Site: Joe Jolliffe Unit
 Well: Joe Jolliffe Unit 4H
 Wellbore: Wellbore #1
 Design: Surveys

Local Co-ordinate Reference: Well Joe Jolliffe Unit 4H
 TVD Reference: GL 1358' + KB 22' @ 1380.00usft (Orion Polaris)
 MD Reference: GL 1358' + KB 22' @ 1380.00usft (Orion Polaris)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 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 (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
894.00	2.31	73.07	893.83	0.55	12.30	8.48	0.11	0.10	1.33
986.00	2.37	69.84	985.75	1.74	15.85	10.22	0.16	0.07	-3.51
1,077.00	2.53	75.09	1,076.67	2.91	19.56	12.08	0.30	0.18	5.77
1,169.00	2.46	70.95	1,168.58	4.07	23.39	14.03	0.21	-0.08	-4.50
1,260.00	3.73	36.23	1,259.46	7.10	26.99	14.52	2.43	1.40	-38.15
1,352.00	4.47	13.42	1,351.23	13.00	29.59	12.30	1.93	0.80	-24.79
1,448.00	4.57	13.04	1,446.93	20.37	31.32	8.44	0.11	0.10	-0.40
1,543.00	4.78	356.82	1,541.62	28.01	31.95	3.60	1.40	0.22	-17.07
1,639.00	4.77	355.05	1,637.28	35.98	31.39	-2.33	0.15	-0.01	-1.84
1,734.00	3.99	1.17	1,732.01	43.22	31.11	-7.55	0.96	-0.82	6.44
1,830.00	4.88	5.71	1,827.72	50.62	31.59	-12.34	1.00	0.93	4.73
1,924.00	6.61	1.80	1,921.24	60.00	32.16	-18.44	1.89	1.84	-4.16
2,019.00	5.52	358.90	2,015.71	70.04	32.24	-25.33	1.19	-1.15	-3.05
2,114.00	4.64	3.23	2,110.34	78.44	32.37	-31.07	1.01	-0.93	4.56
2,209.00	4.78	358.09	2,205.02	86.24	32.45	-36.41	0.47	0.15	-5.41
2,303.00	5.03	359.26	2,298.67	94.27	32.27	-42.12	0.29	0.27	1.24
2,398.00	5.33	352.37	2,393.28	102.81	31.63	-48.50	0.73	0.32	-7.25
2,494.00	5.83	347.15	2,488.83	111.98	29.95	-56.07	0.74	0.52	-5.44
2,590.00	5.95	343.52	2,584.32	121.51	27.46	-64.47	0.41	0.12	-3.78
2,681.00	4.44	334.18	2,674.95	129.20	24.58	-71.87	1.90	-1.66	-10.26
2,777.00	7.00	335.91	2,770.46	137.89	20.58	-80.78	2.67	2.67	1.80
2,872.00	7.69	331.57	2,864.68	148.76	15.19	-92.21	0.93	0.73	-4.57
2,967.00	7.06	328.34	2,958.90	159.32	9.10	-103.92	0.79	-0.66	-3.40
3,060.00	6.33	324.11	3,051.26	168.34	3.09	-114.50	0.95	-0.78	-4.55
3,156.00	5.89	322.59	3,146.72	176.54	-3.00	-124.58	0.49	-0.46	-1.58
3,251.00	8.82	335.40	3,240.93	187.04	-9.00	-136.17	3.52	3.08	13.48
3,347.00	7.77	344.36	3,335.93	199.98	-13.81	-148.62	1.73	-1.09	9.33
3,442.00	7.53	10.45	3,430.11	212.29	-14.41	-157.59	3.63	-0.25	27.46
3,538.00	6.85	7.79	3,525.36	224.15	-12.50	-164.43	0.79	-0.71	-2.77
3,633.00	5.69	3.09	3,619.79	234.46	-11.47	-170.84	1.33	-1.22	-4.95
3,729.00	5.47	355.20	3,715.33	243.77	-11.60	-177.39	0.83	-0.23	-8.22
3,824.00	5.17	354.42	3,809.92	252.54	-12.40	-184.05	0.32	-0.32	-0.82
3,919.00	4.08	354.25	3,904.61	260.17	-13.15	-189.88	1.15	-1.15	-0.21
4,015.00	3.56	356.40	4,000.40	266.54	-13.68	-194.68	0.56	-0.54	-0.21
4,111.00	5.47	356.80	4,096.10	274.08	-14.12	-200.23	1.99	-1.88	-0.21
4,207.00	5.27	350.00	4,191.68	282.99	-15.14	-207.14	0.69	-0.21	-0.21
4,303.00	5.03	346.80	4,287.29	291.43	-16.87	-214.24	0.39	-0.29	-3.33
4,397.00	4.98	0.37	4,380.94	299.53	-17.78	-220.51	1.26	-0.05	14.44
4,493.00	3.30	16.06	4,476.68	306.35	-16.99	-224.67	2.10	-1.75	16.34
4,588.00	3.13	14.55	4,571.53	311.49	-15.59	-227.22	0.20	-0.18	-1.59
4,682.00	1.12	115.59	4,665.49	313.57	-14.11	-227.60	3.75	-2.14	107.49
4,777.00	1.42	23.49	4,760.47	314.25	-12.80	-227.13	1.94	0.32	-96.95
4,872.00	1.04	11.19	4,855.45	316.18	-12.17	-228.01	0.48	-0.40	-12.95

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4,968.00	0.61	19.81	4,951.44	317.51	-11.83	-228.69	0.46	-0.45	8.98
5,064.00	1.08	10.56	5,047.43	318.88	-11.49	-229.39	0.51	0.49	-9.64
5,160.00	0.64	2.02	5,143.42	320.31	-11.30	-230.25	0.48	-0.46	-8.90
5,255.00	0.65	8.26	5,238.41	321.37	-11.21	-230.91	0.07	0.01	6.57
5,350.00	0.58	341.82	5,333.40	322.36	-11.28	-231.65	0.30	-0.07	-27.83
5,445.00	0.44	7.46	5,428.40	323.18	-11.38	-232.30	0.28	-0.15	26.99
5,540.00	0.63	62.72	5,523.40	323.78	-10.87	-232.34	0.55	0.20	58.17
5,634.00	0.75	75.97	5,617.39	324.17	-9.81	-231.85	0.21	0.13	14.10
5,730.00	0.26	73.74	5,713.39	324.38	-8.99	-231.41	0.51	-0.51	-2.32
5,826.00	0.32	21.72	5,809.39	324.69	-8.69	-231.40	0.27	0.06	-54.19
5,921.00	0.26	21.94	5,904.38	325.14	-8.51	-231.58	0.06	-0.06	0.23
6,017.00	0.48	142.46	6,000.38	325.02	-8.18	-231.27	0.68	0.23	125.54
6,111.00	0.12	133.40	6,094.38	324.64	-7.87	-230.78	0.39	-0.38	-9.64
6,206.00	0.24	273.48	6,189.38	324.59	-8.00	-230.83	0.36	0.13	147.45
6,302.00	0.44	233.46	6,285.38	324.38	-8.49	-231.04	0.31	0.21	-41.69
6,397.00	0.31	217.72	6,380.38	323.96	-8.94	-231.08	0.17	-0.14	-16.57
6,489.00	0.24	176.30	6,472.38	323.57	-9.08	-230.91	0.22	-0.08	-45.02
6,581.00	0.26	148.34	6,564.38	323.20	-8.96	-230.56	0.13	0.02	-30.39
6,674.00	0.74	146.09	6,657.37	322.52	-8.52	-229.77	0.52	0.52	-2.42
6,765.00	0.68	155.06	6,748.37	321.54	-7.96	-228.69	0.14	-0.07	9.86
6,859.00	0.26	64.23	6,842.36	321.13	-7.53	-228.10	0.78	-0.45	-96.63
6,920.00	1.41	114.80	6,903.36	320.88	-6.73	-227.34	2.07	1.89	82.90
6,951.00	2.77	122.11	6,934.33	320.32	-5.75	-226.25	4.46	4.39	23.58
6,981.00	4.34	125.14	6,964.28	319.28	-4.20	-224.42	5.27	5.23	10.10
7,012.00	5.72	128.66	6,995.16	317.64	-2.04	-221.72	4.56	4.45	11.35
7,043.00	7.41	129.68	7,025.95	315.40	0.71	-218.19	5.46	5.45	3.29
7,073.00	9.08	129.69	7,055.64	312.65	4.02	-213.90	5.57	5.57	0.03
7,104.00	10.96	129.83	7,086.17	309.20	8.16	-208.52	6.07	6.06	0.45
7,135.00	13.24	130.20	7,116.48	305.02	13.14	-202.03	7.36	7.35	1.19
7,163.00	15.45	130.31	7,143.60	300.54	18.43	-195.11	7.89	7.89	0.39
7,194.00	18.71	130.35	7,173.23	294.64	25.37	-186.03	10.52	10.52	0.13
7,224.00	22.78	131.37	7,201.28	287.69	33.40	-175.42	13.62	13.57	3.40
7,254.00	27.12	132.57	7,228.47	279.22	42.80	-162.77	14.56	14.47	4.00
7,285.00	29.51	133.29	7,255.76	269.20	53.56	-148.07	7.79	7.71	2.32
7,315.00	32.39	133.47	7,281.49	258.61	64.77	-132.64	9.60	9.60	0.60
7,346.00	36.77	133.73	7,307.00	246.47	77.51	-115.06	14.14	14.13	0.03
7,377.00	40.86	133.74	7,331.15	233.04	91.55	-95.63	13.19	13.19	0.03
7,407.00	45.63	134.13	7,353.00	218.79	106.34	-75.08	15.92	15.90	1.30
7,438.00	50.26	135.81	7,373.76	202.51	122.61	-52.08	15.47	14.94	5.42
7,468.00	54.28	135.27	7,392.12	185.59	139.23	-28.36	13.48	13.40	-1.80
7,499.00	57.80	135.57	7,409.43	167.27	157.27	-2.66	11.38	11.35	0.97
7,530.00	61.22	134.96	7,425.16	148.30	176.07	24.04	11.16	11.03	-1.97
7,561.00	64.87	135.21	7,439.21	128.74	195.58	51.66	11.80	11.77	0.81

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 Wellbore: Wellbore #1
 Design: Surveys

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7,593.00	68.28	135.81	7,451.93	107.79	216.15	81.01	10.79	10.66	1.87
7,624.00	73.11	136.06	7,462.17	86.77	236.49	110.24	15.60	15.58	0.81
7,656.00	78.32	135.71	7,470.06	64.52	258.07	141.22	16.32	16.28	-1.09
7,688.00	83.73	135.55	7,475.05	41.93	280.17	172.80	16.91	16.91	-0.50
7,720.00	87.69	134.88	7,477.45	19.29	302.64	204.69	12.55	12.37	-2.09
7,751.00	90.27	134.21	7,478.00	-2.45	324.73	235.68	8.60	8.32	-2.16
7,783.00	91.44	133.82	7,477.52	-24.68	347.74	267.68	3.85	3.66	-1.22
7,877.00	90.67	134.30	7,475.79	-90.04	415.28	361.66	0.97	-0.82	0.51
7,973.00	91.91	133.83	7,473.63	-156.79	484.24	457.64	1.38	1.29	-0.49
8,069.00	88.59	134.38	7,473.21	-223.59	553.16	553.62	3.51	-3.46	0.57
8,165.00	89.97	134.78	7,474.42	-290.97	621.54	649.60	1.50	1.44	0.42
8,260.00	89.03	133.53	7,475.25	-357.14	689.69	744.60	1.65	-0.99	-1.32
8,356.00	90.57	133.76	7,475.58	-423.39	759.15	840.59	1.62	1.60	0.24
8,451.00	90.27	133.13	7,474.89	-488.72	828.13	935.59	0.73	-0.32	-0.66
8,543.00	89.53	133.67	7,475.05	-551.93	894.97	1,027.58	1.00	-0.80	0.59
8,639.00	91.11	133.80	7,474.51	-618.29	964.33	1,123.58	1.65	1.65	0.14
8,735.00	89.77	133.88	7,473.77	-684.79	1,033.57	1,219.57	1.40	-1.40	0.08
8,830.00	88.32	133.49	7,475.36	-750.39	1,102.26	1,314.55	1.58	-1.53	-0.41
8,925.00	89.26	132.79	7,477.36	-815.33	1,171.56	1,409.52	1.23	0.99	-0.74
9,020.00	87.74	132.84	7,479.85	-879.88	1,241.22	1,504.47	1.60	-1.60	0.05
9,115.00	89.09	133.22	7,482.48	-944.68	1,310.64	1,599.42	1.48	1.42	0.40
9,210.00	89.70	133.10	7,483.48	-1,009.65	1,379.93	1,694.41	0.65	0.64	-0.13
9,304.00	91.32	133.12	7,482.64	-1,073.89	1,448.55	1,788.39	1.72	1.72	0.02
9,399.00	89.66	135.41	7,481.83	-1,140.19	1,516.57	1,883.38	2.98	-1.75	2.41
9,495.00	89.06	135.09	7,482.90	-1,208.36	1,584.15	1,979.34	0.71	-0.62	-0.33
9,591.00	90.87	135.38	7,482.96	-1,276.52	1,651.75	2,075.31	1.91	1.89	0.30
9,687.00	88.62	135.62	7,483.39	-1,344.99	1,719.04	2,171.27	2.36	-2.34	0.25
9,783.00	89.93	134.77	7,484.60	-1,413.09	1,786.68	2,267.23	1.63	1.36	-0.89
9,878.00	88.25	134.97	7,486.11	-1,480.10	1,854.00	2,362.20	1.78	-1.77	0.21
9,973.00	89.83	134.14	7,487.70	-1,546.74	1,921.68	2,457.18	1.88	1.66	-0.87
10,068.00	91.21	134.08	7,486.84	-1,612.86	1,989.88	2,552.17	1.45	1.45	-0.06
10,164.00	88.90	134.63	7,486.75	-1,679.97	2,058.52	2,648.16	2.47	-2.41	0.57
10,260.00	90.34	135.72	7,487.39	-1,748.06	2,126.19	2,744.13	1.88	1.50	1.14
10,356.00	88.49	134.59	7,488.37	-1,816.11	2,193.88	2,840.10	2.26	-1.93	-1.18
10,450.00	88.96	134.12	7,490.46	-1,881.81	2,261.08	2,934.07	0.71	0.50	-0.50
10,546.00	90.24	134.22	7,491.13	-1,948.70	2,329.93	3,030.07	1.34	1.34	0.10
10,640.00	88.49	132.55	7,492.17	-2,013.26	2,398.24	3,124.05	2.57	1.86	1.77
10,735.00	89.93	132.44	7,493.48	-2,077.43	2,468.28	3,219.01	1.52	1.52	-0.12
10,830.00	91.48	132.24	7,492.31	-2,141.41	2,538.49	3,313.97	1.65	1.63	0.02
10,926.00	90.98	133.68	7,490.25	-2,206.81	2,608.73	3,409.93	1.59	-0.52	1.50
11,022.00	89.70	133.85	7,489.68	-2,273.21	2,678.05	3,505.93	1.35	-1.33	0.18
11,117.00	88.82	133.60	7,490.91	-2,338.87	2,746.70	3,600.92	0.96	-0.93	-0.26
11,212.00	90.27	134.51	7,491.66	-2,404.92	2,814.97	3,695.91	1.80	1.53	0.96
11,306.00	89.06	133.75	7,492.21	-2,470.37	2,882.44	3,789.90	1.52	-1.29	-0.81

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 MAY 26 2015

Survey Report

Company: Statoil
Project: Wetzel County WV (NAD 83 UTM 17N)
Site: Joe Jolliffe Unit
Well: Joe Jolliffe Unit 4H
Wellbore: Wellbore #1
Design: Surveys

Local Co-ordinate Reference: Well Joe Jolliffe Unit 4H
TVD Reference: GL 1358' + KB 22' @ 1380.00usft (Orion Polaris)
MD Reference: GL 1358' + KB 22' @ 1380.00usft (Orion Polaris)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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 (°/100ft)	Bull Rate (°/100ft)	Turn Rate (°/100ft)
11,402.00	87.27	133.92	7,495.29	-2,536.82	2,951.65	3,885.85	1.87	-1.86	0.18
11,497.00	87.65	133.88	7,499.50	-2,602.63	3,020.03	3,980.76	0.40	0.40	-0.04
11,592.00	88.89	133.45	7,502.36	-2,668.19	3,088.72	4,075.71	1.38	1.31	-0.45
11,686.00	90.77	133.24	7,502.64	-2,732.71	3,157.08	4,169.70	2.01	2.00	-0.22
11,781.00	89.26	133.27	7,502.62	-2,797.81	3,226.27	4,264.69	1.59	-1.59	0.03
11,876.00	90.57	132.98	7,502.76	-2,862.75	3,295.60	4,359.68	1.41	1.38	-0.31
11,972.00	89.36	133.83	7,502.82	-2,928.71	3,365.34	4,455.68	1.54	-1.26	0.89
12,068.00	90.74	133.45	7,502.73	-2,994.96	3,434.82	4,551.67	1.49	1.44	-0.40
12,164.00	90.37	134.67	7,501.80	-3,061.72	3,503.80	4,647.67	1.33	-0.39	1.27
12,259.00	88.75	135.67	7,502.53	-3,129.09	3,570.77	4,742.64	2.00	-1.71	1.05
12,354.00	89.90	135.76	7,503.65	-3,197.09	3,637.09	4,837.58	1.21	1.21	0.09
12,449.00	87.78	135.54	7,505.58	-3,265.00	3,703.49	4,932.51	2.24	-2.23	-0.23
12,543.00	89.83	136.71	7,507.54	-3,332.74	3,768.62	5,026.41	2.51	2.18	1.24
12,639.00	90.81	135.68	7,507.00	-3,402.02	3,835.07	5,122.33	1.48	1.02	-1.07
12,734.00	89.29	134.12	7,506.92	-3,469.08	3,902.35	5,217.31	2.29	-1.60	-1.64
12,829.00	90.40	133.01	7,507.17	-3,534.55	3,971.19	5,312.31	1.65	1.17	-1.17
12,923.00	87.92	132.00	7,508.55	-3,598.05	4,040.47	5,406.26	2.85	-2.64	-1.07
13,019.00	88.62	131.50	7,511.45	-3,661.94	4,112.06	5,502.15	0.90	0.73	-0.52
13,114.00	90.20	132.38	7,512.43	-3,725.43	4,182.72	5,597.08	1.90	1.66	0.93
13,209.00	92.04	132.32	7,510.57	-3,789.41	4,252.91	5,692.03	1.94	1.94	-0.06
13,305.00	90.60	132.38	7,508.36	-3,854.06	4,323.84	5,787.96	1.50	-1.50	0.06
13,401.00	91.45	131.05	7,506.64	-3,917.93	4,395.49	5,883.87	1.64	0.89	-1.39
13,485.00	92.90	131.34	7,503.45	-3,973.22	4,458.65	5,967.72	1.76	1.73	0.35
Last MWD Survey at 13485' MD									
13,530.00	92.90	131.34	7,501.18	-4,002.90	4,492.39	6,012.62	0.00	0.00	0.00
Projection to TD at 13530' MD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
13,485.00	7,503.45	-3,973.22	4,458.65	Last MWD Survey at 13485' MD
13,530.00	7,501.18	-4,002.90	4,492.39	Projection to TD at 13530' MD

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