



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.	PA 321-25
County & State	Garfield County, CO
SDI Job No.	OP.008682
Rig	H&P 271

I, Mel Mireles Jr. , having personal knowledge of all the facts, hereby certify that the attached directional survey run from a measured depth of 107 feet to a measured depth of 8,280 feet is true and correct as determined from all available records.

Signature

 26-Mar-18

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well PA 321-25 - Slot PA 321-25 (B17)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Site:	PA 22-25 Pad	MD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Well:	PA 321-25	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	PA 22-25 Pad				
Site Position:		Northing:	1,615,186.77 usft	Latitude:	39.4968742
From:	Map	Easting:	2,308,728.18 usft	Longitude:	-107.9499045
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.55 °

Well	PA 321-25 - Slot PA 321-25 (B17), B17					
Well Position	+N/-S	0.00 usft	Northing:	1,615,197.10 usft	Latitude:	39.4969118
	+E/-W	0.00 usft	Easting:	2,308,853.00 usft	Longitude:	-107.9494634
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	5,224.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	3/8/2018	9.38	65.77	51,649

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	18.32	

Survey Program	Date	3/23/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
107.00	581.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
653.00	1,064.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
1,173.00	8,280.00	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	
0.04	0.00	272.29	0.04	0.00	0.00	0.00	0.00	0.00	0.00	
SHL (PA 321-25)										
107.00	0.79	272.29	107.00	0.03	-0.74	-0.20	0.74	0.74	0.00	
First SDI Gyro MWD Survey										
213.00	0.88	286.79	212.99	0.29	-2.25	-0.43	0.22	0.08	13.68	
306.00	1.06	54.93	305.98	0.99	-2.23	0.24	1.88	0.19	137.78	
398.00	3.43	40.17	397.90	3.59	0.25	3.48	2.63	2.58	-16.04	

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Site:	PA 22-25 Pad	MD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Well:	PA 321-25	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)	
490.00	6.77	33.13	489.53	10.23	4.99	11.28	3.69	3.63	-7.65	
581.00	9.59	29.71	579.59	21.31	11.68	23.90	3.14	3.10	-3.76	
Last SDI Gyro MWD Survey										
653.00	11.90	25.76	650.33	33.21	17.88	37.14	3.37	3.21	-5.49	
First SDI Surface MWD Survey										
746.00	14.54	20.11	740.86	52.81	26.06	58.32	3.16	2.84	-6.08	
838.00	17.59	21.96	829.25	76.55	35.23	83.75	3.36	3.32	2.01	
932.00	20.69	19.83	918.05	105.35	46.18	114.53	3.38	3.30	-2.27	
1,026.00	23.21	15.62	1,005.23	138.82	56.80	149.64	3.16	2.68	-4.48	
1,064.00	23.65	14.57	1,040.10	153.41	60.73	164.72	1.60	1.16	-2.76	
Last SDI Surface MWD Survey										
1,173.00	24.42	11.87	1,139.65	196.62	70.87	208.93	1.23	0.71	-2.48	
First SDI Production MWD Survey										
1,268.00	24.56	16.09	1,226.11	234.81	80.38	248.17	1.85	0.15	4.44	
1,362.00	23.65	18.08	1,311.91	271.51	91.65	286.55	1.30	-0.97	2.12	
1,457.00	23.00	15.63	1,399.15	307.49	102.56	324.15	1.23	-0.68	-2.58	
1,551.00	23.95	17.29	1,485.37	343.40	113.18	361.57	1.23	1.01	1.77	
1,645.00	23.29	20.80	1,571.50	378.99	125.45	399.21	1.65	-0.70	3.73	
1,739.00	22.44	21.95	1,658.11	413.00	138.75	435.68	1.02	-0.90	1.22	
1,833.00	24.07	21.39	1,744.47	447.49	152.45	472.73	1.75	1.73	-0.60	
1,928.00	23.98	19.75	1,831.25	483.70	166.04	511.38	0.71	-0.09	-1.73	
2,022.00	25.21	22.54	1,916.72	520.17	180.17	550.44	1.80	1.31	2.97	
2,116.00	24.40	20.15	2,002.05	556.89	194.53	589.81	1.37	-0.86	-2.54	
2,211.00	23.79	18.56	2,088.77	593.48	207.39	628.58	0.94	-0.64	-1.67	
2,305.00	24.01	18.78	2,174.71	629.56	219.58	666.67	0.25	0.23	0.23	
2,400.00	24.96	19.54	2,261.17	666.75	232.51	706.03	1.05	1.00	0.80	
2,495.00	23.83	18.78	2,347.68	703.81	245.39	745.27	1.23	-1.19	-0.80	
2,589.00	23.61	21.51	2,433.75	739.30	258.41	783.05	1.19	-0.23	2.90	
2,683.00	22.42	20.81	2,520.26	773.57	271.68	819.76	1.30	-1.27	-0.74	
2,778.00	23.13	24.96	2,607.86	807.42	285.99	856.39	1.85	0.75	4.37	
2,873.00	22.56	23.23	2,695.41	841.08	301.05	893.08	0.93	-0.60	-1.82	
2,967.00	23.74	20.98	2,781.84	875.32	314.94	929.95	1.57	1.26	-2.39	
3,061.00	22.64	20.15	2,868.24	909.98	327.95	966.94	1.22	-1.17	-0.88	
3,155.00	23.74	17.75	2,954.65	944.98	339.95	1,003.94	1.54	1.17	-2.55	
3,250.00	22.33	18.49	3,042.07	980.31	351.50	1,041.11	1.52	-1.48	0.78	
3,344.00	22.91	12.72	3,128.85	1,015.10	361.20	1,077.18	2.44	0.62	-6.14	
3,439.00	21.96	12.97	3,216.66	1,050.45	369.26	1,113.27	1.01	-1.00	0.26	
3,533.00	23.48	10.20	3,303.37	1,086.01	376.52	1,149.31	1.98	1.62	-2.95	
3,628.00	22.42	10.35	3,390.85	1,122.46	383.12	1,185.99	1.12	-1.12	0.16	
3,722.00	23.17	9.83	3,477.50	1,158.31	389.50	1,222.04	0.83	0.80	-0.55	
3,816.00	24.11	10.69	3,563.62	1,195.40	396.22	1,259.36	1.07	1.00	0.91	
3,911.00	25.28	15.53	3,649.93	1,234.02	405.25	1,298.85	2.46	1.23	5.09	
4,005.00	23.87	14.56	3,735.42	1,271.77	415.41	1,337.88	1.56	-1.50	-1.03	
4,100.00	22.69	14.48	3,822.68	1,308.11	424.82	1,375.34	1.24	-1.24	-0.08	

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Well:	PA 321-25	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
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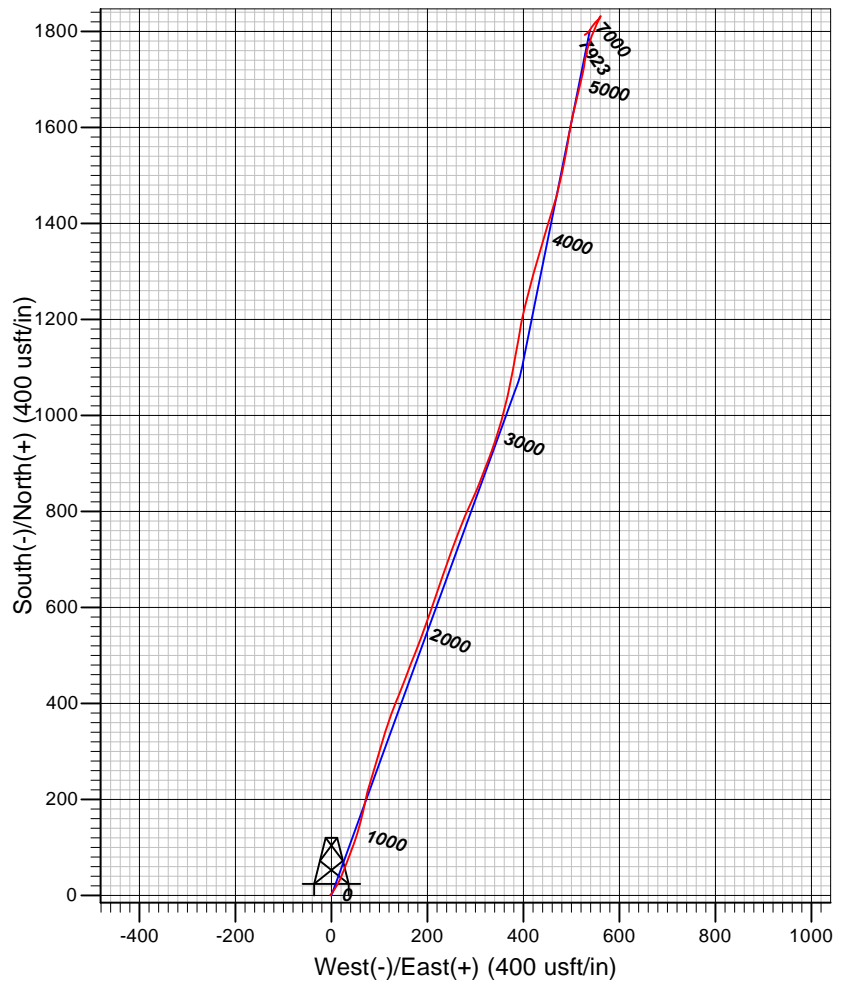
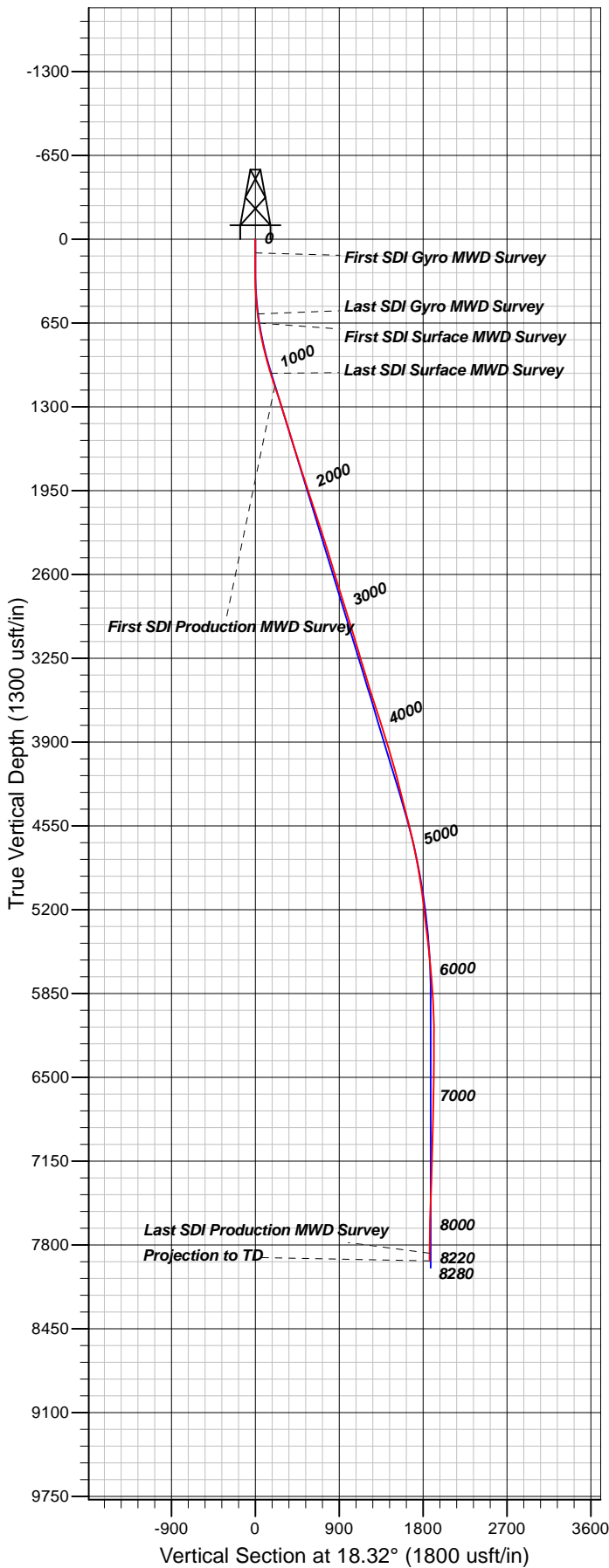
Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,194.00	23.60	17.01	3,909.12	1,343.66	434.86	1,412.25	1.43	0.97	2.69	
4,308.00	22.09	16.67	4,014.17	1,386.02	447.69	1,456.49	1.33	-1.32	-0.30	
4,477.00	19.70	17.20	4,172.05	1,443.68	465.23	1,516.74	1.42	-1.41	0.31	
4,571.00	19.18	13.13	4,260.69	1,473.86	473.42	1,547.96	1.54	-0.55	-4.33	
4,760.00	20.05	11.19	4,438.72	1,535.88	486.76	1,611.03	0.57	0.46	-1.03	
4,794.14	19.74	10.66	4,470.83	1,547.28	488.96	1,622.55	1.06	-0.92	-1.56	
PA 321-25 MVRD										
4,854.00	19.19	9.68	4,527.27	1,566.91	492.48	1,642.30	1.06	-0.91	-1.63	
4,948.00	17.89	8.31	4,616.39	1,596.43	497.17	1,671.79	1.46	-1.38	-1.46	
5,043.00	17.16	14.19	4,706.98	1,624.46	502.71	1,700.14	2.01	-0.77	6.19	
5,137.00	15.19	13.18	4,797.26	1,649.89	508.92	1,726.24	2.12	-2.10	-1.07	
5,231.00	12.77	13.39	4,888.47	1,671.99	514.14	1,748.86	2.58	-2.57	0.22	
5,325.00	12.41	13.84	4,980.21	1,691.91	518.96	1,769.28	0.40	-0.38	0.48	
5,419.00	10.77	12.02	5,072.29	1,710.31	523.20	1,788.08	1.79	-1.74	-1.94	
5,513.00	9.32	9.59	5,164.84	1,726.40	526.30	1,804.33	1.61	-1.54	-2.59	
5,608.00	9.25	7.86	5,258.60	1,741.55	528.63	1,819.45	0.30	-0.07	-1.82	
5,702.00	9.51	15.10	5,351.35	1,756.53	531.68	1,834.63	1.28	0.28	7.70	
5,797.00	9.67	15.83	5,445.02	1,771.79	535.90	1,850.44	0.21	0.17	0.77	
5,891.00	8.00	20.54	5,537.90	1,785.51	540.35	1,864.86	1.93	-1.78	5.01	
5,986.00	7.22	24.55	5,632.06	1,797.13	545.15	1,877.40	0.99	-0.82	4.22	
6,080.00	6.68	23.18	5,725.37	1,807.53	549.76	1,888.72	0.60	-0.57	-1.46	
6,175.00	5.67	23.16	5,819.82	1,816.92	553.78	1,898.90	1.06	-1.06	-0.02	
6,269.00	4.23	23.87	5,913.47	1,824.36	557.01	1,906.98	1.53	-1.53	0.76	
6,364.00	2.37	28.57	6,008.31	1,829.29	559.37	1,912.40	1.98	-1.96	4.95	
6,458.00	0.58	47.26	6,102.27	1,831.32	560.65	1,914.73	1.95	-1.90	19.88	
6,553.00	0.11	117.58	6,197.27	1,831.61	561.08	1,915.14	0.58	-0.49	74.02	
6,647.00	0.20	183.80	6,291.27	1,831.40	561.15	1,914.96	0.20	0.10	70.45	
6,741.00	0.62	228.30	6,385.27	1,830.90	560.76	1,914.36	0.53	0.45	47.34	
6,835.00	0.79	226.38	6,479.26	1,830.11	559.91	1,913.35	0.18	0.18	-2.04	
6,930.00	0.90	198.37	6,574.25	1,828.95	559.20	1,912.03	0.44	0.12	-29.48	
7,024.00	1.30	219.89	6,668.23	1,827.43	558.28	1,910.30	0.60	0.43	22.89	
7,119.00	1.58	217.42	6,763.20	1,825.57	556.80	1,908.06	0.30	0.29	-2.60	
7,214.00	1.65	226.08	6,858.17	1,823.58	555.02	1,905.61	0.27	0.07	9.12	
7,308.00	2.04	231.36	6,952.12	1,821.59	552.73	1,903.01	0.45	0.41	5.62	
7,403.00	2.29	223.39	7,047.05	1,819.16	550.11	1,899.87	0.41	0.26	-8.39	
7,497.00	2.90	212.49	7,140.95	1,815.79	547.54	1,895.87	0.83	0.65	-11.60	
7,591.00	3.74	220.30	7,234.79	1,811.45	544.28	1,890.72	1.01	0.89	8.31	
7,685.00	2.99	210.30	7,328.63	1,806.99	541.06	1,885.48	1.01	-0.80	-10.64	
7,779.00	2.65	211.80	7,422.52	1,803.03	538.68	1,880.97	0.37	-0.36	1.60	
7,873.00	2.21	217.87	7,516.43	1,799.75	536.42	1,877.15	0.54	-0.47	6.46	
7,968.00	1.79	226.85	7,611.38	1,797.29	534.22	1,874.12	0.55	-0.44	9.45	
8,062.00	1.64	237.09	7,705.33	1,795.55	532.02	1,871.78	0.36	-0.16	10.89	
8,156.00	1.23	234.56	7,799.30	1,794.24	530.06	1,869.92	0.44	-0.44	-2.69	
8,220.00	1.32	234.73	7,863.29	1,793.41	528.90	1,868.77	0.14	0.14	0.27	

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Site:	PA 22-25 Pad	MD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Well:	PA 321-25	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 Production MWD Survey									
8,280.00	1.32	234.73	7,923.27	1,792.62	527.77	1,867.66	0.00	0.00	0.00
Projection to TD - PA 321-25 PBHL - PBHL (PA 321-25)									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
107.00	107.00	0.03	-0.74	First SDI Gyro MWD Survey	
581.00	579.59	21.31	11.68	Last SDI Gyro MWD Survey	
653.00	650.33	33.21	17.88	First SDI Surface MWD Survey	
1,064.00	1,040.10	153.41	60.73	Last SDI Surface MWD Survey	
1,173.00	1,139.65	196.62	70.87	First SDI Production MWD Survey	
8,220.00	7,863.29	1,793.41	528.90	Last SDI Production MWD Survey	
8,280.00	7,923.27	1,792.62	527.77	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____



Well Details: PA 321-25

TVD Reference: GL 5224' & RKB 24' @ 5248.00usft						Ground Level: 5224.00	
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot	
0.00	0.00	1615197.11	2308853.00	39.4969117	-107.9494638	PA 321-25 (B17)	

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well PA 321-25 - Slot PA 321-25 (B17), True North
 Vertical (TVD) Reference: GL 5224' & RKB 24' @ 5248.00usft
 Section (VS) Reference: Slot - PA 321-25 (B17)(0.00N, 0.00E)
 Measured Depth Reference: GL 5224' & RKB 24' @ 5248.00usft
 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

12:21, March 26 2018
 Created By: Mel Mireles Jr.