

Well Details: GM 514-8	
TVD Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318) Grid Level: 6280.00 +N/-S +E/-W Northing Easting Latitude Longitude Slot 0.00 0.00 1599816.7300 2256666.9200 39.4506949 -108.1327345 GM 514-8 (B2)	
REFERENCE INFORMATION	
Co-ordinate (N/E) Reference: Well GM 514-8 - Slot GM 514-8 (B2), True North Vertical (TVD) Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318) Section (VS) Reference: Slot - GM 514-8 (B2)(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	
14:02, October 16 2019 Created By: Mel Mireles Jr.	

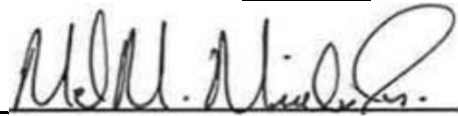


Directional Survey Certification

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 514-8
County & State	Garfield County, CO
SDI Job No.	OP.021542
Rig	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 6,950 feet is true and correct as determined from all available records.

	<u> 16-Oct-19 </u>
Signature	Date

Mel Mireles Jr.
Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District



Scientific Drilling, Intl Survey Report

Company: TEP Rocky Mountain LLC	Local Co-ordinate Reference: Well GM 514-8 - Slot GM 514-8 (B2)
Project: Garfield County, CO NAD83	TVD Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Site: GV 1-8 Pad	MD Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Well: GM 514-8	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 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 514-8 - Slot GM 514-8 (B2)			
Well Position	+N/-S 0.00 usft	Northing: 1,599,816.7300 usft	Latitude: 39.4506950
	+E/-W 0.00 usft	Easting: 2,256,666.9200 usft	Longitude: -108.1327345
Position Uncertainty	0.00 usft	Wellhead Elevation: 0.00 usft	Ground Level: 6,280.00 usft

Wellbore OH					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/9/2019	9.40	65.62	51,543

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	201.02

Survey Program		Date 10/16/2019
From (usft)	To (usft)	Survey (Wellbore)
120.00	764.00	Survey #1 - Gyro MWD Survey (OH)
838.00	960.00	Survey #2 - Surface MWD Survey (OH)
1,083.00	6,950.00	Survey #3 - Production MWD Survey (OH)
		Tool Name
		Gyro MWD 105
		MWD+HDGM
		MWD+HDGM
		Description
		Gyro MWD Error Model Ver 1.0.5
		OWSG 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	
120.00	0.26	326.78	120.00	0.23	-0.15	-0.16	0.22	0.22	0.00	
First SDI Gyro MWD Survey										
212.00	1.41	178.77	211.99	-0.73	-0.24	0.77	1.78	1.25	-160.88	
303.00	3.78	180.26	302.89	-4.85	-0.23	4.61	2.61	2.60	1.64	
395.00	7.21	190.90	394.46	-13.55	-1.33	13.13	3.87	3.73	11.57	
486.00	10.38	192.48	484.38	-27.17	-4.19	26.86	3.49	3.48	1.74	
578.00	13.81	201.71	574.33	-45.47	-10.04	46.05	4.27	3.73	10.03	
669.00	18.21	199.86	661.78	-68.94	-18.89	71.13	4.87	4.84	-2.03	



Scientific Drilling, Intl Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 514-8 - Slot GM 514-8 (B2)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Site:	GV 1-8 Pad	MD Reference:	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Well:	GM 514-8	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)	
764.00	22.70	203.55	750.77	-99.73	-31.27	104.31	4.92	4.73	3.88	
Last SDI Gyro MWD Survey										
838.00	25.68	201.18	818.27	-127.77	-42.77	134.61	4.23	4.03	-3.20	
First SDI Surface MWD Survey										
933.00	28.29	198.80	902.92	-168.29	-57.46	177.70	2.97	2.75	-2.51	
960.00	28.67	199.68	926.65	-180.44	-61.71	190.57	2.10	1.41	3.26	
Last SDI Surface MWD Survey										
1,083.00	30.23	202.09	1,033.76	-236.92	-83.29	251.03	1.59	1.27	1.96	
First SDI Production MWD Survey										
1,177.00	29.71	202.03	1,115.19	-280.44	-100.93	297.98	0.55	-0.55	-0.06	
1,272.00	28.10	200.11	1,198.35	-323.27	-117.45	343.89	1.96	-1.69	-2.02	
1,366.00	29.37	200.16	1,280.77	-365.70	-133.01	389.08	1.35	1.35	0.05	
1,460.00	28.53	198.27	1,363.03	-408.66	-147.99	434.55	1.32	-0.89	-2.01	
1,555.00	30.31	199.74	1,445.78	-452.77	-163.20	481.18	2.02	1.87	1.55	
1,649.00	29.41	200.99	1,527.30	-496.65	-179.48	527.97	1.16	-0.96	1.33	
1,744.00	28.99	200.12	1,610.23	-540.04	-195.75	574.32	0.63	-0.44	-0.92	
1,838.00	27.92	199.12	1,692.87	-582.22	-210.80	619.09	1.25	-1.14	-1.06	
1,933.00	28.96	200.65	1,776.40	-624.76	-226.19	664.32	1.34	1.09	1.61	
2,027.00	28.52	200.85	1,858.82	-667.03	-242.21	709.52	0.48	-0.47	0.21	
2,122.00	29.68	203.93	1,941.84	-709.73	-259.82	755.69	1.99	1.22	3.24	
2,216.00	28.47	204.12	2,023.99	-751.45	-278.42	801.31	1.29	-1.29	0.20	
2,311.00	29.28	203.50	2,107.18	-793.42	-296.93	847.13	0.91	0.85	-0.65	
2,405.00	28.16	203.54	2,189.61	-834.84	-314.96	892.25	1.19	-1.19	0.04	
2,499.00	28.35	203.74	2,272.41	-875.60	-332.80	936.71	0.23	0.20	0.21	
2,594.00	27.11	204.15	2,356.50	-916.00	-350.74	980.85	1.32	-1.31	0.43	
2,688.00	28.82	203.88	2,439.52	-956.26	-368.68	1,024.87	1.82	1.82	-0.29	
2,782.00	26.68	202.97	2,522.70	-996.42	-386.09	1,068.60	2.32	-2.28	-0.97	
2,877.00	27.73	201.98	2,607.19	-1,036.55	-402.68	1,112.01	1.20	1.11	-1.04	
2,971.00	28.70	200.67	2,690.02	-1,077.95	-418.83	1,156.45	1.22	1.03	-1.39	
3,065.00	27.22	200.94	2,773.05	-1,119.15	-434.49	1,200.52	1.58	-1.57	0.29	
3,160.00	28.64	200.04	2,856.98	-1,160.83	-450.05	1,245.01	1.56	1.49	-0.95	
3,254.00	27.71	199.82	2,939.84	-1,202.55	-465.18	1,289.39	1.00	-0.99	-0.23	
3,348.00	29.58	199.07	3,022.34	-1,245.05	-480.18	1,334.43	2.03	1.99	-0.80	
3,442.00	28.95	198.39	3,104.34	-1,288.56	-494.93	1,380.34	0.76	-0.67	-0.72	
3,536.00	28.38	197.74	3,186.82	-1,331.43	-508.92	1,425.37	0.69	-0.61	-0.69	
3,631.00	27.11	199.82	3,270.90	-1,373.30	-523.14	1,469.56	1.68	-1.34	2.19	
3,725.00	25.76	202.52	3,355.07	-1,412.32	-538.22	1,511.40	1.92	-1.44	2.87	
3,819.00	22.72	203.42	3,440.77	-1,447.85	-553.27	1,549.96	3.26	-3.23	0.96	
3,913.00	21.68	202.68	3,527.80	-1,480.53	-567.18	1,585.45	1.15	-1.11	-0.79	
4,007.00	20.65	201.62	3,615.46	-1,511.96	-579.98	1,619.38	1.17	-1.10	-1.13	
4,102.00	19.18	200.84	3,704.78	-1,542.12	-591.70	1,651.74	1.57	-1.55	-0.82	
4,196.00	18.85	199.36	3,793.65	-1,570.88	-602.23	1,682.36	0.62	-0.35	-1.57	
4,291.00	17.40	197.62	3,883.93	-1,598.90	-611.62	1,711.88	1.63	-1.53	-1.83	
4,385.00	17.19	200.51	3,973.68	-1,625.30	-620.74	1,739.80	0.94	-0.22	3.07	



Scientific Drilling, Intl
Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 514-8 - Slot GM 514-8 (B2)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Site:	GV 1-8 Pad	MD Reference:	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Well:	GM 514-8	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)	
4,479.00	16.13	199.42	4,063.74	-1,650.63	-629.95	1,766.75	1.18	-1.13	-1.16	
4,574.00	14.51	205.42	4,155.36	-1,673.83	-639.45	1,791.81	2.38	-1.71	6.32	
4,668.00	13.65	206.70	4,246.54	-1,694.37	-649.48	1,814.59	0.97	-0.91	1.36	
4,762.00	11.43	205.22	4,338.29	-1,712.71	-658.44	1,834.92	2.39	-2.36	-1.57	
4,857.00	9.44	203.72	4,431.72	-1,728.36	-665.58	1,852.09	2.11	-2.09	-1.58	
4,951.00	7.94	201.58	4,524.63	-1,741.46	-671.07	1,866.28	1.63	-1.60	-2.28	
5,046.00	6.04	206.02	4,618.92	-1,752.05	-675.68	1,877.82	2.08	-2.00	4.67	
5,140.00	3.71	194.18	4,712.58	-1,759.44	-678.59	1,885.77	2.69	-2.48	-12.60	
5,235.00	3.50	186.85	4,807.39	-1,765.30	-679.69	1,891.63	0.53	-0.22	-7.72	
5,304.81	3.51	188.84	4,877.07	-1,769.53	-680.28	1,895.79	0.18	0.02	2.84	
GM 514-8 BTV										
5,329.00	3.52	189.52	4,901.22	-1,771.00	-680.51	1,897.24	0.18	0.02	2.83	
5,423.00	1.57	204.18	4,995.12	-1,775.02	-681.52	1,901.36	2.17	-2.07	15.60	
5,517.00	0.31	325.38	5,089.11	-1,775.98	-682.19	1,902.50	1.86	-1.34	128.94	
5,612.00	0.20	17.85	5,184.11	-1,775.61	-682.28	1,902.19	0.26	-0.12	55.23	
5,706.00	0.42	181.81	5,278.11	-1,775.80	-682.24	1,902.35	0.65	0.23	174.43	
5,800.00	0.64	170.17	5,372.10	-1,776.66	-682.17	1,903.13	0.26	0.23	-12.38	
5,894.00	0.89	175.13	5,466.09	-1,777.91	-682.01	1,904.23	0.27	0.27	5.28	
5,989.00	0.81	165.55	5,561.08	-1,779.29	-681.78	1,905.44	0.17	-0.08	-10.08	
6,083.00	0.98	175.17	5,655.07	-1,780.74	-681.55	1,906.71	0.24	0.18	10.23	
6,178.00	1.28	198.82	5,750.05	-1,782.55	-681.82	1,908.50	0.58	0.32	24.89	
6,272.00	1.21	197.38	5,844.03	-1,784.49	-682.46	1,910.54	0.08	-0.07	-1.53	
6,367.00	1.13	200.60	5,939.01	-1,786.33	-683.09	1,912.48	0.11	-0.08	3.39	
6,461.00	1.04	206.01	6,033.00	-1,787.96	-683.79	1,914.25	0.14	-0.10	5.76	
6,556.00	0.09	229.05	6,127.99	-1,788.79	-684.22	1,915.18	1.01	-1.00	24.25	
6,650.00	0.33	210.17	6,221.99	-1,789.07	-684.42	1,915.51	0.26	0.26	-20.09	
6,745.00	1.02	208.09	6,316.98	-1,790.05	-684.95	1,916.62	0.73	0.73	-2.19	
6,839.00	1.74	217.64	6,410.95	-1,791.92	-686.22	1,918.82	0.80	0.77	10.16	
6,890.00	2.02	214.53	6,461.93	-1,793.27	-687.20	1,920.43	0.58	0.55	-6.10	
Last SDI Production MWD Survey										
6,950.00	2.02	214.53	6,521.89	-1,795.01	-688.40	1,922.49	0.00	0.00	0.00	
Projection to TD - GM 514-8 PBHL										



Scientific Drilling, Intl
Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 514-8 - Slot GM 514-8 (B2)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Site:	GV 1-8 Pad	MD Reference:	GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
Well:	GM 514-8	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		Comment	
		+N/-S (usft)	+E/-W (usft)		
120.00	120.00	0.23	-0.15	First SDI Gyro MWD Survey	
764.00	750.77	-99.73	-31.27	Last SDI Gyro MWD Survey	
838.00	818.27	-127.77	-42.77	First SDI Surface MWD Survey	
960.00	926.65	-180.44	-61.71	Last SDI Surface MWD Survey	
1,083.00	1,033.76	-236.92	-83.29	First SDI Production MWD Survey	
6,890.00	6,461.93	-1,793.27	-687.20	Last SDI Production MWD Survey	
6,950.00	6,521.89	-1,795.01	-688.40	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____