



#### Well Details: GM 434-8

+N/-S	+E/-W	North	East	Latitude	Longitude	Slot
0.00	0.00	1599810.1600	2256663.3000	39.4506766	-108.1327466	GM 434-8 (B1)

#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 434-8 - Slot GM 434-8 (B1), True North  
 Vertical (TVD) Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318)  
 Section (VS) Reference: Slot - GM 434-8 (B1)(0.00N, 0.00E)  
 Measured Depth Reference: GL 6280' & RKB 24' @ 6304.00usft (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

Plan: OH

12:08, October 10 2019  
 Created By: Mel Mireles Jr.



## Directional Survey Certification

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

<b>Operator</b>	TEP Rocky Mountain, LLC.
<b>Well Name &amp; No.</b>	GM 434-8
<b>County &amp; State</b>	Garfield County, CO
<b>SDI Job No.</b>	OP.021483
<b>Rig</b>	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 120 feet to a measured depth of 6,982 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

10-Oct-19

Date

### **Mel Mireles Jr.**

Grand Junction Assistant Well Planner  
Scientific Drilling - Colorado District

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 434-8 - Slot GM 434-8 (B1)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Site:</b>	GV 1-8 Pad	<b>MD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Well:</b>	GM 434-8	<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		

Site		GV 1-8 Pad			
Site Position:		Northing:	1,599,836.4100 usft	Latitude:	39.4507498
From:	Map	Easting:	2,256,677.8100 usft	Longitude:	-108.1326980
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.66 °

Well		GM 434-8 - Slot GM 434-8 (B1)				
Well Position	+N/-S	0.00 usft	Northing:	1,599,810.1600 usft	Latitude:	39.4506766
	+E/-W	0.00 usft	Easting:	2,256,663.3000 usft	Longitude:	-108.1327467
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	6,280.00 usft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	10/4/2019	9.40	65.62	51,544

<b>Design</b>	OH				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	193.22	

<b>Survey Program</b>	<b>Date</b>	10/10/2019			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
120.00	558.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
649.00	978.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,077.00	6,982.00	Survey #3 - Production MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
120.00	0.26	194.15	120.00	-0.26	-0.07	0.27	0.22	0.22	0.00	
<b>First SDI Gyro MWD Survey</b>										
212.00	3.08	198.72	211.95	-2.81	-0.91	2.94	3.07	3.07	4.97	
303.00	6.25	203.82	302.64	-9.66	-3.70	10.25	3.51	3.48	5.60	
395.00	10.73	197.40	393.61	-22.42	-8.28	23.72	4.97	4.87	-6.98	
486.00	15.13	194.41	482.28	-42.01	-13.77	44.05	4.89	4.84	-3.29	
558.00	18.54	191.23	551.19	-62.35	-18.34	64.89	4.90	4.74	-4.42	

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 434-8 - Slot GM 434-8 (B1)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Site:</b>	GV 1-8 Pad	<b>MD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Well:</b>	GM 434-8	<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)
<b>Last SDI Gyro MWD Survey</b>									
649.00	20.45	188.74	636.97	-92.25	-23.58	95.20	2.29	2.10	-2.74
<b>First SDI Surface MWD Survey</b>									
744.00	22.42	192.21	725.40	-126.37	-29.93	129.86	2.47	2.07	3.65
838.00	27.24	193.60	810.68	-164.82	-38.79	169.32	5.16	5.13	1.48
933.00	27.79	189.40	894.94	-207.81	-47.52	213.17	2.12	0.58	-4.42
978.00	28.40	188.35	934.64	-228.74	-50.78	234.30	1.74	1.36	-2.33
<b>Last SDI Surface MWD Survey</b>									
1,077.00	28.38	186.85	1,021.74	-275.40	-57.01	281.14	0.72	-0.02	-1.52
<b>First SDI Production MWD Survey</b>									
1,171.00	28.32	190.21	1,104.47	-319.53	-63.63	325.61	1.70	-0.06	3.57
1,266.00	26.75	188.09	1,188.71	-362.87	-70.63	369.41	1.95	-1.65	-2.23
1,360.00	27.36	190.40	1,272.42	-405.06	-77.51	412.05	1.29	0.65	2.46
1,454.00	26.85	191.84	1,356.10	-447.09	-85.76	454.85	0.88	-0.54	1.53
1,549.00	27.64	194.89	1,440.56	-489.38	-95.83	498.33	1.69	0.83	3.21
1,643.00	29.01	195.27	1,523.31	-532.44	-107.43	542.90	1.47	1.46	0.40
1,737.00	27.41	194.42	1,606.14	-575.39	-118.82	587.32	1.75	-1.70	-0.90
1,832.00	28.29	195.23	1,690.13	-618.29	-130.18	631.68	1.01	0.93	0.85
1,926.00	29.03	195.63	1,772.62	-661.75	-142.18	676.73	0.81	0.79	0.43
2,021.00	27.75	195.81	1,856.19	-705.23	-154.42	721.85	1.35	-1.35	0.19
2,115.00	28.18	194.97	1,939.21	-747.73	-166.11	765.90	0.62	0.46	-0.89
2,210.00	26.49	195.60	2,023.60	-789.81	-177.61	809.49	1.80	-1.78	0.66
2,304.00	26.80	192.75	2,107.62	-830.67	-187.92	851.63	1.40	0.33	-3.03
2,399.00	28.55	194.19	2,191.75	-873.57	-198.21	895.75	1.97	1.84	1.52
2,493.00	25.36	192.77	2,275.53	-914.99	-208.17	938.35	3.46	-3.39	-1.51
2,587.00	25.73	198.00	2,360.35	-954.03	-218.93	978.82	2.43	0.39	5.56
2,681.00	27.22	199.20	2,444.49	-993.74	-232.30	1,020.54	1.68	1.59	1.28
2,776.00	27.81	198.66	2,528.75	-1,035.26	-246.54	1,064.21	0.67	0.62	-0.57
2,870.00	26.83	197.05	2,612.26	-1,076.32	-259.78	1,107.20	1.31	-1.04	-1.71
2,965.00	27.28	197.00	2,696.87	-1,117.63	-272.43	1,150.32	0.47	0.47	-0.05
3,059.00	28.68	195.31	2,779.88	-1,159.99	-284.68	1,194.36	1.71	1.49	-1.80
3,153.00	29.69	197.62	2,861.95	-1,203.94	-297.69	1,240.11	1.61	1.07	2.46
3,248.00	30.98	196.56	2,943.94	-1,249.80	-311.78	1,287.98	1.47	1.36	-1.12
3,342.00	32.31	190.81	3,023.98	-1,297.68	-323.39	1,337.24	3.51	1.41	-6.12
3,436.00	31.54	189.43	3,103.76	-1,346.61	-332.13	1,386.88	1.13	-0.82	-1.47
3,530.00	30.00	189.53	3,184.53	-1,394.04	-340.05	1,434.86	1.64	-1.64	0.11
3,624.00	28.54	187.93	3,266.52	-1,439.46	-347.04	1,480.68	1.76	-1.55	-1.70
3,719.00	29.96	190.25	3,349.41	-1,485.28	-354.39	1,526.97	1.91	1.49	2.44
3,813.00	28.79	190.42	3,431.32	-1,530.64	-362.66	1,573.02	1.25	-1.24	0.18
3,907.00	26.98	189.98	3,514.41	-1,573.91	-370.45	1,616.92	1.94	-1.93	-0.47
4,001.00	24.56	189.32	3,599.05	-1,614.19	-377.31	1,657.70	2.59	-2.57	-0.70
4,096.00	25.56	192.46	3,685.11	-1,653.69	-384.93	1,697.89	1.75	1.05	3.31
4,190.00	24.08	190.41	3,770.43	-1,692.35	-392.77	1,737.33	1.82	-1.57	-2.18
4,284.00	21.69	189.27	3,857.02	-1,728.36	-399.03	1,773.82	2.59	-2.54	-1.21

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 434-8 - Slot GM 434-8 (B1)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Site:</b>	GV 1-8 Pad	<b>MD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Well:</b>	GM 434-8	<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)
4,379.00	22.17	193.07	3,945.15	-1,763.15	-405.92	1,809.26	1.58	0.51	4.00
4,473.00	19.12	191.86	4,033.11	-1,795.50	-413.09	1,842.39	3.28	-3.24	-1.29
4,567.00	20.17	194.44	4,121.64	-1,826.26	-420.30	1,873.98	1.45	1.12	2.74
4,662.00	19.12	193.23	4,211.11	-1,857.27	-427.94	1,905.92	1.19	-1.11	-1.27
4,756.00	18.37	193.15	4,300.12	-1,886.68	-434.84	1,936.13	0.80	-0.80	-0.09
4,851.00	17.51	193.71	4,390.50	-1,915.14	-441.63	1,965.39	0.92	-0.91	0.59
4,945.00	15.80	192.89	4,480.55	-1,941.36	-447.84	1,992.33	1.84	-1.82	-0.87
5,040.00	14.96	196.16	4,572.15	-1,965.74	-454.13	2,017.51	1.27	-0.88	3.44
5,134.00	15.08	195.29	4,662.94	-1,989.19	-460.73	2,041.84	0.27	0.13	-0.93
5,228.00	12.47	192.94	4,754.23	-2,010.88	-466.23	2,064.22	2.84	-2.78	-2.50
5,243.80	11.96	193.12	4,769.67	-2,014.14	-466.99	2,067.56	3.26	-3.26	1.14
GM 434-8 BTV									
5,323.00	9.38	194.32	4,847.50	-2,028.38	-470.45	2,082.22	3.26	-3.25	1.51
5,417.00	6.70	206.96	4,940.57	-2,040.70	-474.83	2,095.21	3.40	-2.85	13.45
5,511.00	3.89	211.82	5,034.16	-2,048.30	-479.00	2,103.56	3.02	-2.99	5.17
5,605.00	1.38	220.23	5,128.05	-2,051.87	-481.41	2,107.59	2.69	-2.67	8.95
5,700.00	1.25	4.20	5,223.04	-2,051.71	-482.07	2,107.58	2.63	-0.14	151.55
5,794.00	0.72	18.20	5,317.03	-2,050.13	-481.81	2,105.98	0.62	-0.56	14.89
5,888.00	0.57	42.20	5,411.02	-2,049.22	-481.31	2,104.98	0.33	-0.16	25.53
5,983.00	0.51	70.23	5,506.02	-2,048.73	-480.60	2,104.34	0.28	-0.06	29.51
6,077.00	0.43	78.93	5,600.02	-2,048.52	-479.86	2,103.97	0.11	-0.09	9.26
6,172.00	0.19	223.69	5,695.02	-2,048.56	-479.62	2,103.96	0.63	-0.25	152.38
6,266.00	0.67	242.09	5,789.01	-2,048.93	-480.21	2,104.45	0.52	0.51	19.57
6,360.00	1.07	211.06	5,883.00	-2,049.94	-481.15	2,105.65	0.64	0.43	-33.01
6,455.00	1.39	207.49	5,977.98	-2,051.72	-482.14	2,107.61	0.35	0.34	-3.76
6,549.00	1.30	195.84	6,071.96	-2,053.76	-482.96	2,109.78	0.31	-0.10	-12.39
6,644.00	1.07	178.32	6,166.94	-2,055.68	-483.22	2,111.71	0.45	-0.24	-18.44
6,738.00	0.94	182.20	6,260.92	-2,057.33	-483.23	2,113.32	0.16	-0.14	4.13
6,833.00	1.34	198.30	6,355.90	-2,059.16	-483.61	2,115.19	0.54	0.42	16.95
6,922.00	0.90	199.04	6,444.89	-2,060.81	-484.16	2,116.92	0.49	-0.49	0.83
Last SDI Production MWD Survey									
6,982.00	0.90	199.04	6,504.88	-2,061.70	-484.47	2,117.86	0.00	0.00	0.00
Projection to TD - GM 434-8 PBHL									



Scientific Drilling, Intl  
Survey Report

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 434-8 - Slot GM 434-8 (B1)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Site:</b>	GV 1-8 Pad	<b>MD Reference:</b>	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
<b>Well:</b>	GM 434-8	<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

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
120.00	120.00	-0.26	-0.07	First SDI Gyro MWD Survey
558.00	551.19	-62.35	-18.34	Last SDI Gyro MWD Survey
649.00	636.97	-92.25	-23.58	First SDI Surface MWD Survey
978.00	934.64	-228.74	-50.78	Last SDI Surface MWD Survey
1,077.00	1,021.74	-275.40	-57.01	First SDI Production MWD Survey
6,922.00	6,444.89	-2,060.81	-484.16	Last SDI Production MWD Survey
6,982.00	6,504.88	-2,061.70	-484.47	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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