

+N/-S	+E/-W	North	Easting	Latitude	Longitude	Slot
0.00	0.00	1601158.55	2257369.61	39.4544332	-108.1303847	GM 12-8 (B8)

#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 12-8 - Slot GM 12-8 (B8), True North  
 Vertical (TVD) Reference: GL 6175' & RKB 24' @ 6199.00usft  
 Section (VS) Reference: Slot - GM 12-8 (B8)(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

11:00, December 28 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

<b>Operator</b>	TEP Rocky Mountain, LLC.
<b>Well Name &amp; No.</b>	GM 12-8
<b>County &amp; State</b>	Garfield County, CO
<b>SDI Job No.</b>	OP.014857
<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 122 feet to a measured depth of 7,140 feet is true and correct as determined from all available records.

  
Signature

28-Dec-18

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 12-8 - Slot GM 12-8 (B8)
<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 12-8	<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 12-8 - Slot GM 12-8 (B8)				
Well Position	+N/-S	0.00 usft	Northing:	1,601,158.55 usft	Latitude:	39.4544332
	+E/-W	0.00 usft	Easting:	2,257,369.61 usft	Longitude:	-108.1303847
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	12/11/2018	9.48	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	285.30	

<b>Survey Program</b>	<b>Date</b>	12/28/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
122.00	384.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
476.00	935.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,082.00	7,140.00	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	
122.00	1.50	251.98	121.99	-0.49	-1.52	1.33	1.23	1.23	0.00	
<b>First SDI Gyro MWD Survey</b>										
219.00	7.13	272.20	218.68	-0.66	-8.75	8.26	5.92	5.80	20.85	
311.00	10.12	281.69	309.63	1.20	-22.37	21.90	3.59	3.25	10.32	
384.00	11.96	288.75	381.28	4.93	-35.82	35.85	3.12	2.52	9.67	
<b>Last SDI Gyro MWD Survey</b>										
476.00	13.60	287.72	471.00	11.29	-55.15	56.17	1.80	1.78	-1.12	

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 12-8 - Slot GM 12-8 (B8)
<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 12-8	<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>									
568.00	15.31	287.94	560.08	18.32	-77.01	79.11	1.86	1.86	0.24
660.00	16.78	287.58	648.49	26.08	-101.22	104.52	1.60	1.60	-0.39
751.00	18.90	283.88	735.12	33.58	-128.06	132.38	2.64	2.33	-4.07
843.00	22.41	283.64	821.19	41.29	-159.58	164.82	3.82	3.82	-0.26
935.00	26.29	283.09	904.99	50.05	-196.48	202.72	4.22	4.22	-0.60
<b>Last SDI Surface MWD Survey</b>									
1,082.00	30.19	283.34	1,034.47	65.95	-264.17	272.21	2.65	2.65	0.17
<b>First SDI Production MWD Survey</b>									
1,176.00	33.52	284.81	1,114.30	78.04	-312.28	321.80	3.64	3.54	1.56
1,270.00	35.07	284.44	1,191.96	91.41	-363.53	374.76	1.66	1.65	-0.39
1,364.00	35.17	284.84	1,268.84	105.08	-415.85	428.84	0.27	0.11	0.43
1,459.00	35.03	286.67	1,346.57	119.91	-468.42	483.46	1.12	-0.15	1.93
1,553.00	32.91	286.13	1,424.52	134.75	-518.80	535.97	2.28	-2.26	-0.57
1,647.00	33.23	285.66	1,503.29	148.79	-568.13	587.25	0.44	0.34	-0.50
1,742.00	31.47	286.16	1,583.55	162.72	-617.01	638.08	1.87	-1.85	0.53
1,836.00	31.92	284.56	1,663.53	175.80	-664.63	687.47	1.01	0.48	-1.70
1,930.00	32.08	285.06	1,743.25	188.53	-712.79	737.28	0.33	0.17	0.53
2,025.00	32.13	283.85	1,823.72	201.13	-761.68	787.76	0.68	0.05	-1.27
2,119.00	32.98	286.95	1,902.95	214.58	-810.43	838.32	1.99	0.90	3.30
2,213.00	33.63	287.59	1,981.52	229.90	-859.71	889.91	0.79	0.69	0.68
2,307.00	34.40	286.45	2,059.43	245.29	-909.99	942.47	1.06	0.82	-1.21
2,402.00	34.67	285.27	2,137.69	260.00	-961.80	996.32	0.76	0.28	-1.24
2,496.00	35.17	284.32	2,214.77	273.74	-1,013.82	1,050.12	0.79	0.53	-1.01
2,591.00	34.20	282.92	2,292.88	286.48	-1,066.36	1,104.16	1.32	-1.02	-1.47
2,685.00	33.67	283.49	2,370.87	298.46	-1,117.45	1,156.60	0.66	-0.56	0.61
2,779.00	34.20	282.98	2,448.86	310.48	-1,168.53	1,209.04	0.64	0.56	-0.54
2,874.00	33.84	283.66	2,527.60	322.72	-1,220.25	1,262.16	0.55	-0.38	0.72
2,968.00	33.24	285.38	2,605.95	335.74	-1,270.52	1,314.08	1.20	-0.64	1.83
3,062.00	32.21	288.48	2,685.04	350.51	-1,319.13	1,364.87	2.09	-1.10	3.30
3,156.00	32.20	287.59	2,764.58	366.02	-1,366.76	1,414.90	0.50	-0.01	-0.95
3,250.00	32.49	288.41	2,843.99	381.56	-1,414.59	1,465.14	0.56	0.31	0.87
3,345.00	33.13	288.27	2,923.84	397.76	-1,463.45	1,516.54	0.68	0.67	-0.15
3,439.00	34.15	288.49	3,002.09	414.18	-1,512.87	1,568.54	1.09	1.09	0.23
3,533.00	33.16	288.57	3,080.34	430.73	-1,562.26	1,620.55	1.05	-1.05	0.09
3,628.00	33.83	288.48	3,159.56	447.39	-1,611.97	1,672.89	0.71	0.71	-0.09
3,722.00	33.06	287.61	3,238.00	463.44	-1,661.23	1,724.64	0.96	-0.82	-0.93
3,816.00	33.01	287.17	3,316.80	478.76	-1,710.13	1,775.85	0.26	-0.05	-0.47
3,911.00	31.64	287.73	3,397.08	493.99	-1,758.59	1,826.61	1.48	-1.44	0.59
4,005.00	30.32	286.21	3,477.67	508.12	-1,804.86	1,874.97	1.63	-1.40	-1.62
4,099.00	28.03	285.29	3,559.73	520.57	-1,848.96	1,920.79	2.48	-2.44	-0.98
4,194.00	26.93	285.17	3,644.01	532.08	-1,891.25	1,964.62	1.16	-1.16	-0.13
4,288.00	25.81	285.44	3,728.23	543.10	-1,931.52	2,006.37	1.20	-1.19	0.29
4,382.00	23.41	285.39	3,813.69	553.51	-1,969.26	2,045.52	2.55	-2.55	-0.05

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 12-8 - Slot GM 12-8 (B8)
<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 12-8	<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)
4,477.00	21.48	285.12	3,901.49	563.05	-2,004.25	2,081.79	2.03	-2.03	-0.28
4,571.00	19.88	286.58	3,989.43	572.10	-2,036.18	2,114.98	1.79	-1.70	1.55
4,665.00	18.19	286.70	4,078.28	580.88	-2,065.55	2,145.63	1.80	-1.80	0.13
4,759.00	16.19	287.91	4,168.08	589.13	-2,092.08	2,173.39	2.16	-2.13	1.29
4,854.00	15.48	286.07	4,259.48	596.71	-2,116.87	2,199.29	0.92	-0.75	-1.94
4,948.00	14.86	286.11	4,350.20	603.53	-2,140.50	2,223.89	0.66	-0.66	0.04
5,042.00	13.59	285.80	4,441.32	609.88	-2,162.71	2,246.99	1.35	-1.35	-0.33
5,137.00	12.29	285.59	4,533.90	615.64	-2,183.19	2,268.26	1.37	-1.37	-0.22
5,231.00	10.53	283.45	4,626.04	620.32	-2,201.18	2,286.85	1.93	-1.87	-2.28
5,326.00	8.42	278.66	4,719.74	623.39	-2,216.50	2,302.44	2.37	-2.22	-5.04
5,420.00	7.08	276.90	4,812.88	625.12	-2,229.05	2,315.00	1.45	-1.43	-1.87
5,459.07	6.62	277.01	4,851.67	625.69	-2,233.68	2,319.61	1.17	-1.17	0.28
<b>GM 12-8 BTV</b>									
5,514.00	5.98	277.19	4,906.27	626.43	-2,239.66	2,325.58	1.17	-1.17	0.33
5,608.00	5.28	270.69	4,999.82	627.10	-2,248.85	2,334.62	1.01	-0.74	-6.91
5,702.00	4.91	268.48	5,093.44	627.04	-2,257.19	2,342.65	0.45	-0.39	-2.35
5,796.00	2.73	275.52	5,187.23	627.15	-2,263.44	2,348.71	2.37	-2.32	7.49
5,891.00	1.40	297.38	5,282.17	627.90	-2,266.73	2,352.07	1.60	-1.40	23.01
5,985.00	0.44	269.08	5,376.16	628.42	-2,268.11	2,353.54	1.10	-1.02	-30.11
6,080.00	0.35	234.83	5,471.15	628.25	-2,268.71	2,354.08	0.26	-0.09	-36.05
6,174.00	0.66	221.61	5,565.15	627.68	-2,269.30	2,354.50	0.35	0.33	-14.06
6,268.00	0.92	221.22	5,659.14	626.71	-2,270.16	2,355.07	0.28	0.28	-0.41
6,362.00	1.05	222.59	5,753.13	625.51	-2,271.24	2,355.80	0.14	0.14	1.46
6,457.00	1.22	225.32	5,848.11	624.16	-2,272.55	2,356.70	0.19	0.18	2.87
6,551.00	1.31	230.19	5,942.08	622.76	-2,274.08	2,357.82	0.15	0.10	5.18
6,645.00	1.71	233.65	6,036.05	621.24	-2,276.04	2,359.30	0.44	0.43	3.68
6,739.00	1.62	235.32	6,130.01	619.66	-2,278.26	2,361.03	0.11	-0.10	1.78
6,834.00	1.60	226.39	6,224.97	617.98	-2,280.33	2,362.57	0.26	-0.02	-9.40
6,928.00	1.74	219.00	6,318.94	615.96	-2,282.17	2,363.82	0.27	0.15	-7.86
7,022.00	1.80	224.22	6,412.89	613.80	-2,284.10	2,365.11	0.18	0.06	5.55
7,080.00	2.02	221.21	6,470.86	612.38	-2,285.41	2,366.00	0.42	0.38	-5.19
<b>Last SDI Production MWD Survey</b>									
7,140.00	2.02	221.21	6,530.82	610.78	-2,286.80	2,366.92	0.00	0.00	0.00
<b>Projection to TD - GM 12-8 PBHL</b>									



Scientific Drilling, Intl  
Survey Report

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 12-8 - Slot GM 12-8 (B8)
<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 12-8	<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)	
122.00	121.99	-0.49	-1.52	First SDI Gyro MWD Survey
384.00	381.28	4.93	-35.82	Last SDI Gyro MWD Survey
476.00	471.00	11.29	-55.15	First SDI Surface MWD Survey
935.00	904.99	50.05	-196.48	Last SDI Surface MWD Survey
1,082.00	1,034.47	65.95	-264.17	First SDI Production MWD Survey
7,080.00	6,470.86	612.38	-2,285.41	Last SDI Production MWD Survey
7,140.00	6,530.82	610.78	-2,286.80	Projection to TD

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