



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 434-5
County & State	Garfield County, CO
SDI Job No.	OP.004954
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 122 feet to a measured depth of 6,916 feet is true and correct as determined from all available records.


Signature

27-Oct-17
Date

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

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 434-5 - Slot B15 (GM 434-5)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 434-5	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 34-5 Pad			
Site Position:		Northing:	1,603,476.79 usft	Latitude:	39.4609066
From:	Map	Easting:	2,258,772.10 usft	Longitude:	-108.1256571
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.66 °

Well		GM 434-5 - Slot B15 (GM 434-5)				
Well Position	+N/-S	0.00 usft	Northing:	1,603,471.30 usft	Latitude:	39.4608922
	+E/-W	0.00 usft	Easting:	2,258,780.51 usft	Longitude:	-108.1256268
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	5,977.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/12/2017	9.57	65.77	51,756

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	255.71	

Survey Program	Date	12/14/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
122.00	488.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
565.00	977.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
1,075.00	6,916.00	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	0.09	26.63	122.00	0.09	0.04	-0.06	0.07	0.07	0.00	
First SDI Gyro MWD Survey										
212.00	3.87	252.77	211.93	-0.75	-2.83	2.93	4.37	4.20	-148.73	
305.00	8.18	253.30	304.40	-3.58	-12.17	12.67	4.63	4.63	0.57	
396.00	12.49	252.51	393.90	-8.40	-27.76	28.98	4.74	4.74	-0.87	
488.00	16.45	255.23	482.96	-14.72	-49.85	51.94	4.37	4.30	2.96	
Last SDI Gyro MWD Survey										

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Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 434-5	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)	
565.00	20.57	253.77	555.97	-21.28	-73.39	76.38	5.38	5.35	-1.90	
First SDI Surface MWD Survey										
657.00	24.71	255.57	640.86	-30.59	-107.55	111.77	4.56	4.50	1.96	
750.00	30.00	258.22	723.43	-40.19	-149.17	154.47	5.84	5.69	2.85	
841.00	32.98	258.30	801.02	-49.86	-195.70	201.95	3.28	3.27	0.09	
935.00	33.50	257.86	879.64	-60.50	-246.11	253.43	0.61	0.55	-0.47	
977.00	33.59	257.42	914.65	-65.47	-268.79	276.63	0.62	0.21	-1.05	
Last SDI Surface MWD Survey										
1,075.00	33.34	256.22	996.40	-77.79	-321.40	330.66	0.72	-0.26	-1.22	
First SDI Production MWD Survey										
1,169.00	33.94	256.29	1,074.66	-90.16	-371.98	382.73	0.64	0.64	0.07	
1,264.00	34.99	255.99	1,152.98	-103.04	-424.18	436.49	1.12	1.11	-0.32	
1,358.00	34.28	259.28	1,230.33	-114.49	-476.34	489.86	2.13	-0.76	3.50	
1,453.00	32.47	258.40	1,309.66	-124.60	-527.61	542.04	1.97	-1.91	-0.93	
1,548.00	32.61	258.13	1,389.75	-134.99	-577.64	593.09	0.21	0.15	-0.29	
1,642.00	32.60	259.28	1,468.94	-144.92	-627.31	643.67	0.66	-0.01	1.23	
1,737.00	33.22	259.42	1,548.69	-154.45	-678.04	695.18	0.66	0.65	0.15	
1,832.00	33.59	259.26	1,628.00	-164.13	-729.44	747.38	0.40	0.39	-0.17	
1,926.00	33.95	256.93	1,706.14	-174.91	-780.55	799.58	1.43	0.38	-2.48	
2,021.00	34.21	256.98	1,784.82	-186.93	-832.41	852.80	0.28	0.27	0.05	
2,116.00	34.39	255.97	1,863.30	-199.45	-884.46	906.32	0.63	0.19	-1.06	
2,210.00	33.93	255.15	1,941.09	-212.61	-935.58	959.10	0.69	-0.49	-0.87	
2,305.00	32.09	253.42	2,020.75	-226.60	-985.39	1,010.84	2.18	-1.94	-1.82	
2,399.00	29.74	254.41	2,101.39	-240.00	-1,031.79	1,059.10	2.56	-2.50	1.05	
2,493.00	28.27	253.71	2,183.60	-252.51	-1,075.62	1,104.66	1.60	-1.56	-0.74	
2,588.00	26.30	253.71	2,268.02	-264.72	-1,117.42	1,148.18	2.07	-2.07	0.00	
2,682.00	23.29	254.30	2,353.35	-275.60	-1,155.30	1,187.58	3.21	-3.20	0.63	
2,777.00	20.65	250.75	2,441.45	-286.20	-1,189.20	1,223.05	3.11	-2.78	-3.74	
2,872.00	19.67	255.35	2,530.63	-295.77	-1,220.49	1,255.73	1.96	-1.03	4.84	
2,966.00	17.79	260.07	2,619.65	-302.25	-1,249.95	1,285.87	2.57	-2.00	5.02	
3,060.00	16.46	263.83	2,709.49	-306.16	-1,277.33	1,313.38	1.84	-1.41	4.00	
3,155.00	15.04	271.95	2,800.93	-307.18	-1,303.04	1,338.54	2.76	-1.49	8.55	
3,249.00	12.52	275.73	2,892.22	-305.75	-1,325.37	1,359.83	2.85	-2.68	4.02	
3,344.00	10.18	277.32	2,985.35	-303.65	-1,343.94	1,377.31	2.48	-2.46	1.67	
3,438.00	7.92	273.07	3,078.18	-302.25	-1,358.65	1,391.21	2.51	-2.40	-4.52	
3,532.00	6.07	272.99	3,171.48	-301.64	-1,370.08	1,402.14	1.97	-1.97	-0.09	
3,627.00	4.86	273.24	3,266.04	-301.15	-1,379.12	1,410.77	1.27	-1.27	0.26	
3,721.00	4.36	270.64	3,359.74	-300.89	-1,386.66	1,418.02	0.58	-0.53	-2.77	
3,816.00	3.02	269.56	3,454.54	-300.87	-1,392.78	1,423.94	1.41	-1.41	-1.14	
3,823.88	3.00	269.36	3,462.41	-300.87	-1,393.19	1,424.35	0.26	-0.23	-2.51	
GM 434-5 MVRD										
3,910.00	2.81	267.04	3,548.42	-301.00	-1,397.56	1,428.61	0.26	-0.22	-2.70	
4,005.00	1.61	242.54	3,643.35	-301.74	-1,401.07	1,432.19	1.58	-1.26	-25.79	
4,100.00	0.47	252.21	3,738.33	-302.47	-1,402.62	1,433.88	1.21	-1.20	10.18	

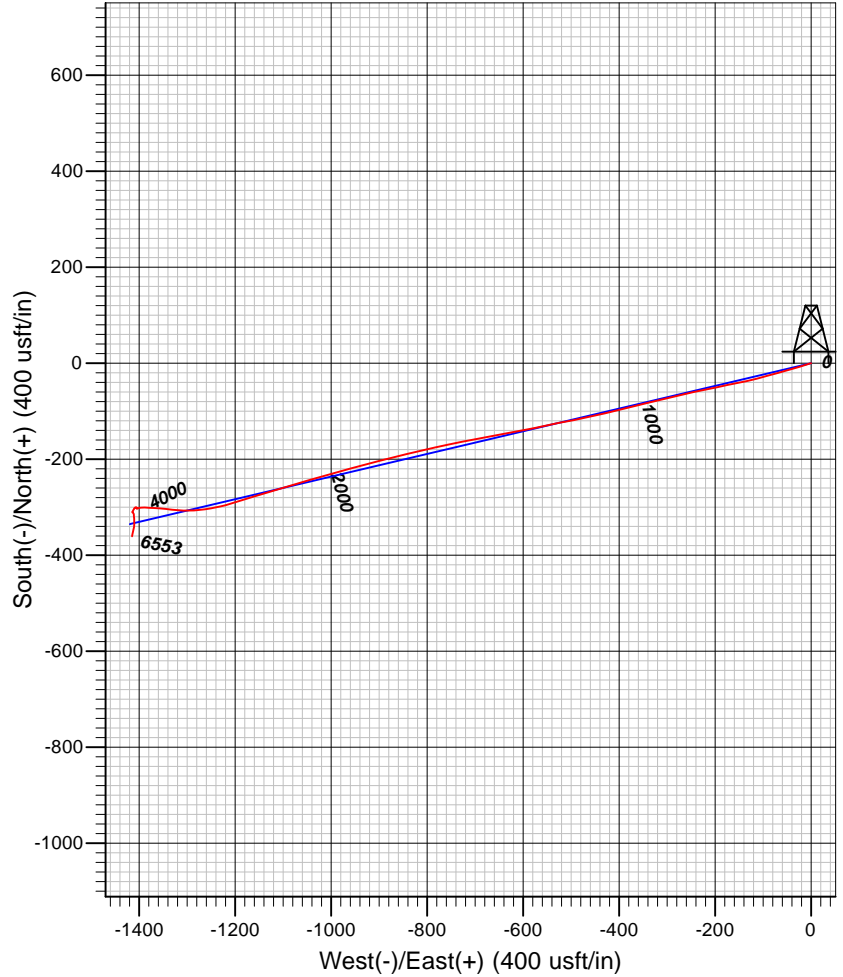
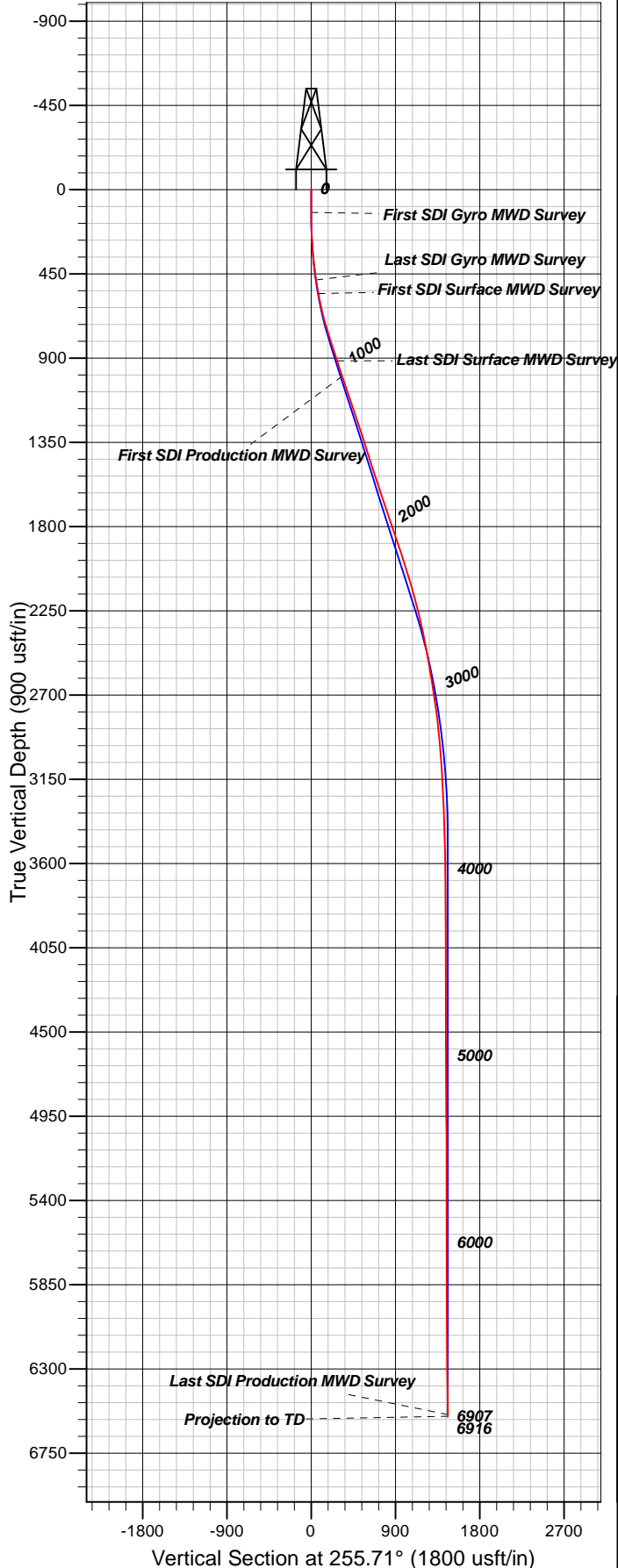
Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 434-5 - Slot B15 (GM 434-5)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 434-5	North Reference:	True
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)
4,194.00	0.79	260.14	3,832.32	-302.70	-1,403.63	1,434.91	0.35	0.34	8.44
4,289.00	0.93	257.05	3,927.31	-302.99	-1,405.02	1,436.33	0.16	0.15	-3.25
4,383.00	0.47	7.47	4,021.31	-302.78	-1,405.72	1,436.95	1.25	-0.49	117.47
4,478.00	0.79	15.45	4,116.30	-301.76	-1,405.49	1,436.48	0.35	0.34	8.40
4,572.00	0.62	331.69	4,210.30	-300.69	-1,405.56	1,436.28	0.58	-0.18	-46.55
4,667.00	0.44	280.09	4,305.29	-300.17	-1,406.16	1,436.74	0.51	-0.19	-54.32
4,761.00	0.53	263.66	4,399.29	-300.16	-1,406.95	1,437.50	0.18	0.10	-17.48
4,856.00	0.52	248.21	4,494.29	-300.36	-1,407.79	1,438.36	0.15	-0.01	-16.26
4,951.00	0.61	243.10	4,589.28	-300.75	-1,408.64	1,439.28	0.11	0.09	-5.38
5,045.00	0.70	222.00	4,683.27	-301.41	-1,409.47	1,440.25	0.27	0.10	-22.45
5,140.00	1.06	214.53	4,778.26	-302.56	-1,410.35	1,441.39	0.40	0.38	-7.86
5,234.00	1.33	211.77	4,872.24	-304.20	-1,411.42	1,442.83	0.29	0.29	-2.94
5,329.00	1.41	203.14	4,967.22	-306.22	-1,412.46	1,444.34	0.23	0.08	-9.08
5,424.00	2.18	213.65	5,062.17	-308.80	-1,413.92	1,446.39	0.88	0.81	11.06
5,518.00	0.67	130.75	5,156.14	-310.64	-1,414.50	1,447.40	2.34	-1.61	-88.19
5,613.00	0.79	112.93	5,251.14	-311.26	-1,413.47	1,446.56	0.27	0.13	-18.76
5,707.00	1.12	148.67	5,345.12	-312.30	-1,412.40	1,445.78	0.71	0.35	38.02
5,802.00	1.06	155.38	5,440.11	-313.89	-1,411.55	1,445.35	0.15	-0.06	7.06
5,896.00	1.60	183.91	5,534.08	-315.99	-1,411.28	1,445.60	0.89	0.57	30.35
5,991.00	1.41	175.92	5,629.05	-318.48	-1,411.28	1,446.22	0.30	-0.20	-8.41
6,085.00	2.06	169.70	5,723.00	-321.29	-1,410.90	1,446.55	0.72	0.69	-6.62
6,179.00	1.86	179.58	5,816.95	-324.48	-1,410.59	1,447.03	0.42	-0.21	10.51
6,273.00	1.90	175.59	5,910.90	-327.56	-1,410.46	1,447.66	0.15	0.04	-4.24
6,367.00	2.46	184.03	6,004.83	-331.13	-1,410.48	1,448.57	0.69	0.60	8.98
6,462.00	2.24	174.50	6,099.75	-335.01	-1,410.44	1,449.49	0.47	-0.23	-10.03
6,556.00	2.82	189.90	6,193.66	-339.12	-1,410.66	1,450.72	0.95	0.62	16.38
6,745.00	4.04	191.99	6,382.32	-350.21	-1,412.85	1,455.57	0.65	0.65	1.11
6,840.00	3.46	190.45	6,477.11	-356.30	-1,414.06	1,458.25	0.62	-0.61	-1.62
6,907.00	3.46	190.45	6,543.99	-360.28	-1,414.80	1,459.95	0.00	0.00	0.00
Last SDI Production MWD Survey									
6,916.00	3.46	190.45	6,552.98	-360.81	-1,414.89	1,460.17	0.00	0.00	0.00
Projection to TD - GM 434-5 PBHL									

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 434-5 - Slot B15 (GM 434-5)
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Site:	MV 34-5 Pad	MD Reference:	GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
Well:	GM 434-5	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	122.00	0.09	0.04	First SDI Gyro MWD Survey
488.00	482.96	-14.72	-49.85	Last SDI Gyro MWD Survey
565.00	555.97	-21.28	-73.39	First SDI Surface MWD Survey
977.00	914.65	-65.47	-268.79	Last SDI Surface MWD Survey
1,075.00	996.40	-77.79	-321.40	First SDI Production MWD Survey
6,907.00	6,543.99	-360.28	-1,414.80	Last SDI Production MWD Survey
6,916.00	6,552.98	-360.81	-1,414.89	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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Well Details: GM 434-5

TVD Reference: GL 5977' & RKB 24' @ 6001.00usft (H&P 271) and Level: 5977.00
 +N/-S +E/-W Northing Easting Latitude Longitude Slot
 0.00 0.00 1603471.30 2258780.51 39.4608922 -108.1256268 B15 (GM 434-5)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 434-5 - Slot B15 (GM 434-5), True North
 Vertical (TVD) Reference: GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
 Section (VS) Reference: Slot - B15 (GM 434-5)(0.00N, 0.00E)
 Measured Depth Reference: GL 5977' & RKB 24' @ 6001.00usft (H&P 271)
 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

9:58, December 14 2017
 Created By: Mel Mireles Jr.