



Well Details: RWF 443-7

TVD Reference: GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318) Level: 6174.50					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	1627441.60	2317141.30	39.5311260	-107.9212580

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well RWF 443-7 - Slot RWF 443-7 (B14), True North
 Vertical (TVD) Reference: GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
 Section (VS) Reference: Slot - RWF 443-7 (B14)(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

14:28, August 07 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 443-7
County & State	Garfield County, CO
SDI Job No.	OP.020072
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 9,697 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

07-Aug-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 443-7 - Slot RWF 443-7 (B14)
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 443-7	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 443-7 - Slot RWF 443-7 (B14)					
Well Position	+N/-S	0.00 usft	Northing:	1,627,441.60 usft	Latitude:	39.5311260
	+E/-W	0.00 usft	Easting:	2,317,141.30 usft	Longitude:	-107.9212595
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	7/26/2019	9.32	65.75	51,464

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	340.27	

Survey Program	Date	8/7/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
122.00	488.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
559.00	1,029.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,172.00	9,697.00	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	0.26	252.25	122.00	-0.08	-0.26	0.01	0.21	0.21	0.00	
First SDI Gyro MWD Survey										
213.00	2.99	306.65	212.96	1.27	-2.36	1.99	3.13	3.00	59.78	
314.00	5.37	307.18	313.68	5.70	-8.24	8.15	2.36	2.36	0.52	
397.00	6.07	305.86	396.27	10.62	-14.90	15.02	0.86	0.84	-1.59	
488.00	6.60	304.37	486.71	16.39	-23.11	23.23	0.61	0.58	-1.64	
Last SDI Gyro MWD Survey										

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RWF 443-7 - Slot RWF 443-7 (B14)
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 443-7	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)	
559.00	7.01	302.34	557.21	21.01	-30.14	29.95	0.67	0.58	-2.86	
First SDI Surface MWD Survey										
652.00	7.65	310.53	649.45	28.07	-39.64	39.80	1.32	0.69	8.81	
746.00	8.66	320.30	742.50	37.58	-48.92	51.89	1.82	1.07	10.39	
840.00	10.12	320.01	835.24	49.35	-58.74	66.29	1.55	1.55	-0.31	
934.00	12.01	318.74	927.49	63.03	-70.50	83.13	2.03	2.01	-1.35	
1,029.00	14.33	319.20	1,019.99	79.36	-84.71	103.30	2.44	2.44	0.48	
Last SDI Surface MWD Survey										
1,172.00	16.11	322.67	1,157.97	108.54	-108.30	138.73	1.40	1.24	2.43	
First SDI Production MWD Survey										
1,266.00	17.59	326.78	1,247.93	130.79	-123.99	164.97	2.02	1.57	4.37	
1,361.00	18.03	327.13	1,338.38	155.15	-139.84	193.25	0.48	0.46	0.37	
1,455.00	19.99	330.68	1,427.25	181.38	-155.60	223.26	2.42	2.09	3.78	
1,550.00	21.89	329.74	1,515.97	210.84	-172.48	256.69	2.03	2.00	-0.99	
1,644.00	23.74	332.49	1,602.62	242.76	-190.05	292.67	2.27	1.97	2.93	
1,739.00	25.68	334.43	1,688.92	278.29	-207.77	332.10	2.21	2.04	2.04	
1,833.00	26.03	336.62	1,773.51	315.60	-224.75	372.94	1.08	0.37	2.33	
1,928.00	26.73	339.53	1,858.62	354.75	-240.49	415.11	1.55	0.74	3.06	
2,022.00	29.02	343.13	1,941.71	396.38	-254.50	459.03	3.02	2.44	3.83	
2,117.00	30.86	344.36	2,024.03	441.90	-267.76	506.35	2.04	1.94	1.29	
2,211.00	30.76	343.18	2,104.77	488.13	-281.22	554.40	0.65	-0.11	-1.26	
2,305.00	30.77	341.76	2,185.54	533.97	-295.70	602.45	0.77	0.01	-1.51	
2,400.00	31.92	343.48	2,266.68	581.13	-310.45	651.82	1.53	1.21	1.81	
2,494.00	31.83	343.66	2,346.50	628.74	-324.49	701.38	0.14	-0.10	0.19	
2,588.00	31.74	342.43	2,426.40	676.10	-338.92	750.83	0.70	-0.10	-1.31	
2,683.00	31.22	346.47	2,507.43	723.87	-352.23	800.28	2.29	-0.55	4.25	
2,777.00	30.78	346.12	2,588.00	770.90	-363.70	848.43	0.51	-0.47	-0.37	
2,871.00	30.07	344.62	2,669.06	816.96	-375.71	895.84	1.11	-0.76	-1.60	
2,966.00	30.95	347.61	2,750.91	863.77	-387.27	943.80	1.85	0.93	3.15	
3,061.00	29.90	347.35	2,832.83	910.74	-397.70	991.53	1.11	-1.11	-0.27	
3,155.00	30.43	346.47	2,914.10	956.74	-408.40	1,038.44	0.73	0.56	-0.94	
3,250.00	32.62	347.08	2,995.07	1,005.10	-419.75	1,087.79	2.33	2.31	0.64	
3,344.00	32.13	345.52	3,074.46	1,053.99	-431.67	1,137.84	1.03	-0.52	-1.66	
3,439.00	31.74	344.45	3,155.09	1,102.53	-444.68	1,187.92	0.72	-0.41	-1.13	
3,533.00	31.22	342.34	3,235.25	1,149.56	-458.70	1,236.93	1.30	-0.55	-2.24	
3,628.00	29.99	341.28	3,317.02	1,195.51	-473.79	1,285.27	1.41	-1.29	-1.12	
3,723.00	32.01	343.74	3,398.45	1,242.18	-488.46	1,334.15	2.51	2.13	2.59	
3,817.00	30.51	343.04	3,478.80	1,288.92	-502.40	1,382.86	1.64	-1.60	-0.74	
3,911.00	33.20	344.42	3,558.64	1,336.54	-516.28	1,432.37	2.96	2.86	1.47	
4,006.00	32.43	344.38	3,638.48	1,386.13	-530.12	1,483.72	0.81	-0.81	-0.04	
4,100.00	32.01	342.07	3,718.00	1,434.11	-544.58	1,533.76	1.38	-0.45	-2.46	
4,195.00	30.95	341.02	3,799.02	1,481.17	-560.27	1,583.35	1.26	-1.12	-1.11	
4,289.00	30.07	339.96	3,880.00	1,526.15	-576.21	1,631.07	1.10	-0.94	-1.13	
4,383.00	32.54	340.32	3,960.31	1,572.08	-592.79	1,679.91	2.64	2.63	0.38	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RWF 443-7 - Slot RWF 443-7 (B14)
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Site:	DOE 1-M-18 Pad	MD Reference:	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
Well:	RWF 443-7	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)
4,478.00	32.01	339.61	4,040.64	1,619.74	-610.17	1,730.64	0.69	-0.56	-0.75
4,572.00	30.95	338.47	4,120.80	1,665.58	-627.72	1,779.71	1.29	-1.13	-1.21
4,667.00	32.36	341.28	4,201.67	1,712.39	-644.85	1,829.55	2.15	1.48	2.96
4,761.00	32.27	340.84	4,281.11	1,759.92	-661.16	1,879.80	0.27	-0.10	-0.47
4,856.00	31.74	339.88	4,361.67	1,807.34	-678.08	1,930.15	0.77	-0.56	-1.01
4,951.00	31.04	340.58	4,442.77	1,853.90	-694.82	1,979.63	0.83	-0.74	0.74
5,045.00	30.69	340.58	4,523.45	1,899.38	-710.85	2,027.85	0.37	-0.37	0.00
5,140.00	28.05	341.20	4,606.24	1,943.40	-726.11	2,074.43	2.80	-2.78	0.65
5,234.00	26.64	342.51	4,689.73	1,984.42	-739.57	2,117.59	1.63	-1.50	1.39
5,329.00	26.09	341.79	4,774.85	2,024.58	-752.50	2,159.76	0.67	-0.58	-0.76
5,423.00	24.45	345.50	4,859.86	2,063.05	-763.83	2,199.80	2.42	-1.74	3.95
5,517.00	23.84	345.37	4,945.63	2,100.27	-773.50	2,238.09	0.65	-0.65	-0.14
5,612.00	22.55	345.69	5,032.95	2,136.50	-782.85	2,275.35	1.36	-1.36	0.34
5,706.00	20.71	346.68	5,120.33	2,170.14	-791.13	2,309.81	2.00	-1.96	1.05
5,801.00	18.38	347.96	5,209.85	2,201.14	-798.13	2,341.35	2.49	-2.45	1.35
5,895.00	17.67	345.33	5,299.24	2,229.43	-804.83	2,370.25	1.15	-0.76	-2.80
5,990.00	17.50	342.60	5,389.80	2,257.01	-812.76	2,398.89	0.89	-0.18	-2.87
6,084.00	17.23	342.16	5,479.52	2,283.75	-821.25	2,426.92	0.32	-0.29	-0.47
6,179.00	15.92	342.60	5,570.57	2,309.58	-829.46	2,454.00	1.39	-1.38	0.46
6,274.00	14.86	343.22	5,662.16	2,333.67	-836.87	2,479.19	1.13	-1.12	0.65
6,368.00	13.72	343.92	5,753.25	2,355.92	-843.44	2,502.35	1.23	-1.21	0.74
6,462.00	12.22	345.50	5,844.85	2,376.27	-849.01	2,523.38	1.64	-1.60	1.68
6,557.00	11.17	347.17	5,937.87	2,394.97	-853.58	2,542.53	1.16	-1.11	1.76
6,651.00	10.11	348.40	6,030.26	2,411.93	-857.26	2,559.74	1.15	-1.13	1.31
6,745.00	8.71	348.84	6,122.99	2,427.00	-860.29	2,574.95	1.49	-1.49	0.47
6,840.00	8.44	345.77	6,216.93	2,440.82	-863.40	2,589.00	0.56	-0.28	-3.23
6,934.00	7.30	344.89	6,310.04	2,453.27	-866.65	2,601.82	1.22	-1.21	-0.94
7,029.00	5.98	344.27	6,404.40	2,463.86	-869.57	2,612.77	1.39	-1.39	-0.65
7,123.00	5.36	344.53	6,497.94	2,472.80	-872.07	2,622.03	0.66	-0.66	0.28
7,218.00	4.75	343.57	6,592.57	2,480.85	-874.36	2,630.39	0.65	-0.64	-1.01
7,234.37	4.55	343.27	6,608.89	2,482.12	-874.74	2,631.71	1.22	-1.22	-1.86
RWF 443-7 KMV									
7,312.00	3.61	341.37	6,686.32	2,487.39	-876.41	2,637.23	1.22	-1.21	-2.44
7,407.00	3.17	338.65	6,781.15	2,492.67	-878.32	2,642.85	0.49	-0.46	-2.86
7,501.00	3.52	353.41	6,875.00	2,497.96	-879.60	2,648.25	0.99	0.37	15.70
7,596.00	3.08	352	6,969.84	2,503.40	-879.77	2,653.44	0.77	-0.46	10.64
7,690.00	2.90	359.48	7,063.71	2,508.30	-879.64	2,658.00	0.29	-0.19	-4.30
7,784.00	1.93	326	7,157.63	2,512.26	-879.57	2,661.71	1.05	-1.03	4.02
7,879.00	1.32	352.18	7,252.59	2,514.94	-879.63	2,664.25	0.72	-0.64	-11.66
7,973.00	1.32	349.72	7,346.56	2,517.08	-879.97	2,666.38	0.06	0.00	-2.62
8,067.00	0.62	351.39	7,440.55	2,518.65	-880.24	2,667.95	0.75	-0.74	1.78
8,162.00	1.58	5.54	7,535.53	2,520.46	-880.19	2,669.63	1.04	1.01	14.89
8,257.00	1.32	11.08	7,630.50	2,522.84	-879.85	2,671.76	0.31	-0.27	5.83
8,351.00	1.06	357.81	7,724.48	2,524.77	-879.68	2,673.52	0.40	-0.28	-14.12

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Well:	RWF 443-7	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)
8,446.00	0.62	10.02	7,819.47	2,526.15	-879.62	2,674.80	0.50	-0.46	12.85
8,540.00	0.62	356.49	7,913.46	2,527.16	-879.57	2,675.73	0.16	0.00	-14.39
8,635.00	0.53	309.29	8,008.46	2,527.95	-879.94	2,676.60	0.49	-0.09	-49.68
8,729.00	0.54	269.80	8,102.46	2,528.22	-880.72	2,677.12	0.38	0.01	-42.01
8,823.00	1.06	188.35	8,196.45	2,527.36	-881.29	2,676.50	1.19	0.55	-86.65
8,918.00	1.41	188.53	8,291.43	2,525.34	-881.59	2,674.70	0.37	0.37	0.19
9,012.00	1.58	181.06	8,385.39	2,522.90	-881.78	2,672.47	0.27	0.18	-7.95
9,107.00	1.76	187.83	8,480.35	2,520.14	-882.01	2,669.95	0.28	0.19	7.13
9,201.00	1.49	193.89	8,574.32	2,517.53	-882.50	2,667.65	0.34	-0.29	6.45
9,296.00	1.58	187.12	8,669.28	2,515.03	-882.96	2,665.46	0.21	0.09	-7.13
9,390.00	1.93	195.47	8,763.24	2,512.22	-883.54	2,663.01	0.46	0.37	8.88
9,485.00	2.11	200.13	8,858.18	2,509.03	-884.57	2,660.36	0.26	0.19	4.91
9,548.00	1.85	201.36	8,921.14	2,507.00	-885.34	2,658.70	0.42	-0.41	1.95
9,634.00	1.83	202.97	9,007.10	2,504.44	-886.38	2,656.64	0.06	-0.02	1.87
Last SDI Production MWD Survey									
9,697.00	1.83	202.97	9,070.07	2,502.59	-887.16	2,655.17	0.00	0.00	0.00
Projection to TD - RWF 443-7 PBHL									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
122.00	122.00	-0.08	-0.26	First SDI Gyro MWD Survey
488.00	486.71	16.39	-23.11	Last SDI Gyro MWD Survey
559.00	557.21	21.01	-30.14	First SDI Surface MWD Survey
1,029.00	1,019.99	79.36	-84.71	Last SDI Surface MWD Survey
1,172.00	1,157.97	108.54	-108.30	First SDI Production MWD Survey
9,634.00	9,007.10	2,504.44	-886.38	Last SDI Production MWD Survey
9,697.00	9,070.07	2,502.59	-887.16	Projection to TD

Checked By: _____ Approved By: _____ Date: _____