



Well Details: GM 13-8

TVD Reference: GL 6175' & RKB 24' @ 6199.00usft		Grid Level: 6175.00		Slot	
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	1601105.17	2257372.30	39.4542869	-108.1303697

GM 13-8 (A1)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 13-8 - Slot GM 13-8 (A1), True North
 Vertical (TVD) Reference: GL 6175' & RKB 24' @ 6199.00usft
 Section (VS) Reference: Slot - GM 13-8 (A1)(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

15:02, January 18 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

Operator	TEP Rocky Mountain, LLC.
Well Name & No.	GM 13-8
County & State	Garfield County, CO
SDI Job No.	OP.015068
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 130 feet to a measured depth of 7,200 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

18-Jan-19

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 13-8 - Slot GM 13-8 (A1)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Site:	MV 60-8D Pad	MD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Well:	GM 13-8	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		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 13-8 - Slot GM 13-8 (A1)					
Well Position	+N/-S	0.00 usft	Northing:	1,601,105.17 usft	Latitude:	39.4542869
	+E/-W	0.00 usft	Easting:	2,257,372.30 usft	Longitude:	-108.1303697
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	6,175.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	1/8/2019	9.47	65.67	51,613

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	243.71	

Survey Program	Date	1/18/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
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	
1,077.00	7,200.00	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	
130.00	0.35	145.11	130.00	-0.33	0.23	-0.06	0.27	0.27	0.00	
First SDI Gyro MWD Survey										
218.00	1.14	248.99	217.99	-0.86	-0.44	0.77	1.44	0.90	118.05	
310.00	4.05	261.47	309.89	-1.67	-4.50	4.78	3.20	3.16	13.57	
401.00	7.74	247.32	400.40	-4.51	-13.34	13.96	4.33	4.05	-15.55	
Last SDI Gyro MWD Survey										
473.00	10.77	245.60	471.45	-9.16	-23.94	25.52	4.23	4.21	-2.39	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 13-8 - Slot GM 13-8 (A1)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Site:	MV 60-8D Pad	MD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Well:	GM 13-8	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)
First SDI Surface MWD Survey									
565.00	13.74	240.30	561.35	-18.13	-41.27	45.03	3.45	3.23	-5.76
657.00	17.03	239.35	650.04	-30.41	-62.35	69.37	3.59	3.58	-1.03
749.00	19.00	240.98	737.53	-44.55	-87.04	97.77	2.21	2.14	1.77
840.00	21.62	245.57	822.87	-58.67	-115.26	129.33	3.37	2.88	5.04
933.00	25.50	245.47	908.10	-74.07	-149.09	166.47	4.17	4.17	-0.11
967.00	27.01	244.90	938.59	-80.39	-162.74	181.51	4.50	4.44	-1.68
Last SDI Surface MWD Survey									
1,077.00	28.56	246.01	1,035.90	-101.67	-209.38	232.76	1.49	1.41	1.01
First SDI Production MWD Survey									
1,171.00	29.56	244.72	1,118.07	-120.71	-250.88	278.39	1.26	1.06	-1.37
1,266.00	31.35	244.19	1,199.96	-141.48	-294.32	326.54	1.91	1.88	-0.56
1,360.00	32.50	244.10	1,279.74	-163.16	-339.05	376.25	1.22	1.22	-0.10
1,454.00	34.14	243.32	1,358.29	-186.03	-385.34	427.88	1.80	1.74	-0.83
1,549.00	33.81	243.21	1,437.07	-209.92	-432.75	480.97	0.35	-0.35	-0.12
1,643.00	34.86	242.34	1,514.69	-234.18	-479.89	533.98	1.23	1.12	-0.93
1,737.00	34.21	242.49	1,592.12	-258.85	-527.13	587.25	0.70	-0.69	0.16
1,831.00	33.76	242.25	1,670.07	-283.22	-573.68	639.78	0.50	-0.48	-0.26
1,926.00	33.01	241.83	1,749.39	-307.73	-619.85	692.03	0.83	-0.79	-0.44
2,020.00	33.57	240.87	1,827.96	-332.47	-665.13	743.58	0.82	0.60	-1.02
2,114.00	32.97	240.35	1,906.56	-357.77	-710.06	795.07	0.71	-0.64	-0.55
2,209.00	32.65	240.18	1,986.40	-383.30	-754.75	846.46	0.35	-0.34	-0.18
2,303.00	33.05	241.47	2,065.37	-408.15	-799.27	897.38	0.86	0.43	1.37
2,397.00	33.29	242.18	2,144.05	-432.44	-844.61	948.78	0.49	0.26	0.76
2,491.00	32.96	241.77	2,222.78	-456.57	-889.95	1,000.12	0.42	-0.35	-0.44
2,586.00	33.88	241.11	2,302.07	-481.59	-935.91	1,052.40	1.04	0.97	-0.69
2,680.00	34.31	240.84	2,379.91	-507.16	-981.98	1,105.04	0.48	0.46	-0.29
2,775.00	33.63	239.81	2,458.70	-533.43	-1,028.10	1,158.02	0.94	-0.72	-1.08
2,869.00	33.01	240.14	2,537.25	-559.27	-1,072.81	1,209.55	0.69	-0.66	0.35
2,963.00	32.50	240.27	2,616.30	-584.54	-1,116.94	1,260.31	0.55	-0.54	0.14
3,058.00	33.06	240.11	2,696.17	-610.11	-1,161.57	1,311.65	0.60	0.59	-0.17
3,152.00	33.72	241.24	2,774.65	-635.44	-1,206.68	1,363.31	0.96	0.70	1.20
3,246.00	34.14	241.98	2,852.65	-660.39	-1,252.83	1,415.74	0.63	0.45	0.79
3,340.00	34.63	243.43	2,930.22	-684.73	-1,300.01	1,468.81	1.02	0.52	1.54
3,434.00	34.65	242.56	3,007.56	-708.99	-1,347.61	1,522.24	0.53	0.02	-0.93
3,529.00	34.21	241.00	3,085.92	-734.38	-1,394.94	1,575.92	1.04	-0.46	-1.64
3,623.00	33.29	241.35	3,164.08	-759.56	-1,440.69	1,628.09	1.00	-0.98	0.37
3,717.00	32.13	242.06	3,243.17	-783.64	-1,485.41	1,678.85	1.30	-1.23	0.76
3,812.00	31.34	243.03	3,323.97	-806.68	-1,529.75	1,728.81	0.99	-0.83	1.02
3,906.00	30.20	243.56	3,404.73	-828.30	-1,572.71	1,776.90	1.25	-1.21	0.56
4,001.00	28.65	243.70	3,487.48	-849.03	-1,614.52	1,823.57	1.63	-1.63	0.15
4,095.00	26.95	244.17	3,570.62	-868.29	-1,653.90	1,867.41	1.82	-1.81	0.50
4,189.00	25.23	245.24	3,655.04	-885.97	-1,691.27	1,908.74	1.90	-1.83	1.14
4,283.00	23.53	245.04	3,740.66	-902.28	-1,726.47	1,947.52	1.81	-1.81	-0.21

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 13-8 - Slot GM 13-8 (A1)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Site:	MV 60-8D Pad	MD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Well:	GM 13-8	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)
4,378.00	23.50	244.88	3,827.77	-918.32	-1,760.82	1,985.42	0.07	-0.03	-0.17
4,472.00	21.96	245.68	3,914.47	-933.52	-1,793.80	2,021.72	1.67	-1.64	0.85
4,566.00	20.25	247.59	4,002.16	-946.96	-1,824.86	2,055.52	1.96	-1.82	2.03
4,661.00	18.59	247.71	4,091.75	-958.97	-1,854.07	2,087.03	1.75	-1.75	0.13
4,755.00	16.96	247.09	4,181.26	-969.99	-1,880.57	2,115.67	1.75	-1.73	-0.66
4,849.00	15.42	247.09	4,271.53	-980.19	-1,904.71	2,141.83	1.64	-1.64	0.00
4,944.00	13.74	245.52	4,363.47	-989.78	-1,926.61	2,165.72	1.82	-1.77	-1.65
5,038.00	13.33	243.26	4,454.86	-999.29	-1,946.45	2,187.71	0.71	-0.44	-2.40
5,132.00	12.90	244.58	4,546.40	-1,008.67	-1,965.60	2,209.04	0.56	-0.46	1.40
5,232.00	11.69	240.78	4,644.11	-1,018.40	-1,984.53	2,230.32	1.46	-1.21	-3.80
5,327.00	9.67	237.92	4,737.46	-1,027.34	-1,999.69	2,247.87	2.20	-2.13	-3.01
5,395.61	7.95	234.69	4,805.26	-1,033.14	-2,008.44	2,258.29	2.61	-2.51	-4.70
GM 13-8 BTV									
5,421.00	7.32	233.12	4,830.42	-1,035.13	-2,011.17	2,261.61	2.61	-2.48	-6.20
5,516.00	5.34	232.41	4,924.84	-1,041.46	-2,019.52	2,271.90	2.09	-2.08	-0.75
5,610.00	3.39	231.83	5,018.56	-1,045.84	-2,025.17	2,278.91	2.07	-2.07	-0.62
5,704.00	0.40	359.43	5,112.51	-1,047.23	-2,027.36	2,281.49	3.88	-3.18	135.74
5,798.00	0.57	8.23	5,206.51	-1,046.44	-2,027.29	2,281.08	0.20	0.18	9.36
5,892.00	0.44	40.67	5,300.51	-1,045.71	-2,026.99	2,280.48	0.33	-0.14	34.51
5,987.00	0.74	178.69	5,395.50	-1,046.04	-2,026.74	2,280.41	1.17	0.32	145.28
6,082.00	1.87	208.96	5,490.48	-1,048.01	-2,027.47	2,281.94	1.35	1.19	31.86
6,177.00	0.07	69.92	5,585.46	-1,049.35	-2,028.17	2,283.15	2.02	-1.89	-146.36
6,271.00	0.20	228.71	5,679.46	-1,049.44	-2,028.24	2,283.26	0.28	0.14	168.93
6,365.00	0.71	214.50	5,773.46	-1,050.03	-2,028.69	2,283.92	0.55	0.54	-15.12
6,459.00	1.38	198.72	5,867.44	-1,051.58	-2,029.39	2,285.23	0.77	0.71	-16.79
6,553.00	1.95	188.17	5,961.40	-1,054.23	-2,029.98	2,286.94	0.69	0.61	-11.22
6,648.00	1.58	191.07	6,056.36	-1,057.12	-2,030.46	2,288.65	0.40	-0.39	3.05
6,742.00	1.46	194.36	6,150.32	-1,059.55	-2,031.00	2,290.21	0.16	-0.13	3.50
6,837.00	2.03	192.33	6,245.28	-1,062.37	-2,031.66	2,292.05	0.60	0.60	-2.14
6,931.00	2.89	192.93	6,339.19	-1,066.30	-2,032.55	2,294.59	0.92	0.91	0.64
7,025.00	2.99	193.45	6,433.07	-1,071.00	-2,033.65	2,297.65	0.11	0.11	0.55
7,119.00	2.97	194.23	6,526.94	-1,075.74	-2,034.82	2,300.80	0.05	-0.02	0.83
7,140.00	3.08	196.41	6,547.91	-1,076.81	-2,035.11	2,301.54	0.76	0.52	10.38
Last SDI Production MWD Survey									
7,200.00	3.08	196.41	6,607.82	-1,079.90	-2,036.02	2,303.73	0.00	0.00	0.00
Projection to TD - GM 13-8 PBHL									



Scientific Drilling, Intl
Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 13-8 - Slot GM 13-8 (A1)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Site:	MV 60-8D Pad	MD Reference:	GL 6175' & RKB 24' @ 6199.00usft
Well:	GM 13-8	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
130.00	130.00	-0.33	0.23	First SDI Gyro MWD Survey	
401.00	400.40	-4.51	-13.34	Last SDI Gyro MWD Survey	
473.00	471.45	-9.16	-23.94	First SDI Surface MWD Survey	
967.00	938.59	-80.39	-162.74	Last SDI Surface MWD Survey	
1,077.00	1,035.90	-101.67	-209.38	First SDI Production MWD Survey	
7,140.00	6,547.91	-1,076.81	-2,035.11	Last SDI Production MWD Survey	
7,200.00	6,607.82	-1,079.90	-2,036.02	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
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