



**Well Details: RWF 514-8**

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	1627435.40	2317152.10	39.5311098	-107.9212260

**REFERENCE INFORMATION**

Co-ordinate (N/E) Reference: Well RWF 514-8 - Slot RWF 514-8 (A13), True North  
 Vertical (TVD) Reference: GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)  
 Section (VS) Reference: Slot - RWF 514-8 (A13)(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



## Directional Survey Certification

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

<b>Operator</b>	<u>TEP Rocky Mountain, LLC.</u>
<b>Well Name &amp; No.</b>	<u>RWF 514-8</u>
<b>County &amp; State</b>	<u>Garfield County, CO</u>
<b>SDI Job No.</b>	<u>OP.019827</u>
<b>Rig</b>	<u>H&amp;P 318</u>

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 9,231 feet is true and correct as determined from all available records.

Signature

30-Jul-19

Date

### **Mel Mireles Jr.**

Grand Junction Assistant Well Planner  
Scientific Drilling - Colorado District



## Scientific Drilling, Intl Survey Report

<b>Company:</b> TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b> Well RWF 514-8 - Slot RWF 514-8 (A13)
<b>Project:</b> Garfield County, CO NAD83	<b>TVD Reference:</b> GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Site:</b> DOE 1-M-18 Pad	<b>MD Reference:</b> GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Well:</b> RWF 514-8	<b>North Reference:</b> True
<b>Wellbore:</b> OH	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> OH	<b>Database:</b> Grand Junction District

<b>Project</b> Garfield County, CO NAD83		
<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> Colorado Central Zone		

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

<b>Well</b> RWF 514-8 - Slot RWF 514-8 (A13)						
<b>Well Position</b>	<b>+N/-S</b>	0.00 usft	<b>Northing:</b>	1,627,435.40 usft	<b>Latitude:</b>	39.5311098
	<b>+E/-W</b>	0.00 usft	<b>Easting:</b>	2,317,152.10 usft	<b>Longitude:</b>	-107.9212206
<b>Position Uncertainty</b>		0.00 usft	<b>Wellhead Elevation:</b>	0.00 usft	<b>Ground Level:</b>	6,174.50 usft

<b>Wellbore</b> OH					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/14/2019	9.32	65.75	51,467

<b>Design</b> OH					
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00		22.96

<b>Survey Program</b>		<b>Date</b> 7/29/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
122.00	1,106.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5
1,172.00	9,231.00	Survey #2 - Production MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM

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	0.97	43.68	121.99	0.75	0.71	0.97	0.80	0.80	0.00	
<b>First SDI Gyro MWD Survey</b>										
213.00	3.26	29.53	212.93	3.56	2.52	4.26	2.56	2.52	-15.55	
305.00	5.98	29.71	304.62	10.00	6.19	11.62	2.96	2.96	0.20	
397.00	8.36	28.83	395.89	20.02	11.79	23.03	2.59	2.59	-0.96	
488.00	11.00	25.49	485.59	33.65	18.71	38.29	2.96	2.90	-3.67	
579.00	14.52	24.70	574.33	51.86	27.22	58.37	3.87	3.87	-0.87	
672.00	15.13	22.06	664.23	73.70	36.65	82.16	0.98	0.66	-2.84	
766.00	15.48	22.32	754.90	96.67	46.02	106.97	0.38	0.37	0.28	



## Scientific Drilling, Intl Survey Report

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well RWF 514-8 - Slot RWF 514-8 (A13)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Site:</b>	DOE 1-M-18 Pad	<b>MD Reference:</b>	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Well:</b>	RWF 514-8	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)	
861.00	17.77	22.68	845.92	121.78	56.43	134.15	2.41	2.41	0.38	
955.00	18.39	21.88	935.28	148.78	67.48	163.31	0.71	0.66	-0.85	
1,050.00	19.53	20.92	1,025.13	177.52	78.74	194.17	1.24	1.20	-1.01	
1,106.00	19.97	21.71	1,077.83	195.14	85.62	213.08	0.92	0.79	1.41	
<b>Last SDI Gyro MWD Survey</b>										
1,172.00	20.84	20.48	1,139.69	216.61	93.90	236.08	1.47	1.32	-1.86	
<b>First SDI Production MWD Survey</b>										
1,266.00	20.40	20.57	1,227.67	247.62	105.50	269.15	0.47	-0.47	0.10	
1,361.00	19.52	19.43	1,316.96	278.09	116.60	301.54	1.01	-0.93	-1.20	
1,455.00	18.64	18.81	1,405.80	307.12	126.67	332.20	0.96	-0.94	-0.66	
1,550.00	18.29	17.76	1,495.90	335.68	136.11	362.18	0.51	-0.37	-1.11	
1,644.00	19.08	20.48	1,584.95	364.12	145.99	392.22	1.25	0.84	2.89	
1,739.00	18.99	20.66	1,674.76	393.13	156.87	423.18	0.11	-0.09	0.19	
1,833.00	19.26	24.35	1,763.57	421.57	168.66	453.96	1.32	0.29	3.93	
1,928.00	18.55	23.73	1,853.45	449.68	181.20	484.74	0.78	-0.75	-0.65	
2,022.00	18.29	22.50	1,942.63	476.99	192.86	514.44	0.50	-0.28	-1.31	
2,117.00	18.64	20.83	2,032.74	504.95	203.97	544.51	0.67	0.37	-1.76	
2,211.00	18.55	26.90	2,121.84	532.33	216.07	574.45	2.06	-0.10	6.46	
2,305.00	18.55	25.23	2,210.96	559.19	229.21	604.30	0.57	0.00	-1.78	
2,400.00	18.11	25.93	2,301.14	586.14	242.11	634.15	0.52	-0.46	0.74	
2,494.00	18.29	24.53	2,390.44	612.70	254.62	663.48	0.50	0.19	-1.49	
2,588.00	18.03	24.88	2,479.75	639.31	266.87	692.77	0.30	-0.28	0.37	
2,683.00	18.11	23.65	2,570.07	666.18	278.97	722.22	0.41	0.08	-1.29	
2,777.00	17.76	26.90	2,659.50	692.34	291.32	751.14	1.13	-0.37	3.46	
2,872.00	17.06	27.69	2,750.15	717.61	304.35	779.48	0.78	-0.74	0.83	
2,966.00	16.80	26.37	2,840.08	741.99	316.79	806.78	0.49	-0.28	-1.40	
3,061.00	16.00	25.05	2,931.21	766.15	328.44	833.57	0.93	-0.84	-1.39	
3,155.00	15.39	25.05	3,021.71	789.18	339.20	858.98	0.65	-0.65	0.00	
3,250.00	16.18	24.09	3,113.12	812.69	349.94	884.81	0.88	0.83	-1.01	
3,345.00	15.92	21.45	3,204.42	836.90	360.11	911.07	0.82	-0.27	-2.78	
3,439.00	15.48	21.98	3,294.91	860.53	369.52	936.50	0.49	-0.47	0.56	
3,533.00	16.71	19.60	3,385.23	884.89	378.75	962.54	1.48	1.31	-2.53	
3,628.00	15.74	18.28	3,476.44	910.00	387.37	989.01	1.09	-1.02	-1.39	
3,723.00	14.95	18.11	3,568.06	933.88	395.22	1,014.07	0.83	-0.83	-0.18	
3,817.00	17.06	17.67	3,658.41	958.54	403.18	1,039.88	2.25	2.24	-0.47	
3,911.00	16.44	16.00	3,748.42	984.47	411.03	1,066.81	0.83	-0.66	-1.78	
4,006.00	17.94	19.08	3,839.18	1,011.22	419.52	1,094.76	1.85	1.58	3.24	
4,100.00	17.23	19.08	3,928.78	1,038.06	428.80	1,123.09	0.76	-0.76	0.00	
4,195.00	18.99	20.66	4,019.07	1,065.82	438.86	1,152.58	1.92	1.85	1.66	
4,289.00	18.20	20.48	4,108.17	1,093.88	449.39	1,182.52	0.84	-0.84	-0.19	
4,384.00	17.15	19.78	4,198.68	1,120.96	459.32	1,211.33	1.13	-1.11	-0.74	
4,478.00	18.29	24.88	4,288.22	1,147.39	470.22	1,239.91	2.05	1.21	5.43	
4,573.00	18.29	24.17	4,378.42	1,174.51	482.59	1,269.72	0.23	0.00	-0.75	



## Scientific Drilling, Intl Survey Report

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well RWF 514-8 - Slot RWF 514-8 (A13)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Site:</b>	DOE 1-M-18 Pad	<b>MD Reference:</b>	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Well:</b>	RWF 514-8	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)	
4,667.00	17.59	23.56	4,467.85	1,200.99	494.31	1,298.67	0.77	-0.74	-0.65	
4,761.00	17.32	22.59	4,557.53	1,226.93	505.36	1,326.86	0.42	-0.29	-1.03	
4,856.00	17.63	29.93	4,648.15	1,252.45	517.97	1,355.29	2.34	0.33	7.73	
4,951.00	16.80	28.30	4,738.90	1,277.01	531.66	1,383.24	1.01	-0.87	-1.72	
5,045.00	16.53	28.30	4,828.95	1,300.74	544.44	1,410.08	0.29	-0.29	0.00	
5,140.00	15.90	29.10	4,920.17	1,324.01	557.17	1,436.47	0.70	-0.66	0.84	
5,234.00	15.37	28.72	5,010.69	1,346.19	569.42	1,461.67	0.57	-0.56	-0.40	
5,329.00	14.33	30.06	5,102.52	1,367.41	581.36	1,485.86	1.15	-1.09	1.41	
5,423.00	13.37	29.36	5,193.78	1,386.95	592.52	1,508.21	1.04	-1.02	-0.74	
5,517.00	12.66	29.62	5,285.37	1,405.38	602.94	1,529.24	0.76	-0.76	0.28	
5,612.00	11.28	30.37	5,378.30	1,422.44	612.78	1,548.79	1.46	-1.45	0.79	
5,706.00	11.17	21.10	5,470.51	1,438.87	620.71	1,567.01	1.92	-0.12	-9.86	
5,801.00	11.08	20.66	5,563.72	1,456.00	627.24	1,585.33	0.13	-0.09	-0.46	
5,896.00	10.46	21.71	5,657.05	1,472.55	633.65	1,603.07	0.68	-0.65	1.11	
5,990.00	9.58	21.71	5,749.61	1,487.75	639.70	1,619.42	0.94	-0.94	0.00	
6,084.00	8.53	23.65	5,842.44	1,501.40	645.39	1,634.21	1.16	-1.12	2.06	
6,179.00	7.74	23.21	5,936.49	1,513.73	650.74	1,647.66	0.83	-0.83	-0.46	
6,274.00	6.77	26.20	6,030.72	1,524.64	655.73	1,659.64	1.10	-1.02	3.15	
6,368.00	6.16	28.74	6,124.13	1,534.03	660.60	1,670.19	0.72	-0.65	2.70	
6,463.00	5.01	28.66	6,218.67	1,542.14	665.04	1,679.39	1.21	-1.21	-0.08	
6,557.00	4.92	31.64	6,312.32	1,549.17	669.13	1,687.46	0.29	-0.10	3.17	
6,651.00	4.66	39.29	6,405.99	1,555.56	673.66	1,695.11	0.73	-0.28	8.14	
6,746.00	4.22	39.99	6,500.71	1,561.22	678.35	1,702.16	0.47	-0.46	0.74	
6,785.97	3.92	42.20	6,540.57	1,563.36	680.21	1,704.85	0.85	-0.76	5.54	
<b>RWF 514-8 KMV</b>										
6,840.00	3.52	45.79	6,594.49	1,565.89	682.64	1,708.12	0.85	-0.74	6.64	
6,934.00	3.25	20.66	6,688.33	1,570.39	685.65	1,713.45	1.59	-0.29	-26.73	
7,029.00	2.64	26.72	6,783.21	1,574.87	687.58	1,718.32	0.72	-0.64	6.38	
7,123.00	2.20	20.04	6,877.13	1,578.49	689.17	1,722.28	0.56	-0.47	-7.11	
7,218.00	1.93	8.88	6,972.06	1,581.79	690.05	1,725.65	0.51	-0.28	-11.75	
7,312.00	1.41	4.57	7,066.02	1,584.50	690.38	1,728.29	0.57	-0.55	-4.59	
7,407.00	1.27	353.00	7,161.00	1,586.71	690.35	1,730.31	0.32	-0.15	-12.18	
7,501.00	0.97	331.70	7,254.98	1,588.45	689.84	1,731.71	0.54	-0.32	-22.66	
7,596.00	0.88	299.10	7,349.97	1,589.51	688.83	1,732.29	0.55	-0.09	-34.32	
7,690.00	1.43	289.12	7,443.95	1,590.25	687.09	1,732.29	0.62	0.59	-10.62	
7,784.00	1.32	272.99	7,537.92	1,590.69	684.90	1,731.84	0.43	-0.12	-17.16	
7,879.00	1.85	263.41	7,632.89	1,590.57	682.28	1,730.71	0.62	0.56	-10.08	
7,973.00	1.41	263.41	7,726.85	1,590.26	679.62	1,729.39	0.47	-0.47	0.00	
8,068.00	1.67	246.54	7,821.81	1,589.58	677.19	1,727.81	0.55	0.27	-17.76	
8,162.00	1.49	242.76	7,915.78	1,588.47	674.85	1,725.88	0.22	-0.19	-4.02	
8,257.00	1.67	225.09	8,010.74	1,586.93	672.77	1,723.65	0.54	0.19	-18.60	
8,351.00	2.81	222.72	8,104.67	1,584.27	670.24	1,720.21	1.22	1.21	-2.52	
8,446.00	4.04	231.24	8,199.50	1,580.46	666.05	1,715.07	1.40	1.29	8.97	
8,540.00	4.22	228.43	8,293.25	1,576.10	660.88	1,709.03	0.29	0.19	-2.99	



**Scientific Drilling, Intl**  
Survey Report

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well RWF 514-8 - Slot RWF 514-8 (A13)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Site:</b>	DOE 1-M-18 Pad	<b>MD Reference:</b>	GL 6174.5' & RKB 24' @ 6198.50usft (H&P 318)
<b>Well:</b>	RWF 514-8	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)	
8,635.00	3.78	224.04	8,388.02	1,571.53	656.09	1,702.96	0.56	-0.46	-4.62	
8,729.00	3.96	225.71	8,481.81	1,567.03	651.61	1,697.07	0.23	0.19	1.78	
8,823.00	3.78	223.77	8,575.59	1,562.53	647.14	1,691.18	0.24	-0.19	-2.06	
9,012.00	4.22	220.26	8,764.13	1,552.72	638.34	1,678.72	0.27	0.23	-1.86	
9,107.00	3.61	219.73	8,858.91	1,547.75	634.17	1,672.52	0.64	-0.64	-0.56	
9,168.00	3.61	222.81	8,919.79	1,544.87	631.64	1,668.87	0.32	0.00	5.05	
<b>Last SDI Production MWD Survey</b>										
9,231.00	3.61	222.81	8,982.67	1,541.96	628.94	1,665.14	0.00	0.00	0.00	
<b>Projection to TD - RWF 514-8 PBHL</b>										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
122.00	121.99	0.75	0.71	First SDI Gyro MWD Survey	
1,106.00	1,077.83	195.14	85.62	Last SDI Gyro MWD Survey	
1,172.00	1,139.69	216.61	93.90	First SDI Production MWD Survey	
9,168.00	8,919.79	1,544.87	631.64	Last SDI Production MWD Survey	
9,231.00	8,982.67	1,541.96	628.94	Projection to TD	

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