



Well Details: RWF 442-18

TVD Reference: GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318) Level: 6174.50
 +N/-S +E/-W Northing Easting Latitude Longitude Slot
 0.00 0.00 1627374.70 2317149.50 39.5309430 -107.9212240 RWF 442-18 (B5)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well RWF 442-18 - Slot RWF 442-18 (B5), True North
 Vertical (TVD) Reference: GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
 Section (VS) Reference: Slot - RWF 442-18 (B5)(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

10:28, May 22 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 442-18
County & State	Garfield County, CO
SDI Job No.	OP.018606
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 202 feet to a measured depth of 9,112 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

22-May-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 442-18 - Slot RWF 442-18 (B5)
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 442-18	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 442-18 - Slot RWF 442-18 (B5)					
Well Position	+N/-S	0.00 usft	Northing:	1,627,374.70 usft	Latitude:	39.5309430
	+E/-W	0.00 usft	Easting:	2,317,149.50 usft	Longitude:	-107.9212241
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	5/14/2019	9.33	65.75	51,485

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	188.06	

Survey Program	Date	5/22/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
202.00	1,038.00	Survey #1 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,180.00	9,112.00	Survey #2 - 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	
202.00	3.56	196.02	201.87	-6.03	-1.73	6.21	1.76	1.76	0.00	
First SDI Surface MWD Survey										
294.00	5.89	193.29	293.55	-13.37	-3.60	13.74	2.54	2.53	-2.97	
385.00	7.53	186.08	383.93	-23.84	-5.31	24.35	2.02	1.80	-7.92	
477.00	10.02	182.47	474.84	-37.84	-6.29	38.35	2.77	2.71	-3.92	
569.00	12.75	183.97	565.02	-55.96	-7.34	56.44	2.98	2.97	1.63	
660.00	15.36	183.55	653.29	-78.01	-8.78	78.48	2.87	2.87	-0.46	
755.00	17.19	183.26	744.48	-104.59	-10.36	105.01	1.93	1.93	-0.31	
849.00	18.07	185.92	834.07	-132.96	-12.65	133.42	1.27	0.94	2.83	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RWF 442-18 - Slot RWF 442-18 (B5)
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 442-18	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)
943.00	19.11	186.25	923.16	-162.76	-15.83	163.37	1.11	1.11	0.35
1,038.00	19.51	187.65	1,012.82	-193.94	-19.64	194.78	0.64	0.42	1.47
Last SDI Surface MWD Survey									
1,180.00	20.70	186.77	1,146.16	-242.36	-25.75	243.58	0.86	0.84	-0.62
First SDI Production MWD Survey									
1,274.00	21.09	186.49	1,233.98	-275.66	-29.62	277.09	0.43	0.41	-0.30
1,369.00	19.26	192.41	1,323.16	-307.95	-34.92	309.81	2.88	-1.93	6.23
1,463.00	19.17	190.89	1,411.92	-338.25	-41.17	340.68	0.54	-0.10	-1.62
1,557.00	17.10	192.02	1,501.25	-366.93	-46.97	369.89	2.23	-2.20	1.20
1,652.00	16.32	191.61	1,592.24	-393.66	-52.56	397.14	0.83	-0.82	-0.43
1,746.00	15.56	191.26	1,682.62	-418.97	-57.68	422.91	0.81	-0.81	-0.37
1,840.00	14.33	192.22	1,773.44	-442.70	-62.60	447.10	1.33	-1.31	1.02
1,935.00	13.68	188.74	1,865.62	-465.29	-66.80	470.06	1.12	-0.68	-3.66
2,029.00	13.11	188.63	1,957.06	-486.82	-70.09	491.84	0.61	-0.61	-0.12
2,124.00	12.70	186.80	2,049.66	-507.84	-72.94	513.05	0.61	-0.43	-1.93
2,218.00	12.17	183.87	2,141.45	-527.99	-74.83	533.27	0.88	-0.56	-3.12
2,312.00	12.94	188.74	2,233.21	-548.28	-77.10	553.67	1.39	0.82	5.18
2,407.00	14.36	189.56	2,325.52	-570.41	-80.68	576.09	1.51	1.49	0.86
2,501.00	13.98	189.03	2,416.66	-593.12	-84.39	599.09	0.43	-0.40	-0.56
2,596.00	13.49	184.15	2,508.95	-615.50	-87.00	621.62	1.32	-0.52	-5.14
2,691.00	14.51	187.11	2,601.13	-638.36	-89.27	644.58	1.31	1.07	3.12
2,785.00	14.31	185.52	2,692.17	-661.61	-91.85	667.96	0.47	-0.21	-1.69
2,880.00	13.79	183.79	2,784.33	-684.60	-93.72	690.98	0.70	-0.55	-1.82
2,974.00	14.09	188.98	2,875.56	-707.08	-96.25	713.59	1.37	0.32	5.52
3,069.00	13.29	184.51	2,967.87	-729.39	-98.91	736.05	1.40	-0.84	-4.71
3,163.00	14.57	193.56	3,059.11	-751.65	-102.54	758.61	2.68	1.36	9.63
3,258.00	13.78	193.18	3,151.22	-774.29	-107.92	781.77	0.84	-0.83	-0.40
3,353.00	13.36	191.58	3,243.57	-796.06	-112.70	803.99	0.59	-0.44	-1.68
3,447.00	15.58	191.35	3,334.58	-819.07	-117.37	827.44	2.36	2.36	-0.24
3,541.00	14.53	188.21	3,425.35	-843.12	-121.53	851.84	1.41	-1.12	-3.34
3,636.00	13.69	187.04	3,517.49	-866.08	-124.61	874.99	0.93	-0.88	-1.23
3,730.00	12.96	186.48	3,608.95	-887.59	-127.17	896.65	0.79	-0.78	-0.60
3,825.00	14.43	187.49	3,701.25	-909.91	-129.91	919.14	1.57	1.55	1.06
3,919.00	13.72	187.46	3,792.43	-932.58	-132.89	942.00	0.76	-0.76	-0.03
4,014.00	12.35	185.04	3,884.98	-953.87	-135.24	963.41	1.55	-1.44	-2.55
4,108.00	14.02	189.10	3,976.50	-975.13	-137.93	984.83	2.03	1.78	4.32
4,203.00	13.55	191.59	4,068.76	-997.39	-141.98	1,007.45	0.80	-0.49	2.62
4,297.00	14.60	192.22	4,159.94	-1,019.76	-146.70	1,030.25	1.13	1.12	0.67
4,392.00	14.09	193.29	4,251.98	-1,042.71	-151.89	1,053.71	0.61	-0.54	1.13
4,486.00	13.63	189.98	4,343.24	-1,064.76	-156.44	1,076.18	0.98	-0.49	-3.52
4,580.00	13.12	186.45	4,434.69	-1,086.27	-159.56	1,097.91	1.02	-0.54	-3.76
4,675.00	11.52	185.12	4,527.50	-1,106.43	-161.62	1,118.16	1.71	-1.68	-1.40
4,769.00	13.66	185.34	4,619.24	-1,126.83	-163.49	1,138.63	2.28	2.28	0.23

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RWF 442-18 - Slot RWF 442-18 (B5)
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 442-18	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)
4,864.00	13.58	186.54	4,711.57	-1,149.08	-165.81	1,160.98	0.31	-0.08	1.26
4,958.00	12.95	185.77	4,803.06	-1,170.53	-168.12	1,182.54	0.70	-0.67	-0.82
5,053.00	11.91	184.18	4,895.83	-1,190.90	-169.91	1,202.95	1.15	-1.09	-1.67
5,147.00	11.26	180.28	4,987.92	-1,209.75	-170.66	1,221.73	1.08	-0.69	-4.15
5,242.00	10.11	179.48	5,081.27	-1,227.36	-170.63	1,239.16	1.22	-1.21	-0.84
5,336.00	8.44	177.86	5,174.04	-1,242.51	-170.30	1,254.11	1.80	-1.78	-1.72
5,430.00	9.32	182.25	5,266.91	-1,257.00	-170.34	1,268.47	1.18	0.94	4.67
5,525.00	9.58	180.47	5,360.62	-1,272.60	-170.70	1,283.96	0.41	0.27	-1.87
5,620.00	9.58	175.79	5,454.30	-1,288.39	-170.19	1,299.52	0.82	0.00	-4.93
5,714.00	8.73	186.57	5,547.11	-1,303.27	-170.43	1,314.30	2.03	-0.90	11.47
5,808.00	7.61	183.51	5,640.15	-1,316.57	-171.63	1,327.63	1.28	-1.19	-3.26
5,903.00	7.03	184.58	5,734.38	-1,328.65	-172.48	1,339.71	0.63	-0.61	1.13
5,997.00	6.92	188.52	5,827.68	-1,339.98	-173.77	1,351.11	0.52	-0.12	4.19
6,091.00	7.38	186.02	5,920.95	-1,351.59	-175.25	1,362.81	0.59	0.49	-2.66
6,186.00	7.33	183.68	6,015.17	-1,363.70	-176.28	1,374.95	0.32	-0.05	-2.46
6,280.00	6.90	186.69	6,108.44	-1,375.29	-177.32	1,386.57	0.61	-0.46	3.20
6,375.00	5.94	188.75	6,202.85	-1,385.82	-178.73	1,397.19	1.04	-1.01	2.17
6,469.00	3.75	185.49	6,296.51	-1,393.69	-179.77	1,405.13	2.35	-2.33	-3.47
6,564.00	4.06	180.77	6,391.29	-1,400.14	-180.11	1,411.57	0.47	0.33	-4.97
6,658.00	1.97	182.11	6,485.15	-1,405.09	-180.21	1,416.47	2.22	-2.22	1.43
RWF 442-18 KMV									
6,752.00	1.08	150.31	6,579.12	-1,407.47	-179.83	1,418.78	1.27	-0.95	-33.83
6,847.00	0.95	135.88	6,674.10	-1,408.81	-178.84	1,419.97	0.30	-0.14	-15.19
6,941.00	0.71	175.35	6,768.09	-1,409.95	-178.25	1,421.02	0.64	-0.26	41.99
7,036.00	0.61	175.01	6,863.09	-1,411.04	-178.16	1,422.08	0.11	-0.11	-0.36
7,130.00	0.86	157.50	6,957.08	-1,412.19	-177.85	1,423.18	0.35	0.27	-18.63
7,225.00	0.42	166.18	7,052.07	-1,413.19	-177.49	1,424.12	0.47	-0.46	9.14
7,319.00	0.79	175.80	7,146.07	-1,414.17	-177.36	1,425.07	0.41	0.39	10.23
7,414.00	1.25	183.10	7,241.05	-1,415.86	-177.37	1,426.74	0.50	0.48	7.68
7,508.00	0.24	113.88	7,335.05	-1,416.96	-177.24	1,427.82	1.26	-1.07	-73.64
7,603.00	0.84	184.17	7,430.04	-1,417.74	-177.11	1,428.57	0.83	0.63	73.99
7,697.00	0.93	351.83	7,524.04	-1,417.67	-177.27	1,428.52	1.87	0.10	178.36
7,792.00	0.35	307.10	7,619.03	-1,416.73	-177.61	1,427.64	0.76	-0.61	-47.08
7,886.00	0.29	7.97	7,713.03	-1,416.32	-177.81	1,427.26	0.35	-0.06	64.76
7,981.00	1.35	238.94	7,808.02	-1,416.66	-178.73	1,427.73	1.63	1.12	-135.82
8,075.00	0.61	187.16	7,902.01	-1,417.73	-179.74	1,428.93	1.15	-0.79	-55.09
8,170.00	1.13	203.87	7,997.00	-1,419.09	-180.19	1,430.33	0.60	0.55	17.59
8,264.00	1.12	179.90	8,090.98	-1,420.85	-180.56	1,432.14	0.50	-0.01	-25.50
8,358.00	1.05	180.60	8,184.96	-1,422.63	-180.57	1,433.90	0.08	-0.07	0.74
8,453.00	1.36	199.61	8,279.94	-1,424.57	-180.95	1,435.87	0.53	0.33	20.01
8,548.00	1.32	231.90	8,374.92	-1,426.30	-182.19	1,437.76	0.79	-0.04	33.99
8,642.00	1.76	109.46	8,468.90	-1,427.45	-181.69	1,438.83	2.88	0.47	-130.26
8,736.00	3.31	89.95	8,562.81	-1,427.93	-177.61	1,438.73	1.86	1.65	-20.76
8,831.00	3.25	77.80	8,657.65	-1,427.36	-172.24	1,437.41	0.73	-0.06	-12.79

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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)	
8,925.00	3.26	81.34	8,751.50	-1,426.39	-166.99	1,435.72	0.21	0.01	3.77	
9,020.00	2.73	86.85	8,846.37	-1,425.86	-162.06	1,434.50	0.63	-0.56	5.80	
9,057.00	2.81	90.80	8,883.33	-1,425.83	-160.27	1,434.22	0.56	0.22	10.68	
Last SDI Production MWD Survey										
9,112.00	2.81	90.80	8,938.26	-1,425.87	-157.58	1,433.87	0.00	0.00	0.00	
Projection to TD - RWF 442-18 PBHL										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
202.00	201.87	-6.03	-1.73	First SDI Surface MWD Survey	
1,038.00	1,012.82	-193.94	-19.64	Last SDI Surface MWD Survey	
1,180.00	1,146.16	-242.36	-25.75	First SDI Production MWD Survey	
9,057.00	8,883.33	-1,425.83	-160.27	Last SDI Production MWD Survey	
9,112.00	8,938.26	-1,425.87	-157.58	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
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