



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 411-10
County & State	Garfield County, CO
SDI Job No.	OP.002538
Rig	H&P 273

I, Mel Mireles Jr., having personal knowledge of all the facts, hereby certify that the attached directional survey run from a measured depth of 86 feet to a measured depth of 7,292 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

13-Jul-17

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well Federal GM 411-10 - Slot B8
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Site:	MV 5-10 Pad	MD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Well:	Federal GM 411-10	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 5-10 Pad			
Site Position:		Northing:	1,600,344.70 usft	Latitude:	39.4529509
From:	Map	Easting:	2,266,881.70 usft	Longitude:	-108.0966291
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.64 °

Well							Federal GM 411-10 - Slot B8						
Well Position		+N/-S	0.00 usft	Northing:		1,600,351.80 usft		Latitude:		39.4529696			
		+E/-W	0.00 usft			Easting:				2,266,871.40 usft		Longitude:	
Position Uncertainty			0.00 usft	Wellhead Elevation:		0.00 usft		Ground Level:		6,148.00 usft			

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/5/2017	9.53	65.75	51,787

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	308.73	

Survey Program	Date	7/13/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
86.00	767.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
840.00	957.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
1,084.00	7,292.00	Survey #3 - Production MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	

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	
86.00	0.18	285.73	86.00	0.04	-0.13	0.12	0.21	0.21	0.00	
First SDI Gyro MWD Survey										
120.00	0.88	312.28	120.00	0.23	-0.37	0.43	2.13	2.06	78.09	
258.00	5.89	312.98	257.71	5.77	-6.34	8.56	3.63	3.63	0.51	
305.00	6.60	304.19	304.44	8.93	-10.34	13.66	2.53	1.51	-18.70	
397.00	9.06	306.21	395.57	16.18	-20.56	26.16	2.69	2.67	2.20	
490.00	12.58	311.48	486.91	27.22	-34.06	43.60	3.93	3.78	5.67	
582.00	16.36	307.00	575.97	41.66	-51.92	66.57	4.28	4.11	-4.87	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well Federal GM 411-10 - Slot B8
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Site:	MV 5-10 Pad	MD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Well:	Federal GM 411-10	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)
675.00	19.00	306.56	664.57	58.56	-74.55	94.79	2.84	2.84	-0.47
767.00	20.94	307.71	751.04	77.54	-99.58	126.20	2.15	2.11	1.25
Last SDI Gyro MWD Survey									
840.00	24.15	310.48	818.45	95.22	-121.27	154.18	4.63	4.40	3.79
First SDI Surface MWD Survey									
935.00	28.69	310.60	903.51	122.69	-153.38	196.41	4.78	4.78	0.13
957.00	29.19	309.59	922.76	129.55	-161.53	207.06	3.18	2.27	-4.59
Last SDI Surface MWD Survey									
1,084.00	29.32	310.45	1,033.56	169.46	-209.05	269.10	0.35	0.10	0.68
First SDI Production MWD Survey									
1,178.00	28.86	309.46	1,115.71	198.81	-244.08	314.79	0.71	-0.49	-1.05
1,273.00	28.54	310.00	1,199.03	227.97	-279.17	360.41	0.43	-0.34	0.57
1,368.00	30.29	308.13	1,281.79	257.35	-315.40	407.06	2.08	1.84	-1.97
1,462.00	29.82	308.52	1,363.15	286.54	-352.34	454.13	0.54	-0.50	0.41
1,557.00	28.84	308.62	1,445.97	315.55	-388.72	500.67	1.03	-1.03	0.11
1,651.00	30.09	309.18	1,527.81	344.59	-424.70	546.90	1.36	1.33	0.60
1,746.00	28.48	307.88	1,610.67	373.55	-461.04	593.37	1.82	-1.69	-1.37
1,841.00	30.37	310.36	1,693.41	403.01	-497.22	640.03	2.37	1.99	2.61
1,935.00	29.55	309.59	1,774.85	433.17	-533.19	686.96	0.96	-0.87	-0.82
2,030.00	28.12	308.68	1,858.07	462.09	-568.72	732.77	1.57	-1.51	-0.96
2,124.00	29.15	310.88	1,940.57	490.92	-603.33	777.81	1.57	1.10	2.34
2,219.00	31.13	312.09	2,022.72	522.53	-639.05	825.45	2.18	2.08	1.27
2,313.00	30.23	311.56	2,103.57	554.52	-674.79	873.34	1.00	-0.96	-0.56
2,407.00	29.19	311.79	2,185.21	585.49	-709.59	919.86	1.11	-1.11	0.24
2,502.00	29.72	310.38	2,267.93	616.18	-744.80	966.54	0.92	0.56	-1.48
2,596.00	31.05	309.91	2,349.02	646.83	-781.14	1,014.07	1.44	1.41	-0.50
2,691.00	29.69	308.02	2,430.98	677.05	-818.47	1,062.09	1.75	-1.43	-1.99
2,786.00	27.71	307.27	2,514.31	704.92	-854.59	1,107.70	2.12	-2.08	-0.79
2,880.00	28.15	308.92	2,597.36	732.08	-889.23	1,151.72	0.95	0.47	1.76
2,975.00	29.46	309.68	2,680.60	761.08	-924.65	1,197.49	1.43	1.38	0.80
3,069.00	31.58	308.62	2,761.57	791.20	-961.67	1,245.22	2.33	2.26	-1.13
3,164.00	30.66	307.65	2,842.90	821.53	-1,000.29	1,294.32	1.10	-0.97	-1.02
3,258.00	29.74	307.48	2,924.14	850.35	-1,037.77	1,341.59	0.98	-0.98	-0.18
3,353.00	31.11	308.13	3,006.06	879.85	-1,075.77	1,389.69	1.48	1.44	0.68
3,447.00	30.13	308.73	3,086.95	909.60	-1,113.28	1,437.57	1.09	-1.04	0.64
3,542.00	32.07	312.26	3,168.30	941.49	-1,150.55	1,486.59	2.80	2.04	3.72
3,636.00	31.11	312.26	3,248.37	974.60	-1,187.00	1,535.74	1.02	-1.02	0.00
3,731.00	28.74	310.75	3,330.70	1,006.02	-1,222.47	1,583.07	2.62	-2.49	-1.59
3,825.00	27.92	310.73	3,413.44	1,035.13	-1,256.27	1,627.65	0.87	-0.87	-0.02
3,919.00	25.80	310.11	3,497.29	1,062.67	-1,288.59	1,670.10	2.27	-2.26	-0.66
4,046.00	24.53	311.35	3,612.24	1,097.90	-1,329.52	1,724.06	1.08	-1.00	0.98
4,108.00	22.55	309.46	3,669.08	1,113.96	-1,348.36	1,748.81	3.42	-3.19	-3.05
4,202.00	20.67	307.10	3,756.47	1,135.42	-1,375.52	1,783.42	2.20	-2.00	-2.51
4,297.00	19.41	306.78	3,845.71	1,154.99	-1,401.53	1,815.96	1.33	-1.33	-0.34

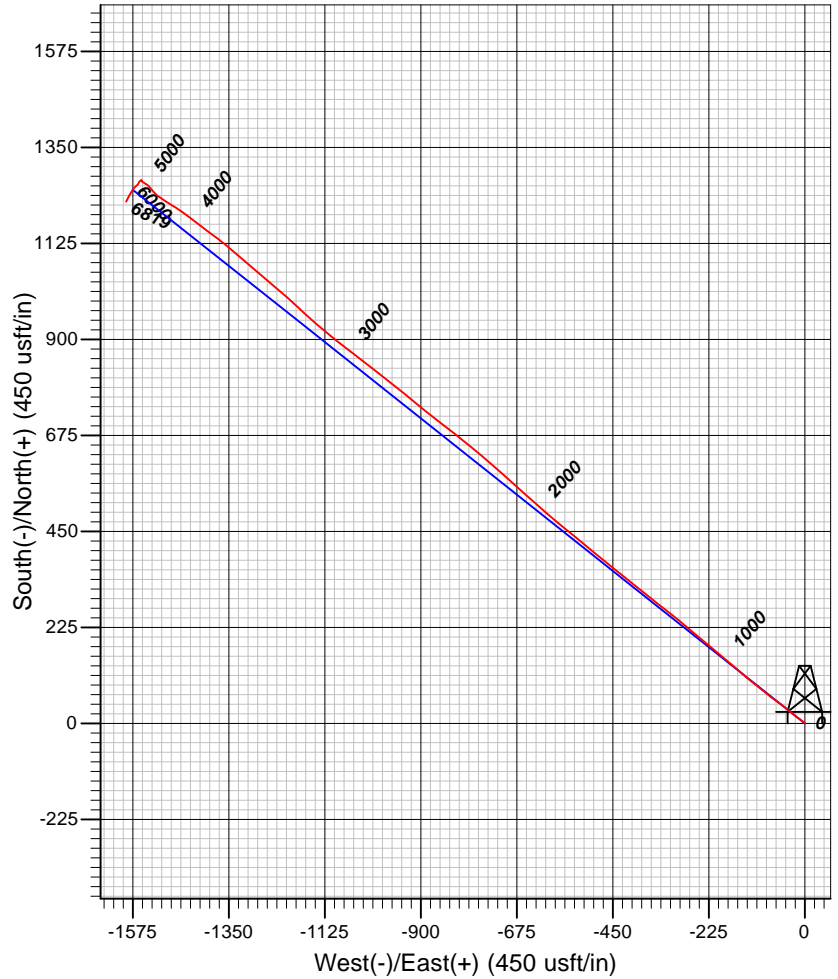
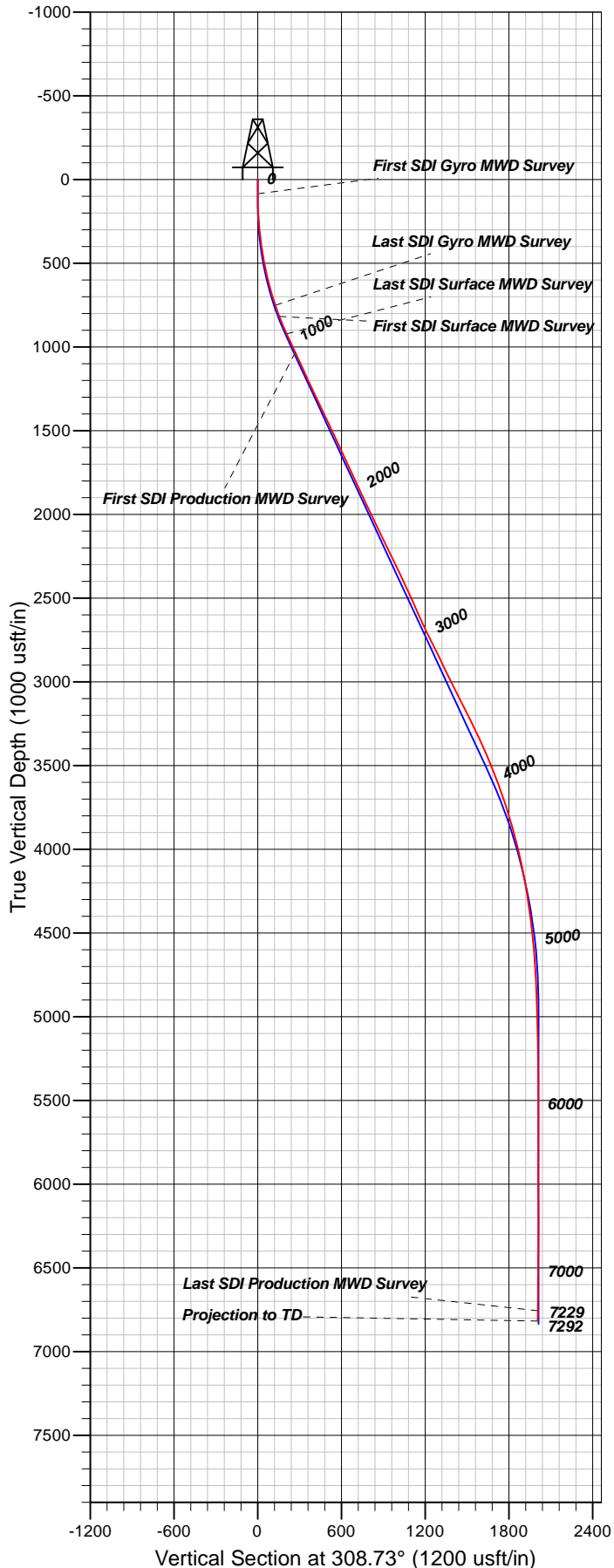
Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well Federal GM 411-10 - Slot B8
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Site:	MV 5-10 Pad	MD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Well:	Federal GM 411-10	North Reference:	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)
4,391.00	17.67	308.00	3,934.83	1,173.12	-1,425.29	1,845.84	1.90	-1.85	1.30
4,486.00	15.75	306.99	4,025.82	1,189.76	-1,446.95	1,873.14	2.04	-2.02	-1.06
4,580.00	13.76	303.02	4,116.72	1,203.53	-1,466.51	1,897.02	2.37	-2.12	-4.22
4,675.00	11.76	301.42	4,209.36	1,214.73	-1,484.25	1,917.87	2.14	-2.11	-1.68
4,769.00	10.30	304.16	4,301.63	1,224.45	-1,499.38	1,935.75	1.65	-1.55	2.91
4,864.00	9.31	304.29	4,395.24	1,233.54	-1,512.76	1,951.88	1.04	-1.04	0.14
4,959.00	7.94	317.23	4,489.17	1,242.69	-1,523.56	1,966.03	2.49	-1.44	13.62
5,054.00	6.24	321.37	4,583.44	1,251.54	-1,531.24	1,977.56	1.87	-1.79	4.36
5,150.00	4.39	320.39	4,679.02	1,258.45	-1,536.84	1,986.25	1.93	-1.93	-1.02
5,243.00	3.22	299.51	4,771.82	1,262.48	-1,541.39	1,992.31	1.93	-1.26	-22.45
5,337.00	2.81	297.55	4,865.69	1,264.84	-1,545.73	1,997.18	0.45	-0.44	-2.09
5,401.01	2.56	306.39	4,929.63	1,266.42	-1,548.27	2,000.14	0.76	-0.39	13.81
GM 411-10 KMW									
5,432.00	2.46	311.26	4,960.59	1,267.27	-1,549.32	2,001.50	0.76	-0.31	15.72
5,526.00	1.93	295.26	5,054.52	1,269.27	-1,552.27	2,005.05	0.86	-0.56	-17.02
5,621.00	1.29	9.48	5,149.49	1,271.01	-1,553.54	2,007.13	2.11	-0.67	78.13
5,716.00	0.69	323.93	5,244.48	1,272.53	-1,553.70	2,008.21	1.00	-0.63	-47.95
5,810.00	0.70	278.21	5,338.47	1,273.07	-1,554.60	2,009.25	0.57	0.01	-48.64
5,905.00	0.79	247.80	5,433.47	1,272.90	-1,555.78	2,010.06	0.42	0.09	-32.01
6,000.00	1.58	225.74	5,528.45	1,271.74	-1,557.33	2,010.54	0.95	0.83	-23.22
6,094.00	2.11	231.01	5,622.40	1,269.75	-1,559.60	2,011.07	0.59	0.56	5.61
6,189.00	1.12	185.38	5,717.36	1,267.72	-1,561.05	2,010.93	1.63	-1.04	-48.03
6,283.00	1.51	206.79	5,811.34	1,265.70	-1,561.69	2,010.17	0.66	0.41	22.78
6,378.00	1.58	219.98	5,906.30	1,263.58	-1,563.10	2,009.94	0.38	0.07	13.88
6,473.00	2.40	226.33	6,001.25	1,261.20	-1,565.38	2,010.23	0.89	0.86	6.68
6,567.00	2.71	224.63	6,095.15	1,258.26	-1,568.36	2,010.72	0.34	0.33	-1.81
6,662.00	3.09	221.58	6,190.03	1,254.75	-1,571.64	2,011.08	0.43	0.40	-3.21
6,756.00	3.22	220.52	6,283.89	1,250.85	-1,575.04	2,011.29	0.15	0.14	-1.13
6,851.00	3.24	209.18	6,378.74	1,246.48	-1,578.08	2,010.92	0.67	0.02	-11.94
6,946.00	3.78	207.46	6,473.56	1,241.35	-1,580.83	2,009.87	0.58	0.57	-1.81
7,040.00	3.52	208.34	6,567.37	1,236.06	-1,583.63	2,008.74	0.28	-0.28	0.94
7,135.00	3.25	210.01	6,662.20	1,231.17	-1,586.36	2,007.81	0.30	-0.28	1.76
7,229.00	3.34	204.91	6,756.05	1,226.37	-1,588.85	2,006.75	0.33	0.10	-5.43
Last SDI Production MWD Survey									
7,292.00	3.34	204.91	6,818.94	1,223.05	-1,590.39	2,005.87	0.00	0.00	0.00
Projection to TD - GM 411-10 PBHL									

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well Federal GM 411-10 - Slot B8
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Site:	MV 5-10 Pad	MD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Well:	Federal GM 411-10	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)	
86.00	86.00	0.04	-0.13	First SDI Gyro MWD Survey
767.00	751.04	77.54	-99.58	Last SDI Gyro MWD Survey
840.00	818.45	95.22	-121.27	First SDI Surface MWD Survey
957.00	922.76	129.55	-161.53	Last SDI Surface MWD Survey
1,084.00	1,033.56	169.46	-209.05	First SDI Production MWD Survey
7,229.00	6,756.05	1,226.37	-1,588.85	Last SDI Production MWD Survey
7,292.00	6,818.94	1,223.05	-1,590.39	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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Well Details: Federal GM 411-10

TVD Reference: GL 6148' & RKB 24' @ 6172.00usft (H&P 318)		Datum Level: 6148.00		Slot	
+N/-S	+E/-W	North	East	Latitude	Longitude
0.00	0.00	1600351.80	2266871.40	39.4529696	-108.0966663

Slot B8

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Federal GM 411-10 - Slot B8, True North
 Vertical (TVD) Reference: GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
 Section (VS) Reference: Slot - B8(0.00N, 0.00E)
 Measured Depth Reference: GL 6148' & RKB 24' @ 6172.00usft (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

16:06, July 13 2017
 Created By: Mel Mireles Jr.