



Well Details: RWF 14-17

+N/-S	+E/-W	North	East	Latitude	Longitude	Slot
0.00	0.00	1627419.30	2317144.00	39.5310650	-107.9212477	RWF 14-17 (B11)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well RWF 14-17 - Slot RWF 14-17 (B11), True North
 Vertical (TVD) Reference: GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
 Section (VS) Reference: Slot - RWF 14-17 (B11)(0.00N, 0.00E)
 Measured Depth Reference: GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
 Calculation Method: Minimum Curvature

PROJECT DETAILS: Garfield County, CO NAD83

Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Central Zone

System Datum: Mean Sea Level

Plan: OH

12:34, July 10 2019
 Created By: Mel Mireles Jr.



Directional Survey Certification

2948 I-70 Business Loop
Grand Junction, CO 81504
(970)-245-9447 Fax (970)-245-9454

Operator	TEP Rocky Mountain, LLC.
Well Name & No.	RWF 14-17
County & State	Garfield County, CO
SDI Job No.	OP.019548
Rig	H&P 318

I, Mel Mireles Jr., having personal knowledge of all the facts, hereby certify that the attached directional survey run from a measured depth of 122 feet to a measured depth of 9,035 feet is true and correct as determined from all available records.

A handwritten signature in black ink, appearing to read 'Mel Mireles Jr.', written over a horizontal line.

Signature

10-Jul-19

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RWF 14-17 - Slot RWF 14-17 (B11)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Site:	DOE 1-M-18 Pad	MD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Well:	RWF 14-17	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Project	Garfield County, CO NAD83		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site		DOE 1-M-18 Pad			
Site Position:		Northing:	1,627,441.60 usft	Latitude:	39.5311260
From:	Map	Easting:	2,317,141.30 usft	Longitude:	-107.9212595
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.53 °

Well		RWF 14-17 - Slot RWF 14-17 (B11)				
Well Position	+N/-S	0.00 usft	Northing:	1,627,419.30 usft	Latitude:	39.5310650
	+E/-W	0.00 usft	Easting:	2,317,144.00 usft	Longitude:	-107.9212478
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	6,174.50 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/27/2019	9.32	65.75	51,472

Design	OH				
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	60.30	

Survey Program	Date	7/10/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
122.00	579.00	Survey #1 - Gyro Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
652.00	1,048.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,173.00	9,035.00	Survey #3 - Production MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	

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	
122.00	0.44	195.21	122.00	-0.45	-0.12	-0.33	0.36	0.36	0.00	
First SDI Gyro MWD Survey										
213.00	1.76	81.30	212.99	-0.58	1.17	0.73	2.18	1.45	-125.18	
305.00	3.87	72.77	304.87	0.56	5.53	5.08	2.33	2.29	-9.27	
397.00	5.98	64.34	396.53	3.55	12.82	12.89	2.42	2.29	-9.16	
488.00	6.86	58.27	486.96	8.46	21.71	23.05	1.22	0.97	-6.67	
579.00	7.74	57.39	577.22	14.62	31.50	34.60	0.97	0.97	-0.97	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RWF 14-17 - Slot RWF 14-17 (B11)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Site:	DOE 1-M-18 Pad	MD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Well:	RWF 14-17	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

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)
Last SDI Gyro MWD Survey									
652.00	8.79	57.13	649.46	20.30	40.32	45.08	1.44	1.44	-0.36
First SDI Surface MWD Survey									
746.00	10.00	57.50	742.19	28.58	53.24	60.40	1.29	1.29	0.39
841.00	11.30	58.30	835.56	37.91	68.11	77.95	1.38	1.37	0.84
935.00	10.00	57.84	927.94	47.09	82.86	95.30	1.39	-1.38	-0.49
1,030.00	8.71	66.55	1,021.67	54.34	96.44	110.70	2.01	-1.36	9.17
1,048.00	8.97	67.33	1,039.46	55.43	98.99	113.44	1.59	1.44	4.33
Last SDI Surface MWD Survey									
1,173.00	8.31	69.77	1,163.04	62.31	116.45	132.03	0.60	-0.53	1.95
First SDI Production MWD Survey									
1,267.00	7.91	69.26	1,256.10	66.95	128.88	145.12	0.43	-0.43	-0.54
1,361.00	8.62	56.69	1,349.13	73.10	140.81	158.54	2.06	0.76	-13.37
1,456.00	7.47	59.71	1,443.20	80.13	152.10	171.82	1.29	-1.21	3.18
1,550.00	7.20	60.03	1,536.43	86.15	162.48	183.82	0.29	-0.29	0.34
1,645.00	7.65	58.01	1,630.63	92.48	173.00	196.09	0.55	0.47	-2.13
1,739.00	7.03	59.42	1,723.86	98.72	183.26	208.09	0.69	-0.66	1.50
1,834.00	6.51	57.75	1,818.20	104.55	192.82	219.29	0.59	-0.55	-1.76
1,929.00	8.27	60.12	1,912.40	110.83	203.29	231.50	1.88	1.85	2.49
2,023.00	8.27	59.68	2,005.43	117.61	214.99	245.02	0.07	0.00	-0.47
2,118.00	8.09	57.57	2,099.46	124.64	226.53	258.53	0.37	-0.19	-2.22
2,212.00	7.91	57.04	2,192.55	131.71	237.54	271.59	0.21	-0.19	-0.56
2,307.00	7.65	56.69	2,286.67	138.74	248.31	284.43	0.28	-0.27	-0.37
2,401.00	7.65	58.19	2,379.83	145.47	258.86	296.93	0.21	0.00	1.60
2,496.00	7.21	61.00	2,474.04	151.70	269.44	309.21	0.60	-0.46	2.96
2,590.00	6.95	58.01	2,567.32	157.57	279.43	320.79	0.48	-0.28	-3.18
2,685.00	8.71	58.45	2,661.43	164.38	290.43	333.72	1.85	1.85	0.46
2,779.00	8.18	57.84	2,754.41	171.66	302.16	347.52	0.57	-0.56	-0.65
2,874.00	8.00	57.40	2,848.47	178.82	313.45	360.87	0.20	-0.19	-0.46
2,968.00	7.11	56.32	2,941.65	185.57	323.80	373.21	0.96	-0.95	-1.15
3,062.00	6.86	55.73	3,034.95	191.96	333.28	384.61	0.28	-0.27	-0.63
3,157.00	8.00	60.65	3,129.15	198.39	343.73	396.87	1.37	1.20	5.18
3,251.00	8.00	60.21	3,222.24	204.85	355.11	409.96	0.07	0.00	-0.47
3,346.00	7.65	61.44	3,316.35	211.16	366.40	422.89	0.41	-0.37	1.29
3,440.00	7.56	58.71	3,409.53	217.36	377.18	435.32	0.40	-0.10	-2.90
3,535.00	6.77	61.09	3,503.79	223.31	387.42	447.17	0.89	-0.83	2.51
3,629.00	8.62	55.29	3,596.94	230.00	398.07	459.73	2.13	1.97	-6.17
3,724.00	7.91	57.31	3,690.95	237.59	409.42	473.35	0.81	-0.75	2.13
3,818.00	7.62	54.99	3,784.09	244.66	419.97	486.01	0.45	-0.31	-2.47
3,913.00	7.47	58.01	3,878.26	251.54	430.36	498.46	0.45	-0.16	3.18
4,008.00	7.20	57.84	3,972.49	257.98	440.64	510.57	0.29	-0.28	-0.18
4,102.00	6.86	52.65	4,065.78	264.52	450.09	522.02	0.77	-0.36	-5.52
4,196.00	8.44	67.68	4,158.95	270.55	460.94	534.43	2.70	1.68	15.99
4,291.00	7.97	64.58	4,252.98	276.02	473.34	547.91	0.68	-0.49	-3.26

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RWF 14-17 - Slot RWF 14-17 (B11)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Site:	DOE 1-M-18 Pad	MD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Well:	RWF 14-17	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

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)
4,385.00	7.74	64.87	4,346.10	281.51	484.95	560.72	0.25	-0.24	0.31
4,480.00	7.12	64.69	4,440.30	286.74	496.07	572.97	0.65	-0.65	-0.19
4,574.00	6.71	65.27	4,533.61	291.53	506.32	584.25	0.44	-0.44	0.62
4,668.00	6.33	67.24	4,627.01	295.83	516.09	594.86	0.47	-0.40	2.10
4,763.00	6.24	67.21	4,721.44	299.86	525.68	605.19	0.09	-0.09	-0.03
4,857.00	5.80	72.86	4,814.92	303.24	534.93	614.89	0.78	-0.47	6.01
4,952.00	5.01	62.93	4,909.50	306.54	543.21	623.72	1.29	-0.83	-10.45
5,046.00	6.07	53.35	5,003.06	311.38	550.85	632.76	1.49	1.13	-10.19
5,141.00	5.45	51.16	5,097.58	317.20	558.39	642.20	0.69	-0.65	-2.31
5,235.00	4.92	53.97	5,191.19	322.37	565.13	650.61	0.63	-0.56	2.99
5,330.00	5.89	58.19	5,285.77	327.34	572.57	659.53	1.10	1.02	4.44
5,424.00	5.72	59.51	5,379.29	332.26	580.70	669.04	0.23	-0.18	1.40
5,518.00	5.36	60.30	5,472.85	336.81	588.55	678.11	0.39	-0.38	0.84
5,613.00	4.57	60.74	5,567.49	340.86	595.71	686.33	0.83	-0.83	0.46
5,707.00	5.36	56.17	5,661.14	345.13	602.62	694.46	0.94	0.84	-4.86
5,802.00	6.86	48.87	5,755.60	351.34	610.58	704.44	1.78	1.58	-7.68
5,897.00	7.11	51.10	5,849.89	358.76	619.43	715.81	0.39	0.26	2.35
5,991.00	6.07	52.74	5,943.27	365.42	627.91	726.48	1.12	-1.11	1.74
6,085.00	5.19	50.54	6,036.82	371.13	635.15	735.60	0.96	-0.94	-2.34
6,180.00	4.84	54.41	6,131.45	376.20	641.73	743.82	0.51	-0.37	4.07
6,274.00	3.78	57.31	6,225.19	380.18	647.56	750.86	1.15	-1.13	3.09
6,369.00	3.78	53.79	6,319.98	383.72	652.72	757.09	0.24	0.00	-3.71
6,463.00	2.55	57.04	6,413.83	386.69	656.98	762.26	1.32	-1.31	3.46
6,543.45	2.25	55.23	6,494.21	388.56	659.78	765.62	0.38	-0.37	-2.25
RWF 14-17 KMV									
6,558.00	2.20	54.85	6,508.75	388.89	660.24	766.19	0.38	-0.37	-2.61
6,652.00	1.32	65.57	6,602.71	390.37	662.70	769.06	1.00	-0.94	11.40
6,747.00	1.06	77.00	6,697.69	391.02	664.56	770.99	0.37	-0.27	12.03
6,841.00	0.79	111.19	6,791.68	390.99	666.01	772.23	0.64	-0.29	36.37
6,935.00	0.35	150.47	6,885.67	390.50	666.75	772.64	0.60	-0.47	41.79
7,030.00	0.97	150.38	6,980.66	389.55	667.29	772.64	0.65	0.65	-0.09
7,124.00	0.79	159.26	7,074.65	388.25	667.92	772.54	0.24	-0.19	9.45
7,219.00	1.82	173.58	7,169.63	386.14	668.32	771.84	1.13	1.08	15.07
7,313.00	0.35	96.42	7,263.61	384.62	668.77	771.48	1.89	-1.56	-82.09
7,408.00	0.69	96.42	7,358.61	384.53	669.63	772.18	0.36	0.36	0.00
7,502.00	0.09	114.61	7,452.60	384.43	670.26	772.68	0.64	-0.64	19.35
7,597.00	0.74	164.01	7,547.60	383.81	670.49	772.58	0.72	0.68	52.00
7,691.00	0.62	147.92	7,641.59	382.80	670.93	772.45	0.24	-0.13	-17.12
7,786.00	0.24	103.26	7,736.59	382.32	671.40	772.62	0.51	-0.40	-47.01
7,880.00	0.29	150.35	7,830.59	382.07	671.71	772.76	0.23	0.05	50.10
7,975.00	0.35	102.66	7,925.59	381.79	672.11	772.98	0.28	0.06	-50.20
8,069.00	0.23	118.14	8,019.59	381.64	672.55	773.29	0.15	-0.13	16.47
8,164.00	0.96	114.84	8,114.58	381.22	673.45	773.85	0.77	0.77	-3.47
8,258.00	1.67	113.00	8,208.56	380.35	675.42	775.14	0.76	0.76	-1.96

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Site:	DOE 1-M-18 Pad	MD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Well:	RWF 14-17	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

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)
8,353.00	2.29	109.25	8,303.50	379.18	678.49	777.23	0.67	0.65	-3.95
8,447.00	2.70	105.01	8,397.41	377.99	682.40	780.03	0.48	0.44	-4.51
8,542.00	3.52	87.81	8,492.27	377.52	687.47	784.21	1.30	0.86	-18.11
8,636.00	3.61	85.17	8,586.09	377.88	693.31	789.45	0.20	0.10	-2.81
8,731.00	3.62	73.86	8,680.90	378.97	699.17	795.08	0.75	0.01	-11.91
8,825.00	3.14	66.94	8,774.74	380.80	704.39	800.52	0.67	-0.51	-7.36
8,919.00	3.17	74.80	8,868.60	382.49	709.26	805.60	0.46	0.03	8.36
8,972.00	3.17	76.38	8,921.52	383.22	712.10	808.42	0.16	0.00	2.98
Last SDI Production MWD Survey									
9,035.00	3.17	76.38	8,984.42	384.04	715.49	811.77	0.00	0.00	0.00
Projection to TD - RWF 14-17 PBHL									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
122.00	122.00	-0.45	-0.12	First SDI Gyro MWD Survey
579.00	577.22	14.62	31.50	Last SDI Gyro MWD Survey
652.00	649.46	20.30	40.32	First SDI Surface MWD Survey
1,048.00	1,039.46	55.43	98.99	Last SDI Surface MWD Survey
1,173.00	1,163.04	62.31	116.45	First SDI Production MWD Survey
8,972.00	8,921.52	383.22	712.10	Last SDI Production MWD Survey
9,035.00	8,984.42	384.04	715.49	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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