



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 511-10
County & State	Garfield County, CO
SDI Job No.	OP.002468
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 122 feet to a measured depth of 7,207 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

06-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 511-10 - Slot B7
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 511-10	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 511-10 - Slot B7						
Well Position		+N/-S	0.00 usft	Northing:		1,600,349.50 usft		Latitude:		39.4529627			
		+E/-W	0.00 usft			Easting:				2,266,864.30 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	7/2/2017	9.53	65.75	51,788

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	300.67	

Survey Program	Date	7/6/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
122.00	767.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
840.00	1,071.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
1,180.00	7,207.00	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	
122.00	1.14	246.09	121.99	-0.49	-1.11	0.70	0.93	0.93	0.00	
First SDI Gyro MWD Survey										
213.00	6.33	294.08	212.78	1.19	-6.52	6.22	6.19	5.70	52.74	
305.00	8.18	292.41	304.04	5.75	-17.20	17.73	2.02	2.01	-1.82	
397.00	10.38	302.43	394.83	12.70	-30.25	32.50	2.96	2.39	10.89	
490.00	12.84	306.56	485.93	23.35	-45.63	51.15	2.79	2.65	4.44	
582.00	15.75	305.33	575.07	36.66	-64.03	73.77	3.18	3.16	-1.34	
675.00	17.51	301.99	664.18	51.37	-86.19	100.34	2.15	1.89	-3.59	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well Federal GM 511-10 - Slot B7
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Site:	MV 5-10 Pad	MD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Well:	Federal GM 511-10	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)
767.00	19.88	303.57	751.32	67.35	-110.97	129.80	2.63	2.58	1.72
Last SDI Gyro MWD Survey									
840.00	22.22	300.42	819.44	81.21	-133.22	156.01	3.56	3.21	-4.32
First SDI Surface MWD Survey									
935.00	25.68	299.99	906.25	100.60	-166.55	194.56	3.65	3.64	-0.45
1,030.00	27.44	298.78	991.22	121.43	-203.56	237.03	1.94	1.85	-1.27
1,071.00	27.87	298.87	1,027.54	130.60	-220.23	256.05	1.05	1.05	0.22
Last SDI Surface MWD Survey									
1,180.00	29.07	296.64	1,123.36	154.78	-266.22	307.93	1.47	1.10	-2.05
First SDI Production MWD Survey									
1,275.00	27.82	295.30	1,206.89	174.60	-306.89	353.03	1.48	-1.32	-1.41
1,369.00	28.56	300.39	1,289.75	195.35	-346.11	397.34	2.68	0.79	5.41
1,464.00	28.51	301.33	1,373.21	218.62	-385.06	442.72	0.48	-0.05	0.99
1,559.00	29.90	301.45	1,456.13	242.77	-424.63	489.07	1.46	1.46	0.13
1,653.00	27.72	298.11	1,538.50	265.30	-463.91	534.34	2.88	-2.32	-3.55
1,748.00	28.69	300.90	1,622.22	287.42	-502.97	579.22	1.72	1.02	2.94
1,842.00	30.21	301.22	1,704.07	311.27	-542.56	625.44	1.63	1.62	0.34
1,937.00	29.14	298.67	1,786.61	334.75	-583.29	672.46	1.74	-1.13	-2.68
2,031.00	29.90	301.50	1,868.41	357.98	-623.35	718.76	1.69	0.81	3.01
2,126.00	29.19	300.89	1,951.06	382.24	-663.42	765.60	0.81	-0.75	-0.64
2,220.00	30.37	303.22	2,032.65	407.03	-702.97	812.26	1.76	1.26	2.48
2,314.00	29.55	302.63	2,114.09	432.55	-742.37	859.17	0.93	-0.87	-0.63
2,409.00	28.97	304.70	2,196.97	458.28	-781.02	905.53	1.23	-0.61	2.18
2,503.00	29.55	306.16	2,278.98	484.91	-818.45	951.32	0.98	0.62	1.55
2,598.00	28.38	305.48	2,362.09	511.84	-855.75	997.13	1.28	-1.23	-0.72
2,693.00	28.84	306.01	2,445.49	538.42	-892.67	1,042.45	0.55	0.48	0.56
2,787.00	29.61	304.15	2,527.53	564.78	-930.23	1,088.20	1.27	0.82	-1.98
2,882.00	27.07	301.75	2,611.14	589.34	-968.04	1,133.25	2.93	-2.67	-2.53
2,976.00	26.90	304.53	2,694.91	612.65	-1,003.75	1,175.85	1.35	-0.18	2.96
3,071.00	27.79	306.60	2,779.29	638.03	-1,039.23	1,219.32	1.37	0.94	2.18
3,165.00	28.78	304.93	2,862.07	664.06	-1,075.38	1,263.68	1.35	1.05	-1.78
3,260.00	29.35	303.47	2,945.11	689.99	-1,113.55	1,309.74	0.96	0.60	-1.54
3,355.00	29.04	303.49	3,028.04	715.55	-1,152.20	1,356.03	0.33	-0.33	0.02
3,449.00	27.79	300.36	3,110.72	739.22	-1,190.14	1,400.73	2.07	-1.33	-3.33
3,543.00	25.76	302.29	3,194.63	761.21	-1,226.32	1,443.07	2.35	-2.16	2.05
3,638.00	23.22	299.61	3,281.08	781.49	-1,260.06	1,482.44	2.92	-2.67	-2.82
3,732.00	22.28	298.79	3,367.77	799.23	-1,291.79	1,518.77	1.06	-1.00	-0.87
3,827.00	20.75	299.74	3,456.15	816.26	-1,322.18	1,553.60	1.65	-1.61	1.00
3,921.00	19.67	299.25	3,544.36	832.25	-1,350.45	1,586.07	1.16	-1.15	-0.52
4,016.00	18.28	299.45	3,634.19	847.38	-1,377.37	1,616.95	1.46	-1.46	0.21
4,110.00	16.85	298.73	3,723.81	861.18	-1,402.16	1,645.30	1.54	-1.52	-0.77
4,204.00	15.87	296.61	3,814.00	873.49	-1,425.59	1,671.74	1.22	-1.04	-2.26
4,299.00	14.52	296.83	3,905.68	884.68	-1,447.84	1,696.58	1.42	-1.42	0.23
4,394.00	14.01	295.26	3,997.75	894.96	-1,468.86	1,719.91	0.67	-0.54	-1.65

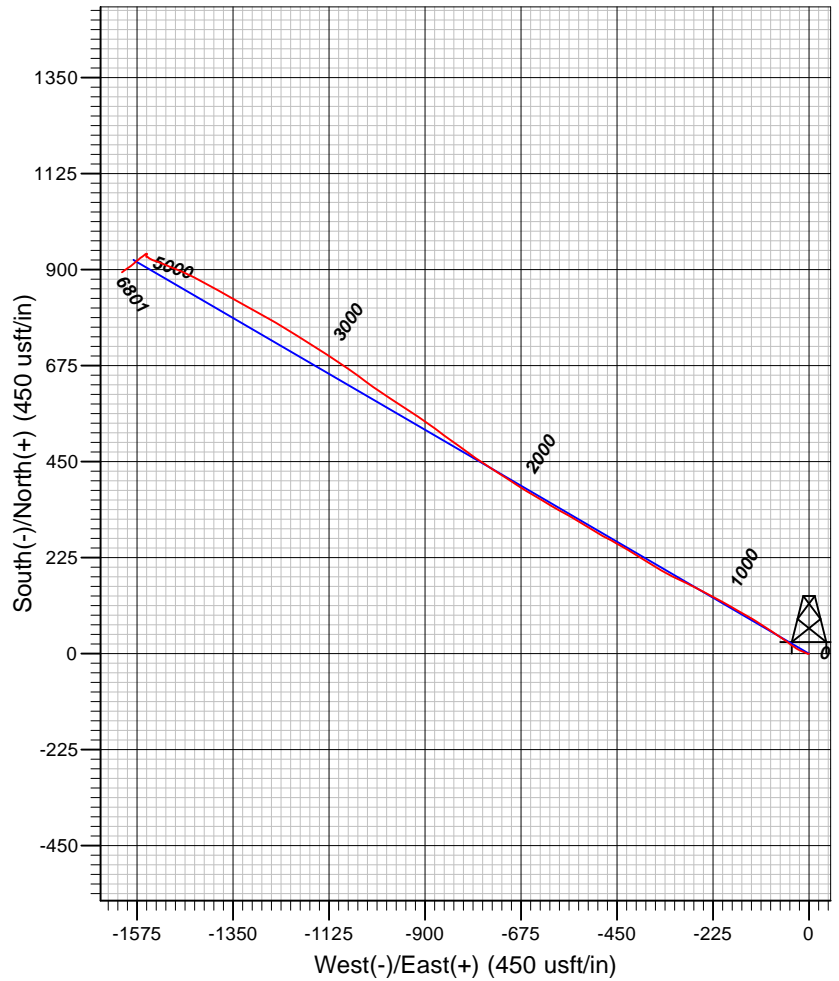
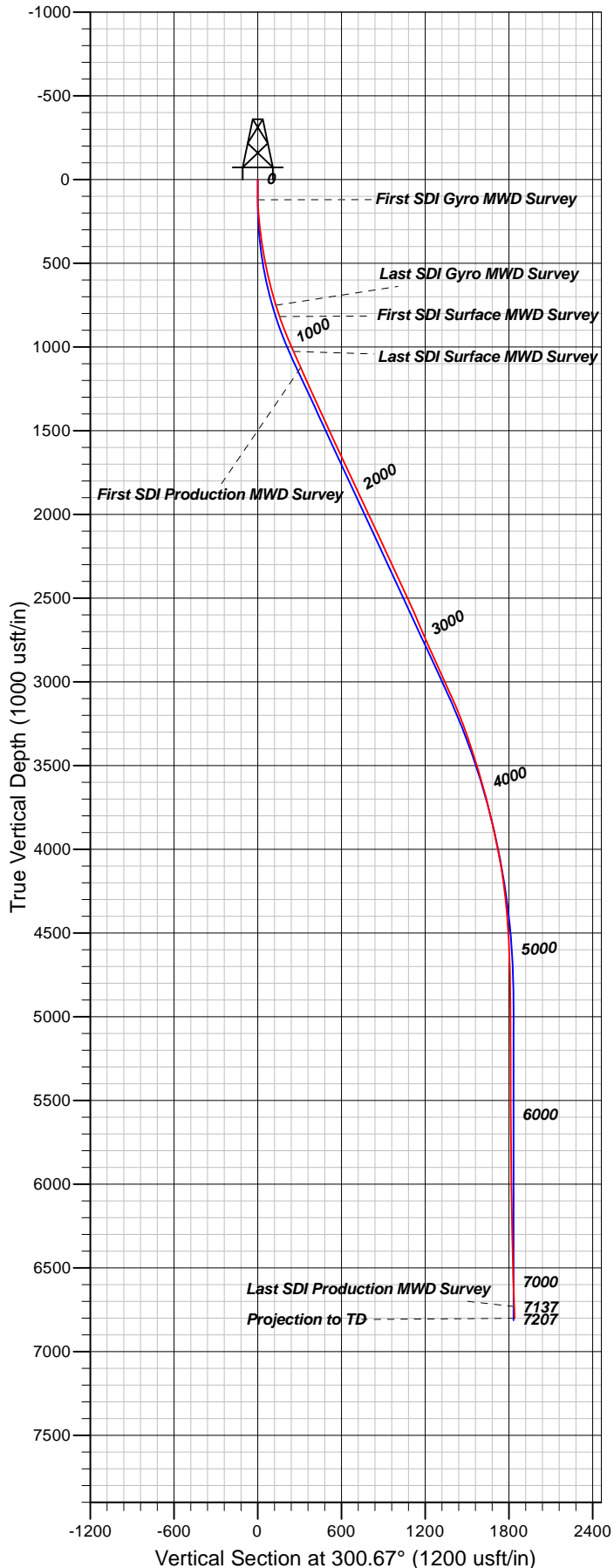
Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well Federal GM 511-10 - Slot B7
Project:	Garfield County, CO NAD83	TVD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Site:	MV 5-10 Pad	MD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Well:	Federal GM 511-10	North Reference:	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)
4,488.00	11.84	290.38	4,089.37	903.18	-1,488.20	1,740.73	2.58	-2.31	-5.19
4,583.00	10.12	291.86	4,182.62	909.68	-1,505.08	1,758.57	1.83	-1.81	1.56
4,678.00	7.55	293.48	4,276.49	915.28	-1,518.55	1,773.01	2.72	-2.71	1.71
4,773.00	5.57	291.03	4,370.86	919.42	-1,528.58	1,783.75	2.10	-2.08	-2.58
4,867.00	5.06	286.75	4,464.46	922.25	-1,536.81	1,792.27	0.69	-0.54	-4.55
4,962.00	4.11	297.09	4,559.16	925.01	-1,543.85	1,799.74	1.32	-1.00	10.88
5,056.00	1.55	319.93	4,653.04	927.51	-1,547.67	1,804.30	2.92	-2.72	24.30
5,151.00	1.62	294.89	4,748.00	929.06	-1,549.71	1,806.85	0.73	0.07	-26.36
5,246.00	1.75	275.54	4,842.96	929.77	-1,552.38	1,809.50	0.61	0.14	-20.37
5,314.34	0.70	345.35	4,911.28	930.27	-1,553.52	1,810.74	2.41	-1.54	102.15
GM 511-10 KMV									
5,340.00	0.96	25.32	4,936.94	930.62	-1,553.47	1,810.87	2.41	1.01	155.78
5,434.00	1.07	15.05	5,030.93	932.18	-1,552.90	1,811.18	0.23	0.12	-10.93
5,529.00	0.71	337.52	5,125.92	933.58	-1,552.90	1,811.89	0.70	-0.38	-39.51
5,623.00	1.02	39.83	5,219.91	934.76	-1,552.59	1,812.22	0.99	0.33	66.29
5,717.00	0.64	47.22	5,313.90	935.76	-1,551.66	1,811.94	0.42	-0.40	7.86
5,812.00	0.30	16.82	5,408.90	936.36	-1,551.20	1,811.85	0.43	-0.36	-32.00
5,907.00	0.38	328.98	5,503.89	936.86	-1,551.29	1,812.19	0.30	0.08	-50.36
6,001.00	0.96	290.03	5,597.89	937.40	-1,552.19	1,813.23	0.75	0.62	-41.44
6,096.00	1.05	239.68	5,692.87	937.23	-1,553.69	1,814.44	0.90	0.09	-53.00
6,190.00	1.58	228.11	5,786.85	935.93	-1,555.40	1,815.24	0.63	0.56	-12.31
6,285.00	1.77	232.40	5,881.81	934.17	-1,557.54	1,816.18	0.24	0.20	4.52
6,380.00	2.03	233.33	5,976.76	932.26	-1,560.05	1,817.37	0.28	0.27	0.98
6,474.00	2.46	238.57	6,070.68	930.22	-1,563.11	1,818.96	0.51	0.46	5.57
6,569.00	3.35	229.05	6,165.56	927.34	-1,566.94	1,820.79	1.06	0.94	-10.02
6,664.00	3.98	229.15	6,260.37	923.36	-1,571.53	1,822.71	0.66	0.66	0.11
6,758.00	4.58	229.76	6,354.10	918.80	-1,576.87	1,824.97	0.64	0.64	0.65
6,853.00	4.81	231.70	6,448.79	913.88	-1,582.89	1,827.64	0.29	0.24	2.04
6,948.00	5.67	232.80	6,543.39	908.58	-1,589.75	1,830.84	0.91	0.91	1.16
7,042.00	5.60	235.78	6,636.93	903.19	-1,597.24	1,834.53	0.32	-0.07	3.17
7,137.00	5.53	233.42	6,731.49	897.86	-1,604.75	1,838.27	0.25	-0.07	-2.48
Last SDI Production MWD Survey									
7,207.00	5.53	233.42	6,801.16	893.84	-1,610.17	1,840.88	0.00	0.00	0.00
Projection to TD - GM 511-10 PBHL									

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well Federal GM 511-10 - Slot B7
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Site:	MV 5-10 Pad	MD Reference:	GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
Well:	Federal GM 511-10	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)	
122.00	121.99	-0.49	-1.11	First SDI Gyro MWD Survey
767.00	751.32	67.35	-110.97	Last SDI Gyro MWD Survey
840.00	819.44	81.21	-133.22	First SDI Surface MWD Survey
1,071.00	1,027.54	130.60	-220.23	Last SDI Surface MWD Survey
1,180.00	1,123.36	154.78	-266.22	First SDI Production MWD Survey
7,137.00	6,731.49	897.86	-1,604.75	Last SDI Production MWD Survey
7,207.00	6,801.16	893.84	-1,610.17	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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Well Details: Federal GM 511-10

TVD Reference: GL 6148' & RKB 24' @ 6172.00usft (H&P 318) Level: 6148.00						
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	1600349.50	2266864.30	39.4529627	-108.0966912	B7

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Federal GM 511-10 - Slot B7, True North
 Vertical (TVD) Reference: GL 6148' & RKB 24' @ 6172.00usft (H&P 318)
 Section (VS) Reference: Slot - B7(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

9:31, July 06 2017
 Created By: Mel Mireles Jr.