



#### Well Details: GM 422-8

TVD Reference: GL 6175' & RKB 24' @ 6199.00usft  
 +N/-S +E/-W Northing Easting Latitude Longitude Slot  
 0.00 0.00 1601112.60 2257373.33 39.4543074 -108.1303668 GM 422-8 (A2)

#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 422-8 - Slot GM 422-8 (A2), True North  
 Vertical (TVD) Reference: GL 6175' & RKB 24' @ 6199.00usft  
 Section (VS) Reference: Slot - GM 422-8 (A2)(0.00N, 0.00E)  
 Measured Depth Reference: GL 6175' & RKB 24' @ 6199.00usft  
 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

13:48, March 26 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 422-8
<b>County &amp; State</b>	Garfield County, CO
<b>SDI Job No.</b>	OP.015029
<b>Rig</b>	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 130 feet to a measured depth of 7,135 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

17-Jan-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 422-8 - Slot GM 422-8 (A2)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Site:</b>	MV 60-8D Pad	<b>MD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Well:</b>	GM 422-8	<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		MV 60-8D Pad			
Site Position:		Northing:	1,601,172.03 usft	Latitude:	39.4544712
From:	Map	Easting:	2,257,381.57 usft	Longitude:	-108.1303437
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.66 °

Well		GM 422-8 - Slot GM 422-8 (A2)				
Well Position	+N/-S	0.00 usft	Northing:	1,601,112.60 usft	Latitude:	39.4543074
	+E/-W	0.00 usft	Easting:	2,257,373.33 usft	Longitude:	-108.1303668
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	6,175.00 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	1/5/2019	9.47	65.67	51,622

<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	249.84	

<b>Survey Program</b>	<b>Date</b>	3/26/2019			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
130.00	401.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
473.00	967.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,079.00	7,135.00	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	
130.00	1.67	336.98	129.98	1.74	-0.74	0.09	1.28	1.28	0.00	
<b>First SDI Gyro MWD Survey</b>										
218.00	4.40	293.90	217.86	4.29	-4.33	2.58	3.84	3.10	-48.95	
310.00	7.21	269.03	309.39	5.62	-13.33	10.58	4.03	3.05	-27.03	
401.00	11.96	260.51	399.10	3.97	-28.35	25.24	5.43	5.22	-9.36	
<b>Last SDI Gyro MWD Survey</b>										
473.00	14.79	252.97	469.14	0.05	-44.50	41.76	4.61	3.93	-10.47	

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 422-8 - Slot GM 422-8 (A2)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Site:</b>	MV 60-8D Pad	<b>MD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Well:</b>	GM 422-8	<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>First SDI Surface MWD Survey</b>									
565.00	18.01	243.31	557.41	-9.78	-68.45	67.62	4.58	3.50	-10.50
657.00	21.48	241.42	643.99	-24.23	-95.95	98.43	3.83	3.77	-2.05
749.00	24.30	242.64	728.73	-40.99	-127.56	133.88	3.11	3.07	1.33
840.00	26.72	243.21	810.85	-58.82	-162.46	172.78	2.67	2.66	0.63
933.00	30.68	245.55	892.42	-78.07	-202.74	217.23	4.43	4.26	2.52
967.00	31.83	246.35	921.48	-85.26	-218.85	234.83	3.60	3.38	2.35
<b>Last SDI Surface MWD Survey</b>									
1,079.00	32.75	248.44	1,016.16	-108.24	-274.08	294.59	1.29	0.82	1.87
<b>First SDI Production MWD Survey</b>									
1,173.00	34.13	251.70	1,094.61	-125.87	-322.77	346.38	2.41	1.47	3.47
1,267.00	35.63	251.02	1,171.72	-143.06	-373.70	400.11	1.65	1.60	-0.72
1,361.00	33.97	249.96	1,248.90	-160.96	-424.27	453.75	1.88	-1.77	-1.13
1,456.00	35.43	251.06	1,327.01	-178.99	-475.25	507.82	1.67	1.54	1.16
1,550.00	33.20	249.53	1,404.64	-196.84	-525.14	560.81	2.54	-2.37	-1.63
1,644.00	33.67	251.35	1,483.09	-214.17	-573.94	612.59	1.18	0.50	1.94
1,738.00	34.09	252.15	1,561.13	-230.58	-623.71	664.96	0.65	0.45	0.85
1,833.00	35.45	252.06	1,639.16	-247.23	-675.26	719.10	1.43	1.43	-0.09
1,927.00	34.05	249.79	1,716.40	-264.72	-725.90	772.66	2.03	-1.49	-2.41
2,022.00	34.93	247.18	1,794.70	-284.46	-775.93	826.42	1.81	0.93	-2.75
2,116.00	34.76	248.46	1,871.85	-304.73	-825.66	880.10	0.80	-0.18	1.36
2,210.00	34.44	249.36	1,949.23	-323.94	-875.46	933.46	0.64	-0.34	0.96
2,304.00	34.64	250.85	2,026.66	-342.07	-925.57	986.76	0.92	0.21	1.59
2,399.00	35.04	251.33	2,104.63	-359.66	-976.91	1,041.02	0.51	0.42	0.51
2,493.00	34.27	251.84	2,181.95	-376.55	-1,027.63	1,094.44	0.88	-0.82	0.54
2,588.00	33.96	251.36	2,260.61	-393.37	-1,078.18	1,147.70	0.43	-0.33	-0.51
2,682.00	34.23	251.88	2,338.45	-409.98	-1,128.19	1,200.36	0.42	0.29	0.55
2,776.00	34.09	252.28	2,416.23	-426.22	-1,178.41	1,253.11	0.28	-0.15	0.43
2,870.00	32.66	252.34	2,494.73	-441.93	-1,227.67	1,304.77	1.52	-1.52	0.06
2,965.00	31.44	252.53	2,575.25	-457.15	-1,275.73	1,355.13	1.29	-1.28	0.20
3,059.00	33.23	250.60	2,654.67	-473.07	-1,323.42	1,405.37	2.20	1.90	-2.05
3,153.00	34.21	249.11	2,732.85	-491.04	-1,372.40	1,457.55	1.36	1.04	-1.59
3,247.00	33.51	247.32	2,810.91	-510.47	-1,421.03	1,509.90	1.30	-0.74	-1.90
3,342.00	34.18	249.35	2,889.82	-529.99	-1,470.20	1,562.79	1.38	0.71	2.14
3,436.00	32.73	249.57	2,968.24	-548.18	-1,518.72	1,614.60	1.55	-1.54	0.23
3,530.00	30.72	249.99	3,048.19	-565.27	-1,565.10	1,664.03	2.15	-2.14	0.45
3,625.00	28.92	250.60	3,130.61	-581.20	-1,609.57	1,711.27	1.92	-1.89	0.64
3,719.00	27.98	251.31	3,213.26	-595.82	-1,651.90	1,756.04	1.06	-1.00	0.76
3,813.00	26.43	251.76	3,296.86	-609.43	-1,692.66	1,798.99	1.66	-1.65	0.48
3,907.00	25.14	251.75	3,381.50	-622.23	-1,731.49	1,839.86	1.37	-1.37	-0.01
4,002.00	23.09	251.11	3,468.20	-634.58	-1,768.29	1,878.66	2.18	-2.16	-0.67
4,096.00	21.05	250.95	3,555.31	-646.06	-1,801.69	1,913.96	2.17	-2.17	-0.17
4,191.00	19.66	251.15	3,644.37	-656.80	-1,832.94	1,947.00	1.46	-1.46	0.21
4,285.00	17.37	250.52	3,733.50	-666.58	-1,861.13	1,976.84	2.45	-2.44	-0.67

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 422-8 - Slot GM 422-8 (A2)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Site:</b>	MV 60-8D Pad	<b>MD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Well:</b>	GM 422-8	<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	15.77	250.92	3,823.60	-675.44	-1,886.44	2,003.65	1.71	-1.70	0.43	
4,474.00	13.70	250.64	3,915.47	-683.39	-1,909.25	2,027.81	2.18	-2.18	-0.29	
4,568.00	11.72	249.64	4,007.16	-690.40	-1,928.71	2,048.49	2.12	-2.11	-1.06	
4,662.00	11.71	246.30	4,099.20	-697.56	-1,946.39	2,067.55	0.72	-0.01	-3.55	
4,756.00	10.75	242.29	4,191.40	-705.47	-1,962.89	2,085.77	1.32	-1.02	-4.27	
4,851.00	9.49	243.07	4,284.92	-713.14	-1,977.72	2,102.33	1.33	-1.33	0.82	
4,945.00	8.29	242.90	4,377.79	-719.73	-1,990.66	2,116.75	1.28	-1.28	-0.18	
5,039.00	7.70	243.78	4,470.88	-725.60	-2,002.34	2,129.74	0.64	-0.63	0.94	
5,134.00	5.84	247.14	4,565.21	-730.29	-2,012.50	2,140.90	2.00	-1.96	3.54	
5,228.00	3.86	251.13	4,658.87	-733.17	-2,019.91	2,148.84	2.14	-2.11	4.24	
5,322.00	2.68	261.12	4,752.72	-734.54	-2,025.07	2,154.16	1.39	-1.26	10.63	
5,405.52	2.18	256.54	4,836.16	-735.21	-2,028.54	2,157.65	0.64	-0.60	-5.49	
<b>GM 422-8 BTV</b>										
5,417.00	2.11	255.74	4,847.63	-735.31	-2,028.96	2,158.07	0.64	-0.59	-6.96	
5,511.00	1.81	243.26	4,941.58	-736.40	-2,031.96	2,161.27	0.55	-0.32	-13.28	
5,605.00	0.14	333.75	5,035.56	-736.97	-2,033.34	2,162.76	1.93	-1.78	96.27	
5,699.00	0.62	175.52	5,129.56	-737.37	-2,033.35	2,162.91	0.80	0.51	-168.33	
5,793.00	1.28	179.03	5,223.55	-738.93	-2,033.29	2,163.39	0.70	0.70	3.73	
5,888.00	1.79	177.93	5,318.51	-741.47	-2,033.22	2,164.20	0.54	0.54	-1.16	
5,982.00	1.46	254.79	5,412.48	-743.26	-2,034.32	2,165.85	2.17	-0.35	81.77	
6,077.00	1.47	242.60	5,507.45	-744.13	-2,036.57	2,168.26	0.33	0.01	-12.83	
6,171.00	1.65	229.41	5,601.42	-745.57	-2,038.67	2,170.73	0.43	0.19	-14.03	
6,265.00	1.68	232.77	5,695.38	-747.28	-2,040.80	2,173.31	0.11	0.03	3.57	
6,359.00	2.32	225.29	5,789.32	-749.46	-2,043.25	2,176.36	0.73	0.68	-7.96	
6,454.00	3.10	218.71	5,884.22	-752.81	-2,046.22	2,180.31	0.88	0.82	-6.93	
6,548.00	3.48	225.05	5,978.06	-756.81	-2,049.83	2,185.07	0.56	0.40	6.74	
6,642.00	3.77	225.27	6,071.87	-761.00	-2,054.04	2,190.47	0.31	0.31	0.23	
6,736.00	3.76	228.53	6,165.67	-765.22	-2,058.55	2,196.16	0.23	-0.01	3.47	
6,831.00	3.76	229.48	6,260.46	-769.30	-2,063.25	2,201.98	0.07	0.00	1.00	
6,925.00	5.46	219.95	6,354.16	-774.74	-2,068.46	2,208.74	1.98	1.81	-10.14	
7,019.00	4.75	222.43	6,447.79	-781.04	-2,073.96	2,216.08	0.79	-0.76	2.64	
7,079.00	4.75	222.43	6,507.58	-784.70	-2,077.31	2,220.49	0.00	0.00	0.00	
<b>Last SDI Production MWD Survey</b>										
7,135.00	4.75	222.43	6,563.39	-788.13	-2,080.44	2,224.60	0.00	0.00	0.00	
<b>Projection to TD - GM 422-8 PBHL</b>										



# Scientific Drilling, Intl

## Survey Report

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 422-8 - Slot GM 422-8 (A2)
<b>Project:</b>	Garfield County, CO NAD83	<b>TVD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Site:</b>	MV 60-8D Pad	<b>MD Reference:</b>	GL 6175' & RKB 24' @ 6199.00usft
<b>Well:</b>	GM 422-8	<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)	
130.00	129.98	1.74	-0.74	First SDI Gyro MWD Survey
401.00	399.10	3.97	-28.35	Last SDI Gyro MWD Survey
473.00	469.14	0.05	-44.50	First SDI Surface MWD Survey
967.00	921.48	-85.26	-218.85	Last SDI Surface MWD Survey
1,079.00	1,016.16	-108.24	-274.08	First SDI Production MWD Survey
7,079.00	6,507.58	-784.70	-2,077.31	Last SDI Production MWD Survey
7,135.00	6,563.39	-788.13	-2,080.44	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------