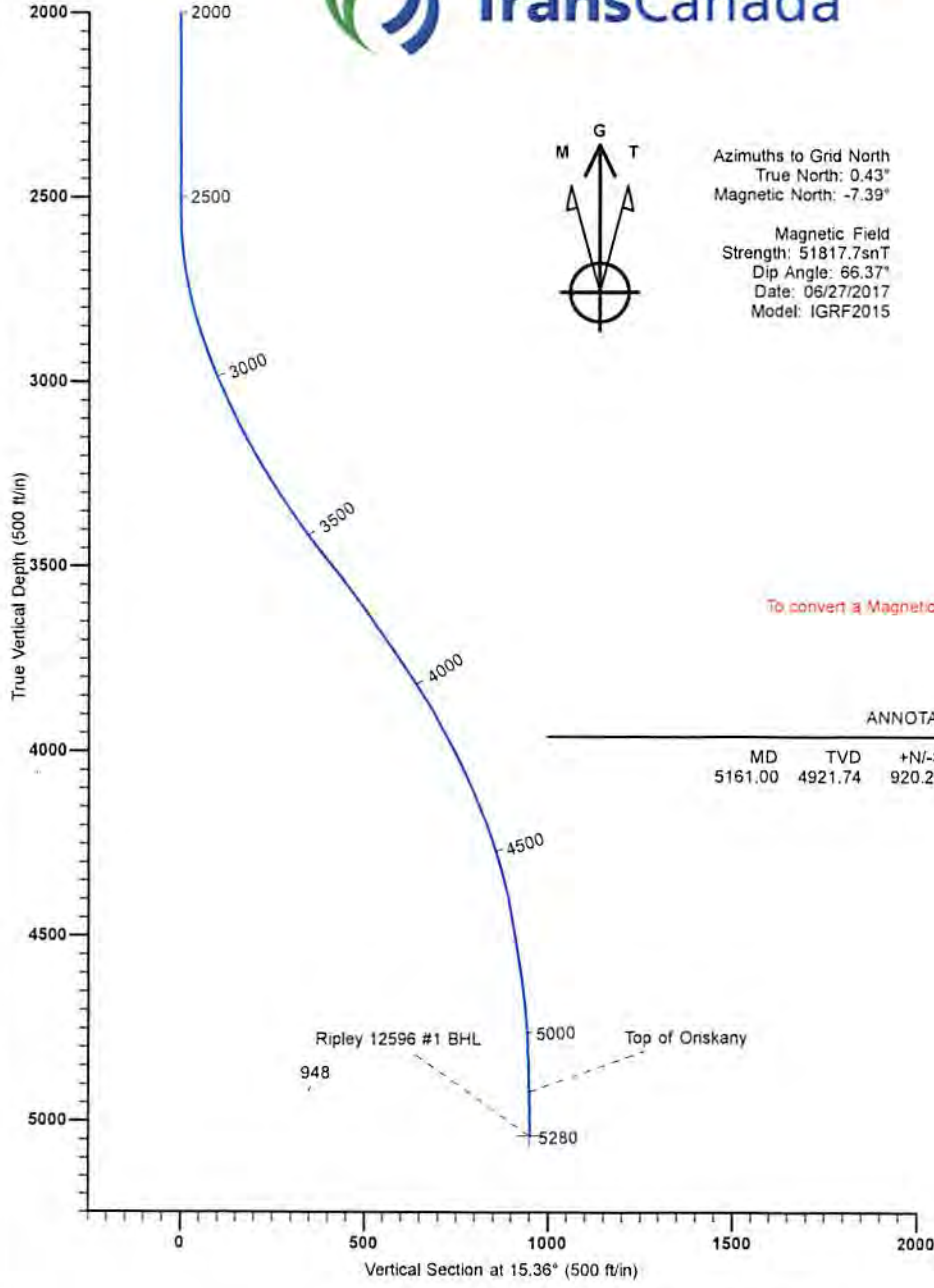
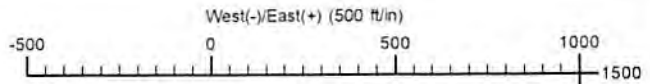


# TRANSCANADA

Project: Jackson County, WV (NAD83) WWSZ  
 Site: Ripley 12596 #1  
 Well: #1  
 Wellbore: OH  
 Design: OH



Azimuths to Grid North  
 True North: 0.43°  
 Magnetic North: -7.39°  
 Magnetic Field  
 Strength: 51817.7snT  
 Dip Angle: 66.37°  
 Date: 06/27/2017  
 Model: IGRF2015

To convert a Magnetic Direction to a Grid Direction, Subtract 7.39°

### ANNOTATIONS

MD	TVD	+N/-S	+E/-W	Annotation
5161.00	4921.74	920.28	228.19	Top of Oriskany

780+16 @ 796.00ft (Planning Revised)  
 North American Datum 1983  
 Well #1, Grid North

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### TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Ripley 12596 #1 SL	0.00	0.00	0.00	38° 52' 58.296 N	81° 41' 58.525 W	Point
Ripley 12596 #1 BHL	5040.69	923.52	227.67	38° 53' 7.441 N	81° 41' 55.734 W	Point

Design: OH (#1/OH)  
 Created By: Mekka Williams  
 eSomina Well Design  
 mekka@esominawelldesign.com  
 11.02, September 08 2017

**PANTHER DRILLING SYSTEMS**  
 189 Panther Drive, Buckhannon, WV 26201  
 231-342-1966



11/10/2017

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Survey Report

<b>Company:</b>	TRANSCANADA	<b>Local Co-ordinate Reference:</b>	Well #1
<b>Project:</b>	Jackson County, WV (NAD83) WWSZ	<b>TVD Reference:</b>	780+16 @ 796.00ft (Planning Revised)
<b>Site:</b>	Ripley 12596 #1	<b>MD Reference:</b>	780+16 @ 796.00ft (Planning Revised)
<b>Well:</b>	#1	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	PANTHER_EDM

<b>Project</b>	Jackson County, WV (NAD83) WWSZ		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	West Virginia Southern Zone		

<b>Site</b>	Ripley 12596 #1				
<b>Site Position:</b>		<b>Northing:</b>	686,396.18 ft	<b>Latitude:</b>	38° 52' 58.296 N
<b>From:</b>	Map	<b>Easting:</b>	1,769,349.74 ft	<b>Longitude:</b>	81° 41' 58.525 W
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13.20 in	<b>Grid Convergence:</b>	-0.43 °

<b>Well</b>	#1					
<b>Well Position</b>	+N/-S	0.00 ft	<b>Northing:</b>	686,396.18 ft	<b>Latitude:</b>	38° 52' 58.296 N
	+E/-W	0.00 ft	<b>Easting:</b>	1,769,349.74 ft	<b>Longitude:</b>	81° 41' 58.525 W
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	780.00 ft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	06/27/17	-7.82	66.37	51,818

<b>Design</b>	OH				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	15.36	

<b>Survey Program</b>	<b>Date</b>	09/08/17			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
2,450.00	5,070.00	Survey #1 (OH)	MWD	OWSG MWD - Standard	
5,140.00	5,280.00	Survey #2 (OH)	Projection	Projection	

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build 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	
<b>Ripley 12596 #1 SL</b>										
2,450.00	0.00	360.00	2,450.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,507.00	1.10	32.00	2,507.00	0.46	0.29	0.52	1.93	1.93	0.00	
2,552.00	0.30	10.99	2,551.99	0.95	0.54	1.06	1.84	-1.78	-46.69	
2,597.00	2.85	2.63	2,596.97	2.18	0.62	2.26	5.67	5.67	-18.58	
2,642.00	5.84	4.92	2,641.84	5.58	0.86	5.61	6.65	6.64	5.09	
2,687.00	8.48	8.35	2,686.48	11.14	1.54	11.15	5.94	5.87	7.62	
2,731.00	11.03	9.14	2,729.84	18.51	2.68	18.56	5.80	5.80	1.80	
2,773.00	13.22	7.21	2,770.90	27.24	3.92	27.31	5.30	5.21	-4.60	

11/10/2017

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WV Department of  
Environmental Protection



Survey Report

<b>Company:</b>	TRANSCANADA	<b>Local Co-ordinate Reference:</b>	Well #1
<b>Project:</b>	Jackson County, WV (NAD83) WVSZ	<b>TVD Reference:</b>	780+16 @ 796.00ft (Planning Revised)
<b>Site:</b>	Ripley 12596 #1	<b>MD Reference:</b>	780+16 @ 796.00ft (Planning Revised)
<b>Well:</b>	#1	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	PANTHER_EDM

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,817.00	15.91	7.38	2,813.49	38.22	5.33	38.26	6.11	6.11	0.39
2,862.00	18.37	7.47	2,856.48	51.37	7.04	51.40	5.47	5.47	0.20
2,907.00	19.56	11.87	2,899.04	65.77	9.51	65.94	4.13	2.64	9.78
2,952.00	20.70	12.04	2,941.29	80.92	12.72	81.40	2.54	2.53	0.38
2,997.00	22.50	9.49	2,983.13	97.19	15.80	97.91	4.51	4.00	-5.67
3,042.00	24.65	2.37	3,024.38	115.07	17.61	115.62	7.92	4.78	-15.82
3,084.00	27.20	358.40	3,062.16	133.42	17.70	133.34	7.34	6.07	-9.45
3,120.00	28.43	355.60	3,094.00	150.19	16.82	149.28	4.98	3.42	-7.78
3,162.00	29.00	357.10	3,130.83	170.33	15.54	168.36	2.19	1.36	3.57
3,207.00	29.50	3.10	3,170.10	192.29	15.58	189.55	6.61	1.11	13.33
3,249.00	30.10	7.80	3,206.55	213.05	17.57	210.10	5.74	1.43	11.19
3,294.00	30.89	11.33	3,245.33	235.58	21.37	232.81	4.35	1.76	7.84
3,338.00	32.47	15.55	3,282.78	258.02	26.76	255.89	6.18	3.59	9.59
3,383.00	33.62	19.16	3,320.50	281.42	34.09	280.40	5.07	2.56	8.02
3,425.00	34.54	23.39	3,355.30	303.34	42.63	303.80	6.05	2.19	10.07
3,470.00	35.46	24.52	3,392.16	326.92	53.11	329.32	2.50	2.04	2.51
3,512.00	37.75	22.59	3,425.67	349.88	63.11	354.10	6.10	5.45	-4.60
3,557.00	38.67	21.88	3,461.23	375.65	73.64	381.74	2.27	2.04	-1.58
3,602.00	38.98	22.67	3,496.29	401.75	84.33	409.74	1.30	0.69	1.76
3,644.00	37.88	22.06	3,529.19	425.89	94.27	435.65	2.77	-2.62	-1.45
3,689.00	36.56	21.09	3,565.02	451.20	104.28	462.71	3.21	-2.93	-2.16
3,734.00	36.52	17.40	3,601.18	476.49	113.11	489.43	4.88	-0.09	-8.20
3,779.00	35.86	16.08	3,637.50	501.93	120.76	515.99	2.27	-1.47	-2.93
3,821.00	35.20	15.20	3,671.88	525.43	127.34	540.40	1.99	-1.57	-2.10
3,866.00	34.40	14.50	3,708.63	550.26	133.93	566.08	1.99	-1.78	-1.56
3,911.00	33.53	13.44	3,745.95	574.65	140.00	591.21	2.34	-1.93	-2.36
3,956.00	34.19	14.15	3,783.32	599.00	145.98	616.27	1.71	1.47	1.58
4,001.00	33.61	14.23	3,820.67	623.33	152.13	641.37	1.29	-1.29	0.18
4,046.00	32.82	12.83	3,858.32	647.30	157.90	666.00	2.45	-1.76	-3.11
4,092.00	29.53	12.57	3,897.67	670.52	163.14	689.79	7.16	-7.15	-0.57
4,136.00	27.78	15.64	3,936.28	690.98	168.26	710.87	5.20	-3.98	6.98
4,181.00	27.20	14.06	3,976.20	711.06	173.59	731.64	2.07	-1.29	-3.51
4,226.00	27.07	12.04	4,016.25	731.05	178.22	752.15	2.07	-0.29	-4.49
4,268.00	25.58	13.18	4,053.90	749.23	182.28	770.75	3.75	-3.55	2.71
4,313.00	22.41	16.87	4,095.00	766.90	186.99	789.04	7.79	-7.04	8.20
4,358.00	22.50	18.36	4,136.59	783.28	192.19	806.21	1.28	0.20	3.31
4,400.00	21.88	17.49	4,175.48	798.37	197.08	822.06	1.67	-1.48	-2.07
4,422.00	21.35	17.49	4,195.93	806.10	199.51	830.16	2.41	-2.41	0.00
4,467.00	18.94	17.05	4,238.18	820.90	204.12	845.64	5.37	-5.36	-0.98
4,512.00	16.83	15.56	4,281.00	834.16	208.00	859.46	4.80	-4.69	-3.31
4,557.00	15.69	13.80	4,324.20	846.34	211.20	872.06	2.76	-2.53	-3.91
4,602.00	14.01	13.01	4,367.70	857.56	213.88	883.58	3.76	-3.73	-1.76
4,644.00	11.95	13.01	4,408.62	866.75	216.00	893.01	4.90	-4.90	0.00

<b>Company:</b>	TRANSCANADA	<b>Local Co-ordinate Reference:</b>	Well #1
<b>Project:</b>	Jackson County, WV (NAD83) WVSZ	<b>TVD Reference:</b>	780+16 @ 796.00ft (Planning Revised)
<b>Site:</b>	Ripley 12596 #1	<b>MD Reference:</b>	780+16 @ 796.00ft (Planning Revised)
<b>Well:</b>	#1	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	PANTHER_EDM

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,689.00	10.85	12.39	4,452.73	875.43	217.96	901.89	2.46	-2.44	-1.38	
4,734.00	9.40	12.92	4,497.03	883.15	219.69	909.79	3.23	-3.22	1.18	
4,779.00	8.96	13.36	4,541.45	890.14	221.32	916.97	0.99	-0.98	0.98	
4,824.00	8.48	15.03	4,585.93	896.75	222.99	923.79	1.21	-1.07	3.71	
4,868.00	7.65	17.05	4,629.50	902.68	224.69	929.96	1.99	-1.89	4.59	
4,913.00	6.50	18.20	4,674.16	907.97	226.37	935.50	2.57	-2.56	2.56	
4,958.00	4.79	17.23	4,718.94	912.18	227.72	939.92	3.81	-3.80	-2.16	
5,003.00	3.12	10.90	4,763.83	915.18	228.51	943.02	3.83	-3.71	-14.07	
5,048.00	1.93	354.29	4,808.78	917.14	228.66	944.95	3.08	-2.64	-36.91	
5,070.00	1.58	350.95	4,830.77	917.80	228.58	945.57	1.66	-1.59	-15.18	
5,161.00	1.58	350.95	4,921.74	920.28	228.19	947.85	0.00	0.00	0.00	
<b>Top of Oriskany</b>										
5,269.89	1.58	350.95	5,030.59	923.25	227.71	950.59	0.00	0.00	0.00	
<b>Ripley 12596 #1 PBHL</b>										
5,280.00	1.58	350.95	5,040.69	923.52	227.67	950.84	0.00	0.00	0.00	
<b>Ripley 12596 #1 BHL</b>										

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Ripley 12596 #1 SL - hit/miss target - Shape - Point	0.00	360.00	0.00	0.00	0.00	686,396.18	1,769,349.74	38° 52' 58.296 N	81° 41' 58.525 W
Ripley 12596 #1 BHL - actual wellpath hits target center - Point	0.00	360.00	5,040.69	923.52	227.67	687,319.70	1,769,577.41	38° 53' 7.441 N	81° 41' 55.734 W

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
5,161.00	4,921.74	920.28	228.19	Top of Oriskany

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

**APPROVED**

NAME: *James S. Stevens*  
DATE: *10/26/2017*

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