



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.	RU 413-17
County & State	Garfield County, CO
SDI Job No.	OP.009508
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 123 feet to a measured depth of 10,722 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

23-Apr-18

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RU 413-17 - Slot RU 413-17 (A7)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 8368.6 & RKB 24' @ 8392.60usft (H&P 318)
Site:	RU 23-17 Pad	MD Reference:	GL 8368.6 & RKB 24' @ 8392.60usft (H&P 318)
Well:	RU 413-17	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		RU 23-17 Pad			
Site Position:		Northing:	1,594,634.40 usft	Latitude:	39.4435163
From:	Map	Easting:	2,351,232.80 usft	Longitude:	-107.7974906
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.45 °

Well	RU 413-17 - Slot RU 413-17 (A7)					
Well Position	+N/-S	0.00 usft	Northing:	1,594,616.80 usft	Latitude:	39.4434690
	+E/-W	0.00 usft	Easting:	2,351,246.70 usft	Longitude:	-107.7974398
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	8,368.60 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/15/2018	9.18	65.57	51,571

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	268.89	

Survey Program	Date	4/23/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
123.00	675.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4
753.00	1,085.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1
1,180.00	10,722.00	Survey #3 - Production MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1

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
123.00	0.18	9.76	123.00	0.19	0.03	-0.04	0.15	0.15	0.00
First SDI Gyro MWD Survey									
216.00	0.53	126.21	216.00	0.08	0.40	-0.41	0.68	0.38	125.22
308.00	0.62	324.93	308.00	0.24	0.46	-0.47	1.23	0.10	-175.30
399.00	2.64	270.70	398.96	0.66	-1.92	1.90	2.56	2.22	-59.59
491.00	4.66	275.54	490.77	1.05	-7.76	7.73	2.22	2.20	5.26
584.00	7.04	264.81	583.28	0.90	-17.19	17.17	2.81	2.56	-11.54
675.00	10.29	262.97	673.23	-0.60	-30.82	30.82	3.58	3.57	-2.02

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RU 413-17 - Slot RU 413-17 (A7)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 8368.6 & RKB 24' @ 8392.60usft (H&P 318)
Site:	RU 23-17 Pad	MD Reference:	GL 8368.6 & RKB 24' @ 8392.60usft (H&P 318)
Well:	RU 413-17	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									
753.00	13.08	269.16	749.61	-1.58	-46.56	46.58	3.92	3.58	7.94
First SDI Surface MWD Survey									
847.00	16.39	271.34	840.50	-1.43	-70.46	70.48	3.57	3.52	2.32
941.00	17.34	269.33	930.46	-1.28	-97.73	97.73	1.19	1.01	-2.14
1,036.00	17.70	267.76	1,021.05	-2.01	-126.31	126.33	0.63	0.38	-1.65
1,085.00	18.20	266.79	1,067.67	-2.73	-141.40	141.42	1.19	1.02	-1.98
Last SDI Surface MWD Survey									
1,180.00	18.82	265.02	1,157.76	-4.89	-171.48	171.54	0.88	0.65	-1.86
First SDI Production MWD Survey									
1,274.00	17.91	263.32	1,246.97	-7.89	-200.94	201.05	1.12	-0.97	-1.81
1,369.00	17.74	265.90	1,337.41	-10.62	-229.88	230.04	0.85	-0.18	2.72
1,463.00	17.03	271.48	1,427.12	-11.29	-257.93	258.10	1.93	-0.76	5.94
1,558.00	18.73	272.59	1,517.53	-10.24	-287.08	287.22	1.82	1.79	1.17
1,652.00	18.55	272.94	1,606.60	-8.79	-317.08	317.20	0.23	-0.19	0.37
1,747.00	17.20	267.01	1,697.02	-8.75	-346.21	346.31	2.38	-1.42	-6.24
1,841.00	18.29	270.57	1,786.55	-9.33	-374.84	374.95	1.64	1.16	3.79
1,936.00	18.11	270.22	1,876.79	-9.12	-404.51	404.61	0.22	-0.19	-0.37
2,030.00	17.85	268.85	1,966.20	-9.36	-433.52	433.62	0.53	-0.28	-1.46
2,125.00	17.15	266.70	2,056.81	-10.46	-462.06	462.18	1.00	-0.74	-2.26
2,219.00	18.11	272.32	2,146.40	-10.66	-490.50	490.61	2.08	1.02	5.98
2,313.00	17.76	273.03	2,235.83	-9.31	-519.41	519.50	0.44	-0.37	0.76
2,408.00	17.50	272.59	2,326.37	-7.90	-548.15	548.20	0.31	-0.27	-0.46
2,502.00	16.95	271.81	2,416.15	-6.83	-575.97	575.99	0.63	-0.59	-0.83
2,597.00	18.90	275.30	2,506.54	-4.97	-605.13	605.11	2.34	2.05	3.67
2,691.00	18.38	276.98	2,595.61	-1.76	-635.00	634.92	0.80	-0.55	1.79
2,786.00	17.15	277.77	2,686.08	1.95	-663.75	663.58	1.32	-1.29	0.83
2,880.00	18.64	277.33	2,775.53	5.74	-692.38	692.14	1.59	1.59	-0.47
2,975.00	17.59	276.37	2,865.82	9.27	-721.70	721.39	1.15	-1.11	-1.01
3,069.00	16.80	277.07	2,955.62	12.52	-749.30	748.92	0.87	-0.84	0.74
3,164.00	19.04	276.23	3,046.00	15.89	-778.33	777.88	2.37	2.36	-0.88
3,258.00	18.76	277.02	3,134.93	19.40	-808.58	808.05	0.40	-0.30	0.84
3,353.00	17.41	275.40	3,225.24	22.61	-837.89	837.30	1.52	-1.42	-1.71
3,447.00	18.99	273.64	3,314.53	24.90	-867.16	866.51	1.78	1.68	-1.87
3,541.00	18.11	272.50	3,403.65	26.51	-897.02	896.34	1.01	-0.94	-1.21
3,636.00	17.23	272.24	3,494.17	27.70	-925.83	925.12	0.93	-0.93	-0.27
3,731.00	18.29	267.58	3,584.64	27.62	-954.78	954.07	1.87	1.12	-4.91
3,825.00	17.59	268.46	3,674.07	26.62	-983.72	983.02	0.80	-0.74	0.94
3,920.00	16.41	267.11	3,764.92	25.56	-1,011.47	1,010.79	1.31	-1.24	-1.42
4,014.00	18.39	265.91	3,854.61	23.83	-1,039.52	1,038.87	2.14	2.11	-1.28
4,109.00	17.78	266.21	3,944.92	21.80	-1,068.94	1,068.32	0.65	-0.64	0.32
4,204.00	18.47	268.02	4,035.21	20.32	-1,098.46	1,097.86	0.94	0.73	1.91
4,298.00	17.59	268.28	4,124.59	19.38	-1,127.54	1,126.95	0.94	-0.94	0.28
4,392.00	19.42	268.68	4,213.73	18.60	-1,157.36	1,156.78	1.95	1.95	0.43

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Site:	RU 23-17 Pad	MD Reference:	GL 8368.6 & RKB 24' @ 8392.60usft (H&P 318)
Well:	RU 413-17	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)	
4,487.00	18.57	268.29	4,303.55	17.78	-1,188.27	1,187.70	0.90	-0.89	-0.41	
4,582.00	16.80	270.13	4,394.06	17.36	-1,217.12	1,216.56	1.95	-1.86	1.94	
4,676.00	17.94	272.06	4,483.77	17.91	-1,245.17	1,244.60	1.36	1.21	2.05	
4,771.00	17.18	272.83	4,574.34	19.13	-1,273.81	1,273.20	0.84	-0.80	0.81	
4,865.00	18.73	273.73	4,663.76	20.80	-1,302.74	1,302.09	1.68	1.65	0.96	
4,960.00	17.94	274.17	4,753.94	22.85	-1,332.55	1,331.86	0.84	-0.83	0.46	
5,054.00	19.75	270.46	4,842.90	24.03	-1,362.87	1,362.16	2.31	1.93	-3.95	
5,149.00	18.29	270.10	4,932.71	24.19	-1,393.83	1,393.11	1.54	-1.54	-0.38	
5,243.00	20.34	271.60	5,021.42	24.67	-1,424.92	1,424.17	2.24	2.18	1.60	
5,337.00	19.43	273.29	5,109.81	26.02	-1,456.86	1,456.08	1.14	-0.97	1.80	
5,432.00	21.28	270.91	5,198.88	27.20	-1,489.87	1,489.07	2.13	1.95	-2.51	
5,526.00	20.35	271.53	5,286.74	27.91	-1,523.27	1,522.44	1.02	-0.99	0.66	
5,621.00	20.11	272.78	5,375.88	29.14	-1,556.09	1,555.24	0.52	-0.25	1.32	
5,715.00	18.99	271.97	5,464.46	30.45	-1,587.52	1,586.63	1.23	-1.19	-0.86	
5,810.00	20.66	268.28	5,553.83	30.48	-1,619.72	1,618.83	2.20	1.76	-3.88	
5,904.00	19.98	267.39	5,641.98	29.25	-1,652.34	1,651.47	0.79	-0.72	-0.95	
5,998.00	19.26	266.96	5,730.52	27.70	-1,683.86	1,683.01	0.78	-0.77	-0.46	
6,092.00	19.08	268.72	5,819.31	26.53	-1,714.71	1,713.87	0.64	-0.19	1.87	
6,187.00	18.47	268.28	5,909.26	25.74	-1,745.27	1,744.45	0.66	-0.64	-0.46	
6,281.00	16.80	269.16	5,998.84	25.09	-1,773.74	1,772.92	1.80	-1.78	0.94	
6,376.00	17.48	266.71	6,089.62	24.07	-1,801.71	1,800.91	1.04	0.72	-2.58	
6,471.00	17.34	264.81	6,180.27	21.97	-1,830.05	1,829.29	0.62	-0.15	-2.00	
6,565.00	15.88	266.21	6,270.34	19.85	-1,856.84	1,856.11	1.61	-1.55	1.49	
6,660.00	17.76	267.23	6,361.27	18.29	-1,884.28	1,883.58	2.00	1.98	1.07	
6,755.00	17.94	265.91	6,451.70	16.55	-1,913.35	1,912.67	0.47	0.19	-1.39	
6,849.00	16.80	265.28	6,541.41	14.40	-1,941.33	1,940.69	1.23	-1.21	-0.67	
6,944.00	15.74	265.12	6,632.61	12.17	-1,967.85	1,967.25	1.12	-1.12	-0.17	
7,039.00	15.48	266.52	6,724.10	10.31	-1,993.34	1,992.77	0.48	-0.27	1.47	
7,134.00	14.86	267.14	6,815.79	8.93	-2,018.16	2,017.62	0.67	-0.65	0.65	
7,228.00	13.47	267.89	6,906.93	7.93	-2,041.14	2,040.61	1.49	-1.48	0.80	
7,323.00	13.37	270.22	6,999.34	7.56	-2,063.19	2,062.65	0.58	-0.11	2.45	
7,417.00	11.43	271.09	7,091.14	7.78	-2,083.37	2,082.83	2.07	-2.06	0.93	
7,512.00	10.73	269.60	7,184.37	7.90	-2,101.62	2,101.08	0.80	-0.74	-1.57	
7,607.00	9.41	271.62	7,277.90	8.06	-2,118.23	2,117.68	1.44	-1.39	2.13	
7,702.00	8.62	270.48	7,371.73	8.33	-2,133.11	2,132.55	0.85	-0.83	-1.20	
7,796.00	6.60	274.96	7,464.90	8.86	-2,145.54	2,144.97	2.24	-2.15	4.77	
7,891.00	6.33	277.16	7,559.29	9.99	-2,156.17	2,155.58	0.39	-0.28	2.32	
7,986.00	4.04	274.43	7,653.90	10.90	-2,164.71	2,164.10	2.42	-2.41	-2.87	
8,080.00	3.25	274.52	7,747.71	11.36	-2,170.67	2,170.04	0.84	-0.84	0.10	
8,175.00	1.93	296.41	7,842.61	12.29	-2,174.78	2,174.14	1.71	-1.39	23.04	
8,270.00	1.93	306.87	7,937.56	13.96	-2,177.50	2,176.82	0.37	0.00	11.01	
8,364.00	1.58	306.43	8,031.51	15.68	-2,179.81	2,179.10	0.37	-0.37	-0.47	
8,459.00	1.58	305.99	8,126.48	17.22	-2,181.92	2,181.18	0.01	0.00	-0.46	

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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)	
8,554.00	0.07	251.89	8,221.47	17.98	-2,183.03	2,182.28	1.62	-1.59	-56.95	
8,648.00	1.06	180.74	8,315.46	17.09	-2,183.10	2,182.36	1.11	1.05	-75.69	
8,743.00	1.06	197.27	8,410.44	15.37	-2,183.37	2,182.67	0.32	0.00	17.40	
8,838.00	0.95	216.16	8,505.43	13.90	-2,184.10	2,183.42	0.37	-0.12	19.88	
8,932.00	1.23	230.93	8,599.41	12.63	-2,185.34	2,184.69	0.42	0.30	15.71	
9,027.00	1.26	266.39	8,694.39	11.92	-2,187.17	2,186.54	0.80	0.03	37.33	
9,122.00	1.41	280.23	8,789.37	12.06	-2,189.37	2,188.73	0.37	0.16	14.57	
9,216.00	1.41	282.17	8,883.34	12.51	-2,191.64	2,190.99	0.05	0.00	2.06	
9,311.00	2.29	276.91	8,978.29	12.99	-2,194.66	2,194.00	0.94	0.93	-5.54	
9,406.00	2.20	288.14	9,073.21	13.78	-2,198.28	2,197.60	0.47	-0.09	11.82	
9,501.00	2.64	288.23	9,168.13	15.04	-2,202.09	2,201.39	0.46	0.46	0.09	
9,595.00	2.02	297.37	9,262.05	16.48	-2,205.62	2,204.89	0.77	-0.66	9.72	
9,690.00	2.11	296.41	9,356.99	18.02	-2,208.67	2,207.91	0.10	0.09	-1.01	
9,784.00	2.55	295.44	9,450.91	19.69	-2,212.11	2,211.32	0.47	0.47	-1.03	
9,879.00	2.52	298.48	9,545.82	21.59	-2,215.85	2,215.02	0.14	-0.03	3.20	
9,974.00	2.55	306.07	9,640.73	23.83	-2,219.40	2,218.52	0.35	0.03	7.99	
10,069.00	2.35	318.55	9,735.64	26.54	-2,222.40	2,221.47	0.60	-0.21	13.14	
10,163.00	2.81	334.02	9,829.55	30.05	-2,224.68	2,223.69	0.88	0.49	16.46	
10,258.00	3.43	339.30	9,924.41	34.81	-2,226.71	2,225.62	0.72	0.65	5.56	
10,352.00	2.64	350.55	10,018.27	39.57	-2,228.05	2,226.88	1.05	-0.84	11.97	
10,447.00	2.02	340.62	10,113.19	43.31	-2,228.97	2,227.72	0.78	-0.65	-10.45	
10,541.00	1.76	324.00	10,207.14	46.04	-2,230.37	2,229.06	0.64	-0.28	-17.68	
10,635.00	2.08	312.11	10,301.09	48.35	-2,232.48	2,231.13	0.54	0.34	-12.65	
10,663.00	2.02	319.35	10,329.07	49.07	-2,233.18	2,231.82	0.95	-0.21	25.86	
Last SDI Production MWD Survey										
10,722.00	2.02	319.35	10,388.04	50.65	-2,234.53	2,233.14	0.00	0.00	0.00	
Projection to TD - PBHL(RU_413-17)										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
123.00	123.00	0.19	0.03	First SDI Gyro MWD Survey	
675.00	673.23	-0.60	-30.82	Last SDI Gyro MWD Survey	
753.00	749.61	-1.58	-46.56	First SDI Surface MWD Survey	
1,085.00	1,067.67	-2.73	-141.40	Last SDI Surface MWD Survey	
1,180.00	1,157.76	-4.89	-171.48	First SDI Production MWD Survey	
10,663.00	10,329.07	49.07	-2,233.18	Last SDI Production MWD Survey	
10,722.00	10,388.04	50.65	-2,234.53	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
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