



Well Details: PA 432-24	
TVD Reference: GL 5733' & RKB 24' @ 5757.00usft Ground Level: 5733.00 +N/-S +E/-W Northing Easting Latitude Longitude Slot 0.00 0.00 1618800.90 2312506.80 39.5070719 -107.9368628PA 432-24 (B2)	
REFERENCE INFORMATION	
Co-ordinate (N/E) Reference: Well PA 432-24 - Slot PA 432-24 (B2), True North Vertical (TVD) Reference: GL 5733' & RKB 24' @ 5757.00usft Section (VS) Reference: Slot - PA 432-24 (B2)(0.00N, 0.00E) Measured Depth Reference: GL 5733' & RKB 24' @ 5757.00usft 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	
12:45, October 22 2018 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.	PA 432-24
County & State	Garfield County, CO
SDI Job No.	OP.013777
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 124 feet to a measured depth of 9,205 feet is true and correct as determined from all available records.

Signature

 22-Oct-18

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District



Scientific Drilling, Intl

Survey Report

Company: TEP Rocky Mountain LLC	Local Co-ordinate Reference: Well PA 432-24 - Slot PA 432-24 (B2)
Project: Garfield County, CO NAD83	TVD Reference: GL 5733' & RKB 24' @ 5757.00usft
Site: RWF 13-19 Pad	MD Reference: GL 5733' & RKB 24' @ 5757.00usft
Well: PA 432-24	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 RWF 13-19 Pad					
Site Position:		Northing:	1,618,792.50 usft	Latitude:	39.5070510
From: Map		Easting:	2,312,535.60 usft	Longitude:	-107.9367600
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.54 °

Well PA 432-24 - Slot PA 432-24 (B2)						
Well Position	+N/-S	0.00 usft	Northing:	1,618,800.90 usft	Latitude:	39.5070719
	+E/-W	0.00 usft	Easting:	2,312,506.80 usft	Longitude:	-107.9368628
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	5,733.00 usft

Wellbore OH					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/12/2018	9.35	65.75	51,565

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	299.10	

Survey Program		Date 10/22/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
124.00	861.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5
935.00	1,070.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM
1,177.00	9,205.00	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	0.00
124.00	0.09	133.07	124.00	-0.07	0.07	-0.09	0.07	0.07	0.07	0.00
First SDI Gyro MWD Survey										
217.00	1.41	256.11	216.99	-0.39	-0.99	0.67	1.57	1.42	132.30	
310.00	3.61	264.73	309.90	-0.93	-5.01	3.93	2.39	2.37	9.27	
402.00	5.54	276.59	401.60	-0.69	-12.31	10.42	2.33	2.10	12.89	
494.00	8.62	294.26	492.90	2.65	-23.01	21.40	4.06	3.35	19.21	
586.00	12.67	295.31	583.30	9.80	-38.42	38.34	4.41	4.40	1.14	
678.00	15.57	297.25	672.51	19.77	-58.53	60.75	3.19	3.15	2.11	



Scientific Drilling, Intl Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well PA 432-24 - Slot PA 432-24 (B2)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5733' & RKB 24' @ 5757.00usft
Site:	RWF 13-19 Pad	MD Reference:	GL 5733' & RKB 24' @ 5757.00usft
Well:	PA 432-24	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)	
769.00	17.77	294.87	759.68	31.20	-81.98	86.81	2.53	2.42	-2.62	
861.00	19.97	297.86	846.73	44.45	-108.62	116.52	2.61	2.39	3.25	
Last SDI Gyro MWD Survey										
935.00	21.96	301.34	915.83	57.56	-131.61	142.99	3.17	2.69	4.70	
First SDI Surface MWD Survey										
1,030.00	24.27	301.67	1,003.20	77.05	-163.40	180.25	2.44	2.43	0.35	
1,070.00	25.68	301.14	1,039.46	85.85	-177.82	197.12	3.57	3.53	-1.33	
Last SDI Surface MWD Survey										
1,177.00	27.02	299.94	1,135.34	109.97	-218.72	244.60	1.35	1.25	-1.12	
First SDI Production MWD Survey										
1,272.00	29.24	298.26	1,219.11	131.73	-257.86	289.38	2.48	2.34	-1.77	
1,366.00	31.90	300.79	1,300.04	155.32	-299.43	337.17	3.14	2.83	2.69	
1,461.00	34.63	301.25	1,379.47	182.17	-344.08	389.24	2.89	2.87	0.48	
1,555.00	37.39	300.62	1,455.50	210.57	-391.48	444.48	2.96	2.94	-0.67	
1,650.00	36.88	299.68	1,531.24	239.38	-441.07	501.81	0.80	-0.54	-0.99	
1,744.00	38.12	298.45	1,605.81	267.17	-491.09	559.03	1.54	1.32	-1.31	
1,838.00	37.68	297.50	1,679.99	294.26	-542.08	616.76	0.78	-0.47	-1.01	
1,933.00	37.56	297.32	1,755.23	320.95	-593.56	674.73	0.17	-0.13	-0.19	
2,027.00	37.04	296.64	1,830.01	346.80	-644.33	731.65	0.71	-0.55	-0.72	
2,121.00	36.66	296.56	1,905.23	372.04	-694.73	787.97	0.41	-0.40	-0.09	
2,216.00	37.74	297.62	1,980.90	398.20	-745.86	845.37	1.32	1.14	1.12	
2,310.00	36.84	297.72	2,055.68	424.64	-796.30	902.30	0.96	-0.96	0.11	
2,405.00	36.17	297.48	2,132.04	450.83	-846.38	958.80	0.72	-0.71	-0.25	
2,499.00	34.55	297.42	2,208.70	475.90	-894.65	1,013.17	1.72	-1.72	-0.06	
2,594.00	35.37	299.34	2,286.56	501.78	-942.54	1,067.60	1.44	0.86	2.02	
2,688.00	33.99	299.56	2,363.86	528.08	-989.11	1,121.08	1.47	-1.47	0.23	
2,782.00	34.67	302.69	2,441.49	555.48	-1,034.47	1,174.04	2.01	0.72	3.33	
2,877.00	36.49	302.99	2,518.75	585.46	-1,080.91	1,229.20	1.92	1.92	0.32	
2,971.00	35.81	303.82	2,594.65	615.98	-1,127.20	1,284.49	0.89	-0.72	0.88	
3,065.00	36.73	303.80	2,670.44	646.93	-1,173.40	1,339.91	0.98	0.98	-0.02	
3,160.00	36.87	302.46	2,746.51	678.03	-1,221.06	1,396.68	0.86	0.15	-1.41	
3,254.00	37.91	300.17	2,821.20	707.68	-1,269.82	1,453.70	1.85	1.11	-2.44	
3,348.00	37.05	297.79	2,895.79	735.40	-1,319.84	1,510.89	1.79	-0.91	-2.53	
3,442.00	35.74	297.54	2,971.46	761.29	-1,369.24	1,566.65	1.40	-1.39	-0.27	
3,537.00	36.45	299.61	3,048.22	788.07	-1,418.38	1,622.61	1.49	0.75	2.18	
3,631.00	35.35	299.45	3,124.37	815.23	-1,466.34	1,677.72	1.17	-1.17	-0.17	
3,725.00	34.78	299.88	3,201.31	841.96	-1,513.26	1,731.72	0.66	-0.61	0.46	
3,820.00	33.82	299.82	3,279.78	868.61	-1,559.70	1,785.25	1.01	-1.01	-0.06	
3,914.00	32.91	300.09	3,358.29	894.42	-1,604.49	1,836.94	0.98	-0.97	0.29	
4,008.00	32.19	300.57	3,437.53	919.96	-1,648.14	1,887.51	0.81	-0.77	0.51	
4,102.00	31.02	300.62	3,517.58	945.03	-1,690.54	1,936.75	1.24	-1.24	0.05	
4,197.00	29.57	301.08	3,599.61	969.60	-1,731.69	1,984.65	1.55	-1.53	0.48	
4,291.00	28.63	297.35	3,681.75	991.92	-1,771.56	2,030.34	2.17	-1.00	-3.97	
4,385.00	27.43	298.28	3,764.72	1,012.52	-1,810.63	2,074.50	1.36	-1.28	0.99	



Scientific Drilling, Intl Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well PA 432-24 - Slot PA 432-24 (B2)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5733' & RKB 24' @ 5757.00usft
Site:	RWF 13-19 Pad	MD Reference:	GL 5733' & RKB 24' @ 5757.00usft
Well:	PA 432-24	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)	
4,480.00	26.66	298.41	3,849.33	1,033.03	-1,848.65	2,117.70	0.81	-0.81	0.14	
4,574.00	25.97	297.99	3,933.59	1,052.72	-1,885.37	2,159.36	0.76	-0.73	-0.45	
4,668.00	25.24	298.27	4,018.36	1,071.88	-1,921.19	2,199.98	0.79	-0.78	0.30	
4,763.00	24.61	298.16	4,104.51	1,090.81	-1,956.47	2,240.01	0.66	-0.66	-0.12	
4,857.00	22.11	298.86	4,190.80	1,108.58	-1,989.23	2,277.28	2.68	-2.66	0.74	
4,951.00	21.45	297.60	4,278.09	1,125.09	-2,019.95	2,312.15	0.86	-0.70	-1.34	
5,046.00	20.29	297.26	4,366.85	1,140.68	-2,049.99	2,345.98	1.23	-1.22	-0.36	
5,140.00	19.36	296.52	4,455.28	1,155.10	-2,078.42	2,377.83	1.02	-0.99	-0.79	
5,234.00	16.55	300.36	4,544.70	1,168.83	-2,103.92	2,406.79	3.24	-2.99	4.09	
5,328.00	15.08	301.95	4,635.14	1,182.07	-2,125.85	2,432.39	1.63	-1.56	1.69	
5,422.00	13.74	301.29	4,726.18	1,194.33	-2,145.76	2,455.76	1.44	-1.43	-0.70	
5,516.00	11.90	307.93	4,817.84	1,206.09	-2,162.95	2,476.49	2.50	-1.96	7.06	
5,609.00	11.91	311.61	4,908.84	1,218.36	-2,177.69	2,495.33	0.82	0.01	3.96	
5,704.00	12.07	310.04	5,001.76	1,231.26	-2,192.62	2,514.66	0.38	0.17	-1.65	
5,799.00	11.34	310.68	5,094.79	1,243.74	-2,207.31	2,533.56	0.78	-0.77	0.67	
5,893.00	11.79	305.01	5,186.88	1,255.27	-2,222.18	2,552.17	1.30	0.48	-6.03	
5,988.00	10.05	297.38	5,280.16	1,264.65	-2,237.50	2,570.11	2.38	-1.83	-8.03	
6,082.00	8.03	287.08	5,373.00	1,270.35	-2,251.06	2,584.73	2.75	-2.15	-10.96	
6,176.00	6.82	286.18	5,466.21	1,273.84	-2,262.69	2,596.59	1.29	-1.29	-0.96	
6,271.00	6.02	285.83	5,560.61	1,276.77	-2,272.90	2,606.94	0.84	-0.84	-0.37	
6,365.00	5.08	288.46	5,654.17	1,279.43	-2,281.59	2,615.83	1.04	-1.00	2.80	
6,442.47	4.17	288.62	5,731.38	1,281.41	-2,287.51	2,621.96	1.18	-1.18	0.20	
PA 432-24 KMV										
6,460.00	3.96	288.66	5,748.87	1,281.81	-2,288.69	2,623.19	1.18	-1.18	0.26	
6,554.00	3.34	292.39	5,842.68	1,283.89	-2,294.30	2,629.10	0.71	-0.66	3.97	
6,648.00	2.44	287.64	5,936.56	1,285.54	-2,298.74	2,633.78	0.99	-0.96	-5.05	
6,743.00	1.65	276.78	6,031.50	1,286.32	-2,302.02	2,637.02	0.92	-0.83	-11.43	
6,837.00	1.75	272.20	6,125.46	1,286.53	-2,304.80	2,639.56	0.18	0.11	-4.87	
6,931.00	0.97	89.04	6,219.45	1,286.60	-2,305.44	2,640.15	2.89	-0.83	188.13	
7,026.00	1.70	107.10	6,314.42	1,286.20	-2,303.29	2,638.07	0.88	0.77	19.01	
7,120.00	1.73	57.33	6,408.38	1,286.55	-2,300.76	2,636.04	1.54	0.03	-52.95	
7,215.00	1.63	67.69	6,503.34	1,287.84	-2,298.30	2,634.52	0.34	-0.11	10.91	
7,309.00	1.67	86.86	6,597.31	1,288.42	-2,295.70	2,632.53	0.59	0.04	20.39	
7,403.00	1.82	82.94	6,691.26	1,288.68	-2,292.85	2,630.16	0.20	0.16	-4.17	
7,497.00	1.55	338.18	6,785.24	1,290.05	-2,291.84	2,629.94	2.84	-0.29	-111.45	
7,591.00	1.19	358.92	6,879.21	1,292.20	-2,292.33	2,631.42	0.65	-0.38	22.06	
7,686.00	0.47	337.09	6,974.20	1,293.55	-2,292.50	2,632.22	0.81	-0.76	-22.98	
7,780.00	0.18	282.47	7,068.20	1,293.93	-2,292.80	2,632.67	0.42	-0.31	-58.11	
7,875.00	0.19	264.03	7,163.20	1,293.95	-2,293.10	2,632.94	0.06	0.01	-19.41	
7,970.00	0.45	194.67	7,258.20	1,293.57	-2,293.35	2,632.98	0.44	0.27	-73.01	
8,064.00	0.27	232.69	7,352.20	1,293.08	-2,293.62	2,632.97	0.31	-0.19	40.45	
8,158.00	0.59	167.53	7,446.19	1,292.48	-2,293.69	2,632.74	0.57	0.34	-69.32	
8,253.00	0.68	158.00	7,541.19	1,291.47	-2,293.38	2,631.98	0.15	0.09	-10.03	



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Well: PA 432-24	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)	
8,347.00	0.75	179.26	7,635.18	1,290.34	-2,293.16	2,631.24	0.29	0.07	22.62	
8,442.00	0.52	148.23	7,730.18	1,289.35	-2,292.92	2,630.55	0.43	-0.24	-32.66	
8,536.00	0.62	202.14	7,824.17	1,288.52	-2,292.89	2,630.12	0.56	0.11	57.35	
8,631.00	0.87	171.89	7,919.16	1,287.33	-2,292.98	2,629.62	0.48	0.26	-31.84	
8,725.00	1.17	170.65	8,013.15	1,285.68	-2,292.73	2,628.59	0.32	0.32	-1.32	
8,820.00	1.59	160.92	8,108.12	1,283.47	-2,292.14	2,627.01	0.50	0.44	-10.24	
8,914.00	2.55	157.88	8,202.06	1,280.30	-2,290.92	2,624.40	1.03	1.02	-3.23	
9,008.00	2.79	171.82	8,295.96	1,276.10	-2,289.81	2,621.39	0.73	0.26	14.83	
9,102.00	3.08	168.08	8,389.83	1,271.37	-2,288.96	2,618.34	0.37	0.31	-3.98	
9,145.00	3.17	167.99	8,432.77	1,269.07	-2,288.48	2,616.80	0.21	0.21	-0.21	
Last SDI Production MWD Survey										
9,205.00	3.17	167.99	8,492.68	1,265.83	-2,287.79	2,614.62	0.00	0.00	0.00	
Projection to TD - PA 432-24 PBHL										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
124.00	124.00	-0.07	0.07	First SDI Gyro MWD Survey	
861.00	846.73	44.45	-108.62	Last SDI Gyro MWD Survey	
935.00	915.83	57.56	-131.61	First SDI Surface MWD Survey	
1,070.00	1,039.46	85.85	-177.82	Last SDI Surface MWD Survey	
1,177.00	1,135.34	109.97	-218.72	First SDI Production MWD Survey	
9,145.00	8,432.77	1,269.07	-2,288.48	Last SDI Production MWD Survey	
9,205.00	8,492.68	1,265.83	-2,287.79	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____