



#### Well Details: GM 511-8

TVD Reference: GL 6175' & RKB 24' @ 6199.00usft  
 +N/-S +E/-W Northing Easting Latitude Longitude Slot  
 0.00 0.00 1601165.98 2257370.64 39.4544537 -108.1303818 GM 511-8 (B9)

#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 511-8 - Slot GM 511-8 (B9), True North  
 Vertical (TVD) Reference: GL 6175' & RKB 24' @ 6199.00usft  
 Section (VS) Reference: Slot - GM 511-8 (B9)(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

11:04, January 02 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 511-8
<b>County &amp; State</b>	Garfield County, CO
<b>SDI Job No.</b>	OP.014916
<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 129 feet to a measured depth of 7,213 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

02-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 511-8 - Slot GM 511-8 (B9)
<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 511-8	<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 511-8 - Slot GM 511-8 (B9)				
Well Position	+N/-S	0.00 usft	Northing:	1,601,165.98 usft	Latitude:	39.4544537
	+E/-W	0.00 usft	Easting:	2,257,370.64 usft	Longitude:	-108.1303818
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	12/16/2018	9.48	65.67	51,621

<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	292.24	

<b>Survey Program</b>	<b>Date</b>	12/27/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
129.00	129.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
198.00	964.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
1,078.00	7,213.00	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	
129.00	1.06	307.44	128.99	0.73	-0.95	1.15	0.82	0.82	0.00	
<b>SDI Gyro MWD Survey</b>										
198.00	2.76	292.78	197.95	1.76	-2.99	3.43	2.54	2.46	-21.25	
<b>First SDI Surface MWD Survey</b>										
290.00	4.78	298.89	289.75	4.47	-8.38	9.45	2.24	2.20	6.64	
382.00	7.34	283.49	381.23	7.69	-17.46	19.07	3.27	2.78	-16.74	
473.00	10.90	283.00	471.07	10.98	-31.50	33.31	3.91	3.91	-0.54	

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 511-8 - Slot GM 511-8 (B9)
<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 511-8	<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)
566.00	13.54	284.67	561.95	15.72	-50.60	52.79	2.86	2.84	1.80
657.00	16.36	286.46	649.86	22.05	-73.20	76.10	3.14	3.10	1.97
749.00	18.82	288.45	737.56	30.42	-99.71	103.80	2.75	2.67	2.16
840.00	21.96	291.10	822.85	41.19	-129.52	135.47	3.60	3.45	2.91
933.00	24.80	293.15	908.20	55.12	-163.68	172.37	3.18	3.05	2.20
964.00	26.10	295.01	936.19	60.56	-175.84	185.68	4.92	4.19	6.00
Last SDI Surface MWD Survey									
1,078.00	27.81	297.00	1,037.81	83.24	-222.26	237.23	1.70	1.50	1.75
First SDI Production MWD Survey									
1,172.00	29.75	293.80	1,120.20	102.61	-263.14	282.40	2.63	2.06	-3.40
1,266.00	32.27	292.54	1,200.76	121.64	-307.67	330.82	2.77	2.68	-1.34
1,361.00	30.78	291.33	1,281.74	140.21	-353.74	380.49	1.70	-1.57	-1.27
1,455.00	31.89	294.27	1,362.03	159.16	-398.78	429.36	2.01	1.18	3.13
1,550.00	32.98	293.92	1,442.21	179.96	-445.29	480.28	1.16	1.15	-0.37
1,644.00	33.97	294.50	1,520.61	201.23	-492.58	532.10	1.11	1.05	0.62
1,738.00	35.01	294.13	1,598.09	223.14	-541.09	585.29	1.13	1.11	-0.39
1,832.00	35.58	292.17	1,674.81	244.48	-591.02	639.59	1.35	0.61	-2.09
1,927.00	35.82	291.07	1,751.96	264.91	-642.56	695.02	0.72	0.25	-1.16
2,021.00	34.70	291.41	1,828.72	284.56	-693.14	749.28	1.21	-1.19	0.36
2,115.00	34.97	293.58	1,905.87	305.11	-742.74	802.96	1.35	0.29	2.31
2,209.00	34.27	294.13	1,983.23	326.70	-791.58	856.34	0.82	-0.74	0.59
2,304.00	34.50	294.40	2,061.63	348.75	-840.49	909.96	0.29	0.24	0.28
2,398.00	35.12	295.10	2,138.81	371.22	-889.22	963.57	0.78	0.66	0.74
2,493.00	35.17	295.64	2,216.49	394.65	-938.63	1,018.17	0.33	0.05	0.57
2,587.00	35.52	293.09	2,293.17	417.08	-988.16	1,072.50	1.61	0.37	-2.71
2,682.00	34.35	292.67	2,371.05	438.23	-1,038.28	1,126.90	1.26	-1.23	-0.44
2,776.00	34.86	293.00	2,448.42	458.95	-1,087.48	1,180.28	0.58	0.54	0.35
2,870.00	34.28	290.97	2,525.82	478.92	-1,136.93	1,233.61	1.37	-0.62	-2.16
2,964.00	33.24	290.03	2,603.97	497.22	-1,185.85	1,285.82	1.24	-1.11	-1.00
3,059.00	34.00	290.30	2,683.08	515.35	-1,235.23	1,338.39	0.82	0.80	0.28
3,152.00	34.24	290.55	2,760.07	533.56	-1,284.11	1,390.53	0.30	0.26	0.27
3,247.00	34.47	292.05	2,838.50	553.03	-1,334.06	1,444.13	0.92	0.24	1.58
3,341.00	35.49	292.28	2,915.52	573.36	-1,383.96	1,498.02	1.09	1.09	0.24
3,435.00	35.17	292.80	2,992.21	594.20	-1,434.17	1,552.37	0.47	-0.34	0.55
3,530.00	34.03	293.08	3,070.41	615.22	-1,483.85	1,606.31	1.21	-1.20	0.29
3,624.00	35.08	293.65	3,147.82	636.37	-1,532.79	1,659.62	1.17	1.12	0.61
3,718.00	33.80	293.47	3,225.34	657.62	-1,581.52	1,712.76	1.37	-1.36	-0.19
3,813.00	35.54	293.63	3,303.47	679.21	-1,631.06	1,766.79	1.83	1.83	0.17
3,907.00	34.92	293.13	3,380.25	700.73	-1,680.83	1,821.00	0.73	-0.66	-0.53
4,001.00	33.47	293.33	3,458.00	721.57	-1,729.37	1,873.82	1.55	-1.54	0.21
4,096.00	30.44	293.10	3,538.60	741.39	-1,775.57	1,924.09	3.19	-3.19	-0.24
4,190.00	29.33	293.93	3,620.10	760.07	-1,818.52	1,970.91	1.26	-1.18	0.88
4,284.00	27.15	293.95	3,702.90	778.12	-1,859.17	2,015.37	2.32	-2.32	0.02
4,378.00	26.03	294.05	3,786.96	795.23	-1,897.61	2,057.42	1.19	-1.19	0.11

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 511-8 - Slot GM 511-8 (B9)
<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 511-8	<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)
4,473.00	24.45	293.71	3,872.89	811.63	-1,934.64	2,097.91	1.67	-1.66	-0.36
4,567.00	22.36	292.90	3,959.15	826.41	-1,968.93	2,135.24	2.25	-2.22	-0.86
4,662.00	22.21	292.00	4,047.05	840.17	-2,002.22	2,171.26	0.39	-0.16	-0.95
4,756.00	20.43	291.03	4,134.62	852.71	-2,034.01	2,205.44	1.93	-1.89	-1.03
4,850.00	18.66	291.09	4,223.20	864.01	-2,063.36	2,236.88	1.88	-1.88	0.06
4,944.00	18.96	293.06	4,312.18	875.40	-2,091.44	2,267.18	0.75	0.32	2.10
5,038.00	17.00	292.37	4,401.58	886.62	-2,118.20	2,296.19	2.10	-2.09	-0.73
5,133.00	16.88	292.22	4,492.46	897.12	-2,143.81	2,323.87	0.13	-0.13	-0.16
5,228.00	13.97	291.30	4,584.03	906.50	-2,167.27	2,349.14	3.07	-3.06	-0.97
5,322.00	12.40	293.54	4,675.55	914.65	-2,187.09	2,370.57	1.76	-1.67	2.38
5,416.00	10.29	294.33	4,767.71	922.14	-2,204.00	2,389.06	2.25	-2.24	0.84
5,505.30	7.59	294.41	4,855.92	927.87	-2,216.64	2,402.92	3.02	-3.02	0.09
GM 511-8 BTV									
5,510.00	7.45	294.42	4,860.57	928.12	-2,217.20	2,403.54	3.02	-3.02	0.13
5,604.00	5.28	303.30	4,953.99	933.02	-2,226.37	2,413.87	2.53	-2.31	9.45
5,698.00	3.43	305.06	5,047.72	937.01	-2,232.28	2,420.86	1.97	-1.97	1.87
5,793.00	1.54	300.62	5,142.62	939.29	-2,235.71	2,424.90	2.00	-1.99	-4.67
5,887.00	0.31	344.76	5,236.61	940.18	-2,236.86	2,426.30	1.42	-1.31	46.96
5,982.00	1.00	226.28	5,331.60	939.86	-2,237.53	2,426.79	1.24	0.73	-124.72
6,076.00	1.03	200.61	5,425.59	938.50	-2,238.42	2,427.10	0.48	0.03	-27.31
6,170.00	1.46	227.74	5,519.57	936.90	-2,239.60	2,427.60	0.76	0.46	28.86
6,264.00	1.92	221.75	5,613.53	934.92	-2,241.54	2,428.64	0.52	0.49	-6.37
6,359.00	0.82	212.51	5,708.50	933.16	-2,242.96	2,429.29	1.18	-1.16	-9.73
6,453.00	1.50	182.17	5,802.48	931.36	-2,243.37	2,428.99	0.95	0.72	-32.28
6,547.00	1.78	191.55	5,896.44	928.70	-2,243.71	2,428.29	0.41	0.30	9.98
6,642.00	1.61	184.59	5,991.40	925.93	-2,244.11	2,427.62	0.28	-0.18	-7.33
6,736.00	0.92	150.59	6,085.38	923.96	-2,243.85	2,426.62	1.05	-0.73	-36.17
6,830.00	0.82	135.88	6,179.37	922.82	-2,243.01	2,425.42	0.26	-0.11	-15.65
6,925.00	0.67	177.93	6,274.36	921.77	-2,242.51	2,424.56	0.58	-0.16	44.26
7,019.00	1.40	208.34	6,368.34	920.21	-2,243.04	2,424.46	0.95	0.78	32.35
7,113.00	1.93	216.46	6,462.30	917.93	-2,244.53	2,424.97	0.62	0.56	8.64
7,153.00	1.85	217.78	6,502.28	916.88	-2,245.32	2,425.31	0.23	-0.20	3.30
Last SDI Production MWD Survey									
7,213.00	1.85	217.78	6,562.25	915.35	-2,246.51	2,425.83	0.00	0.00	0.00
Projection to TD - GM 511-8 PBHL									



Scientific Drilling, Intl  
Survey Report

<b>Company:</b>	TEP Rocky Mountain LLC	<b>Local Co-ordinate Reference:</b>	Well GM 511-8 - Slot GM 511-8 (B9)
<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 511-8	<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)	
129.00	128.99	0.73	-0.95	SDI Gyro MWD Survey
198.00	197.95	1.76	-2.99	First SDI Surface MWD Survey
964.00	936.19	60.56	-175.84	Last SDI Surface MWD Survey
1,078.00	1,037.81	83.24	-222.26	First SDI Production MWD Survey
7,153.00	6,502.28	916.88	-2,245.32	Last SDI Production MWD Survey
7,213.00	6,562.25	915.35	-2,246.51	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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