



Well Details: PA 434-24

TVD Reference: GL 5733' & RKB 24' @ 5757.00usft		Ground Level: 5733.00	
+N/-S	+E/-W	North	East
0.00	0.00	1618768.20	2312583.20
		Latitude	Longitude
		39.5069878	-107.9365890

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well PA 434-24 - Slot PA 434-24 (A13), True North
 Vertical (TVD) Reference: GL 5733' & RKB 24' @ 5757.00usft
 Section (VS) Reference: Slot - PA 434-24 (A13)(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

18:03, September 13 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 434-24
County & State	Garfield County, CO
SDI Job No.	OP. 012790
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 8,840 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

14-Sep-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 434-24 - Slot PA 434-24 (A13)
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 434-24	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 434-24 - Slot PA 434-24 (A13)					
Well Position	+N/-S	0.00 usft	Northing:	1,618,768.20 usft	Latitude:	39.5069878
	+E/-W	0.00 usft	Easting:	2,312,583.20 usft	Longitude:	-107.9365891
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	9/4/2018	9.35	65.75	51,577

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	241.68	

Survey Program	Date	9/13/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
124.00	678.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
750.00	1,075.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,174.00	8,840.00	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	
124.00	0.35	205.22	124.00	-0.34	-0.16	0.30	0.28	0.28	0.00	
First SDI Gyro MWD Survey										
216.00	2.73	236.78	215.96	-1.80	-2.11	2.71	2.65	2.59	34.30	
310.00	4.93	245.74	309.75	-4.68	-7.67	8.97	2.42	2.34	9.53	
402.00	6.25	246.18	401.31	-8.33	-15.86	17.91	1.44	1.43	0.48	
494.00	8.27	241.26	492.56	-13.54	-26.24	29.52	2.30	2.20	-5.35	
586.00	11.52	241.35	583.18	-21.12	-40.11	45.33	3.53	3.53	0.10	
678.00	14.87	241.08	672.74	-31.24	-58.51	66.32	3.64	3.64	-0.29	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well PA 434-24 - Slot PA 434-24 (A13)
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Site:	RWF 13-19 Pad	MD Reference:	GL 5733' & RKB 24' @ 5757.00usft
Well:	PA 434-24	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)
Last SDI Gyro MWD Survey									
750.00	17.28	238.63	741.92	-41.28	-75.73	86.24	3.48	3.35	-3.40
First SDI Surface MWD Survey									
841.00	20.53	240.64	828.00	-56.14	-101.18	115.70	3.64	3.57	2.21
936.00	23.10	241.27	916.19	-73.27	-132.05	151.00	2.72	2.71	0.66
1,030.00	25.63	244.51	1,001.82	-90.88	-166.57	189.75	3.04	2.69	3.45
1,075.00	26.56	244.55	1,042.23	-99.40	-184.44	209.52	2.07	2.07	0.09
Last SDI Surface MWD Survey									
1,174.00	27.55	243.03	1,130.40	-119.29	-224.84	254.52	1.22	1.00	-1.54
First SDI Production MWD Survey									
1,269.00	27.88	242.97	1,214.50	-139.35	-264.20	298.69	0.35	0.35	-0.06
1,363.00	27.92	243.81	1,297.57	-159.05	-303.53	342.65	0.42	0.04	0.89
1,457.00	28.04	243.96	1,380.58	-178.46	-343.13	386.72	0.15	0.13	0.16
1,552.00	27.77	244.82	1,464.54	-197.68	-383.22	431.13	0.51	-0.28	0.91
1,646.00	29.81	243.73	1,546.91	-217.34	-423.99	476.35	2.24	2.17	-1.16
1,740.00	29.54	243.01	1,628.59	-238.20	-465.59	522.87	0.48	-0.29	-0.77
1,835.00	28.66	242.25	1,711.59	-259.44	-506.62	569.06	1.00	-0.93	-0.80
1,929.00	27.34	241.20	1,794.59	-280.33	-545.49	613.19	1.50	-1.40	-1.12
2,023.00	28.61	242.08	1,877.61	-301.27	-584.29	657.28	1.42	1.35	0.94
2,118.00	27.53	242.04	1,961.43	-322.21	-623.78	701.98	1.14	-1.14	-0.04
2,212.00	29.35	244.26	2,044.08	-342.41	-663.73	746.72	2.24	1.94	2.36
2,306.00	29.47	243.78	2,125.97	-362.63	-705.22	792.84	0.28	0.13	-0.51
2,401.00	29.35	243.62	2,208.73	-383.30	-747.04	839.47	0.15	-0.13	-0.17
2,495.00	28.77	243.94	2,290.89	-403.47	-788.00	885.09	0.64	-0.62	0.34
2,590.00	28.28	244.03	2,374.36	-423.37	-828.77	930.42	0.52	-0.52	0.09
2,684.00	27.75	243.62	2,457.35	-442.84	-868.40	974.54	0.60	-0.56	-0.44
2,778.00	26.30	243.42	2,541.08	-461.88	-906.63	1,017.23	1.55	-1.54	-0.21
2,872.00	27.99	243.25	2,624.72	-481.13	-944.95	1,060.10	1.80	1.80	-0.18
2,966.00	27.00	243.83	2,708.11	-500.47	-983.80	1,103.47	1.09	-1.05	0.62
3,061.00	26.38	243.89	2,792.98	-519.27	-1,022.11	1,146.11	0.65	-0.65	0.06
3,155.00	27.22	245.11	2,876.89	-537.51	-1,060.36	1,188.44	1.07	0.89	1.30
3,249.00	26.97	245.28	2,960.57	-555.47	-1,099.22	1,231.17	0.28	-0.27	0.18
3,344.00	25.73	246.73	3,045.70	-572.63	-1,137.74	1,273.22	1.47	-1.31	1.53
3,438.00	25.44	244.97	3,130.48	-589.23	-1,174.78	1,313.70	0.87	-0.31	-1.87
3,532.00	26.58	243.51	3,214.96	-607.15	-1,211.89	1,354.88	1.39	1.21	-1.55
3,627.00	25.50	243.12	3,300.32	-625.88	-1,249.16	1,396.56	1.15	-1.14	-0.41
3,721.00	27.01	242.65	3,384.62	-644.84	-1,286.17	1,438.13	1.62	1.61	-0.50
3,815.00	26.01	244.27	3,468.73	-663.59	-1,323.69	1,480.07	1.31	-1.06	1.72
3,909.00	24.54	244.68	3,553.73	-680.89	-1,359.91	1,520.15	1.57	-1.56	0.44
4,004.00	22.77	245.12	3,640.75	-697.06	-1,394.42	1,558.21	1.87	-1.86	0.46
4,098.00	21.37	246.43	3,727.86	-711.56	-1,426.62	1,593.44	1.58	-1.49	1.39
4,192.00	21.43	243.11	3,815.38	-726.18	-1,457.64	1,627.67	1.29	0.06	-3.53
4,287.00	20.48	243.02	3,904.10	-741.57	-1,487.93	1,661.64	1.00	-1.00	-0.09
4,381.00	19.25	242.21	3,992.50	-756.25	-1,516.29	1,693.57	1.34	-1.31	-0.86

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well PA 434-24 - Slot PA 434-24 (A13)
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 434-24	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)
4,475.00	18.66	244.35	4,081.40	-769.99	-1,543.56	1,724.09	0.97	-0.63	2.28
4,569.00	17.79	243.87	4,170.69	-782.82	-1,570.00	1,753.46	0.94	-0.93	-0.51
4,777.00	15.83	243.49	4,369.79	-809.48	-1,623.92	1,813.57	0.94	-0.94	-0.18
4,851.00	15.24	242.19	4,441.09	-818.52	-1,641.56	1,833.39	0.93	-0.80	-1.76
4,945.00	14.33	243.27	4,531.97	-829.52	-1,662.88	1,857.37	1.01	-0.97	1.15
5,040.00	12.80	244.43	4,624.32	-839.35	-1,682.87	1,879.64	1.64	-1.61	1.22
5,134.00	11.16	243.34	4,716.27	-847.93	-1,700.39	1,899.13	1.76	-1.74	-1.16
5,229.00	9.97	239.70	4,809.66	-856.20	-1,715.71	1,916.54	1.44	-1.25	-3.83
5,323.00	9.02	238.97	4,902.37	-864.11	-1,729.05	1,932.03	1.02	-1.01	-0.78
5,417.00	8.04	236.18	4,995.33	-871.56	-1,740.83	1,945.94	1.13	-1.04	-2.97
5,512.00	7.08	235.19	5,089.50	-878.60	-1,751.15	1,958.37	1.02	-1.01	-1.04
5,606.00	5.88	244.27	5,182.90	-884.00	-1,760.25	1,968.93	1.67	-1.28	9.66
5,700.00	4.50	254.15	5,276.52	-887.10	-1,768.13	1,977.35	1.74	-1.47	10.51
5,795.00	4.06	249.25	5,371.25	-889.31	-1,774.86	1,984.32	0.60	-0.46	-5.16
5,889.00	2.46	254.00	5,465.10	-891.04	-1,779.91	1,989.59	1.72	-1.70	5.05
5,984.00	1.22	305.26	5,560.05	-891.02	-1,782.70	1,992.03	2.05	-1.31	53.96
PA 434-24 KMV									
6,077.00	0.99	297.47	5,653.04	-890.08	-1,784.22	1,992.92	0.29	-0.25	-8.38
6,172.00	0.86	303.25	5,748.02	-889.31	-1,785.55	1,993.72	0.17	-0.14	6.08
6,266.00	1.13	102.84	5,842.02	-889.13	-1,785.23	1,993.36	2.08	0.29	169.78
6,361.00	1.36	119.67	5,937.00	-889.90	-1,783.34	1,992.06	0.45	0.24	17.72
6,455.00	1.41	129.23	6,030.97	-891.18	-1,781.47	1,991.02	0.25	0.05	10.17
6,550.00	1.31	116.02	6,125.94	-892.40	-1,779.59	1,989.95	0.35	-0.11	-13.91
6,644.00	0.53	197.08	6,219.93	-893.28	-1,778.76	1,989.63	1.42	-0.83	86.23
6,738.00	0.79	205.35	6,313.93	-894.28	-1,779.16	1,990.46	0.29	0.28	8.80
6,832.00	0.95	193.21	6,407.91	-895.63	-1,779.62	1,991.50	0.26	0.17	-12.91
6,927.00	1.32	184.43	6,502.90	-897.49	-1,779.88	1,992.61	0.43	0.39	-9.24
7,021.00	1.12	190.13	6,596.87	-899.47	-1,780.13	1,993.77	0.25	-0.21	6.06
7,116.00	1.23	180.12	6,691.85	-901.40	-1,780.29	1,994.83	0.24	0.12	-10.54
7,210.00	1.23	156.39	6,785.83	-903.34	-1,779.89	1,995.40	0.54	0.00	-25.24
7,305.00	0.48	320.77	6,880.83	-903.96	-1,779.73	1,995.56	1.79	-0.79	173.03
7,399.00	0.26	303.48	6,974.83	-903.54	-1,780.16	1,995.73	0.26	-0.23	-18.39
7,494.00	0.05	357.02	7,069.83	-903.38	-1,780.34	1,995.81	0.25	-0.22	56.36
7,588.00	0.45	175.67	7,163.82	-903.71	-1,780.32	1,995.95	0.53	0.43	190.05
7,682.00	0.91	190.76	7,257.82	-904.81	-1,780.43	1,996.57	0.52	0.49	16.05
7,777.00	1.00	190.14	7,352.80	-906.37	-1,780.71	1,997.56	0.10	0.09	-0.65
7,871.00	1.28	176.36	7,446.79	-908.22	-1,780.79	1,998.51	0.41	0.30	-14.66
7,966.00	1.91	179.97	7,541.75	-910.86	-1,780.72	1,999.70	0.67	0.66	3.80
8,060.00	2.64	189.36	7,635.67	-914.56	-1,781.07	2,001.77	0.87	0.78	9.99
8,155.00	3.74	191.92	7,730.53	-919.76	-1,782.07	2,005.11	1.17	1.16	2.69
8,249.00	3.21	200.82	7,824.35	-925.22	-1,783.64	2,009.08	0.80	-0.56	9.47
8,343.00	3.87	204.80	7,918.17	-930.55	-1,785.91	2,013.60	0.75	0.70	4.23
8,437.00	3.42	209.12	8,011.98	-935.88	-1,788.60	2,018.51	0.56	-0.48	4.60

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8,532.00	4.23	205.71	8,106.77	-941.52	-1,791.50	2,023.73	0.89	0.85	-3.59	
8,626.00	4.66	199.49	8,200.49	-948.24	-1,794.28	2,029.36	0.69	0.46	-6.62	
8,721.00	3.99	192.87	8,295.22	-955.10	-1,796.30	2,034.40	0.88	-0.71	-6.97	
8,780.00	4.04	191.28	8,354.07	-959.14	-1,797.16	2,037.08	0.21	0.08	-2.69	
Last SDI Production MWD Survey										
8,840.00	4.04	191.28	8,413.92	-963.28	-1,797.99	2,039.77	0.00	0.00	0.00	
Projection to TD - PA 434-24 PBHL										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
124.00	124.00	-0.34	-0.16	First SDI Gyro MWD Survey	
678.00	672.74	-31.24	-58.51	Last SDI Gyro MWD Survey	
750.00	741.92	-41.28	-75.73	First SDI Surface MWD Survey	
1,075.00	1,042.23	-99.40	-184.44	Last SDI Surface MWD Survey	
1,174.00	1,130.40	-119.29	-224.84	First SDI Production MWD Survey	
8,780.00	8,354.07	-959.14	-1,797.16	Last SDI Production MWD Survey	
8,840.00	8,413.92	-963.28	-1,797.99	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
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