



Well Details: GM 413-14

TVD Reference: GL 5172' & RKB 24' @ 5196.00usft (H&P 318) Level: 5172.00
 +N/-S +E/-W Northing Easting Latitude Longitude Slot
 0.00 0.00 1592870.90 2272801.30 39.4329025 -108.0749237 GM 413-14 (B8)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 413-14 - Slot GM 413-14 (B8), True North
 Vertical (TVD) Reference: GL 5172' & RKB 24' @ 5196.00usft (H&P 318)
 Section (VS) Reference: Slot - GM 413-14 (B8) (0.00N, 0.00E)
 Measured Depth Reference: GL 5172' & RKB 24' @ 5196.00usft (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

11:17, April 29 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 413-14
County & State	Garfield County, CO
SDI Job No.	OP.018016
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 123 feet to a measured depth of 6,690 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

29-Apr-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 413-14 - Slot GM 413-14 (B8)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5172' & RKB 24' @ 5196.00usft (H&P 318)
Site:	GM 34-14 Pad	MD Reference:	GL 5172' & RKB 24' @ 5196.00usft (H&P 318)
Well:	GM 413-14	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		GM 34-14 Pad			
Site Position:		Northing:	1,592,890.50 usft	Latitude:	39.4329552
From:	Map	Easting:	2,272,786.40 usft	Longitude:	-108.0749784
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.62 °

Well		GM 413-14 - Slot GM 413-14 (B8)				
Well Position	+N/-S	0.00 usft	Northing:	1,592,870.90 usft	Latitude:	39.4329026
	+E/-W	0.00 usft	Easting:	2,272,801.30 usft	Longitude:	-108.0749237
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	5,172.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/17/2019	9.33	65.60	51,610

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	282.10	

Survey Program	Date	4/29/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
123.00	957.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5	
1,083.00	6,690.00	Survey #2 - 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	
123.00	0.44	305.33	123.00	0.27	-0.39	0.43	0.36	0.36	0.00	
First SDI Gyro MWD Survey										
216.00	2.99	277.03	215.95	0.78	-3.08	3.18	2.81	2.74	-30.43	
307.00	5.63	282.39	306.69	2.03	-9.80	10.01	2.93	2.90	5.89	
399.00	9.24	283.80	397.90	4.76	-21.39	21.91	3.93	3.92	1.53	
491.00	14.25	284.24	487.94	9.31	-39.55	40.62	5.45	5.45	0.48	
583.00	18.74	284.94	576.13	15.90	-64.81	66.71	4.89	4.88	0.76	
674.00	21.47	280.81	661.58	22.80	-95.30	97.96	3.38	3.00	-4.54	
768.00	25.25	278.17	747.87	28.88	-132.06	135.18	4.17	4.02	-2.81	

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 413-14 - Slot GM 413-14 (B8)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5172' & RKB 24' @ 5196.00usft (H&P 318)
Site:	GM 34-14 Pad	MD Reference:	GL 5172' & RKB 24' @ 5196.00usft (H&P 318)
Well:	GM 413-14	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)
863.00	29.03	280.72	832.39	36.05	-174.78	178.45	4.16	3.98	2.68
957.00	33.96	283.10	912.52	46.25	-222.79	227.54	5.41	5.24	2.53
Last SDI Gyro MWD Survey									
1,083.00	36.76	283.81	1,015.27	63.23	-293.70	300.43	2.25	2.22	0.56
First SDI Production MWD Survey									
1,178.00	37.75	283.61	1,090.89	76.85	-349.57	357.91	1.05	1.04	-0.21
1,272.00	40.09	282.67	1,164.02	90.27	-407.07	416.95	2.57	2.49	-1.00
1,367.00	45.67	281.02	1,233.60	103.48	-470.32	481.56	5.99	5.87	-1.74
1,461.00	50.53	280.97	1,296.36	116.82	-538.98	551.49	5.17	5.17	-0.05
1,556.00	56.39	283.36	1,352.90	132.95	-613.54	627.78	6.49	6.17	2.52
1,651.00	59.51	283.68	1,403.31	151.78	-691.82	708.26	3.30	3.28	0.34
1,745.00	59.39	282.86	1,451.09	170.36	-770.61	789.20	0.76	-0.13	-0.87
1,840.00	59.00	281.88	1,499.74	187.84	-850.31	870.79	0.98	-0.41	-1.03
1,934.00	58.63	280.66	1,548.42	203.56	-929.17	951.20	1.18	-0.39	-1.30
2,029.00	58.00	279.00	1,598.32	217.37	-1,008.82	1,031.97	1.63	-0.66	-1.75
2,123.00	58.24	280.74	1,647.97	231.05	-1,087.45	1,111.73	1.59	0.26	1.85
2,218.00	58.03	279.64	1,698.12	245.32	-1,166.86	1,192.36	1.01	-0.22	-1.16
2,312.00	57.01	281.19	1,748.60	259.65	-1,244.85	1,271.62	1.76	-1.09	1.65
2,406.00	55.33	282.64	1,800.93	275.76	-1,321.25	1,349.70	2.20	-1.79	1.54
2,501.00	53.30	282.67	1,856.35	292.67	-1,396.53	1,426.85	2.14	-2.14	0.03
2,595.00	51.53	283.64	1,913.68	309.61	-1,469.06	1,501.33	2.05	-1.88	1.03
2,690.00	50.21	283.99	1,973.63	327.20	-1,540.62	1,574.98	1.42	-1.39	0.37
2,784.00	47.68	283.85	2,035.36	344.26	-1,609.42	1,645.83	2.69	-2.69	-0.15
2,879.00	47.42	284.00	2,099.48	361.13	-1,677.46	1,715.89	0.30	-0.27	0.16
2,973.00	45.51	284.66	2,164.23	377.98	-1,743.48	1,783.98	2.09	-2.03	0.70
3,068.00	42.96	283.77	2,232.29	394.27	-1,807.71	1,850.20	2.76	-2.68	-0.94
3,162.00	40.84	283.76	2,302.25	409.20	-1,868.68	1,912.94	2.26	-2.26	-0.01
3,256.00	40.53	283.89	2,373.53	423.85	-1,928.19	1,974.19	0.34	-0.33	0.14
3,351.00	38.19	284.13	2,446.98	438.43	-1,986.64	2,034.41	2.47	-2.46	0.25
3,445.00	36.09	283.41	2,521.91	451.95	-2,041.76	2,091.13	2.28	-2.23	-0.77
3,540.00	34.00	282.51	2,599.68	464.19	-2,094.91	2,145.67	2.27	-2.20	-0.95
3,635.00	32.44	282.68	2,679.15	475.54	-2,145.70	2,197.71	1.65	-1.64	0.18
3,729.00	31.16	282.13	2,759.04	486.18	-2,194.08	2,247.25	1.40	-1.36	-0.59
3,824.00	30.42	281.03	2,840.65	495.95	-2,241.72	2,295.87	0.98	-0.78	-1.16
3,918.00	28.86	279.92	2,922.35	504.41	-2,287.42	2,342.34	1.76	-1.66	-1.18
4,013.00	26.83	279.66	3,006.34	511.96	-2,331.15	2,386.67	2.14	-2.14	-0.27
4,107.00	24.79	281.09	3,090.96	519.31	-2,371.40	2,427.57	2.27	-2.17	1.52
4,202.00	23.91	282.64	3,177.51	527.35	-2,409.73	2,466.74	1.14	-0.93	1.63
4,296.00	24.63	282.53	3,263.20	535.77	-2,447.44	2,505.38	0.77	0.77	-0.12
4,390.00	22.78	284.66	3,349.27	544.63	-2,484.17	2,543.15	2.17	-1.97	2.27
4,485.00	20.65	285.90	3,437.52	553.87	-2,518.08	2,578.24	2.29	-2.24	1.31
4,579.00	18.16	286.31	3,526.18	562.53	-2,548.08	2,609.39	2.65	-2.65	0.44
4,674.00	15.87	283.84	3,617.01	569.79	-2,574.91	2,637.14	2.53	-2.41	-2.60

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Site:	GM 34-14 Pad	MD Reference:	GL 5172' & RKB 24' @ 5196.00usft (H&P 318)
Well:	GM 413-14	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)
4,768.00	13.78	283.29	3,707.88	575.44	-2,598.29	2,661.18	2.23	-2.22	-0.59
4,862.00	12.09	282.95	3,799.49	580.22	-2,618.78	2,682.22	1.80	-1.80	-0.36
4,872.19	11.89	282.95	3,809.46	580.70	-2,620.84	2,684.34	1.97	-1.97	0.04
GM 413-14 KMV									
4,957.00	10.22	282.99	3,892.69	584.35	-2,636.69	2,700.60	1.97	-1.97	0.04
5,051.00	8.36	286.36	3,985.46	588.15	-2,651.37	2,715.75	2.06	-1.98	3.59
5,146.00	5.86	288.15	4,079.72	591.60	-2,662.61	2,727.46	2.64	-2.63	1.88
5,240.00	3.53	278.06	4,173.40	593.50	-2,670.03	2,735.12	2.62	-2.48	-10.73
5,335.00	1.40	246.24	4,268.31	593.45	-2,673.99	2,738.98	2.58	-2.24	-33.49
5,429.00	0.69	165.64	4,362.30	592.43	-2,674.90	2,739.66	1.55	-0.76	-85.74
5,524.00	0.96	144.90	4,457.29	591.23	-2,674.30	2,738.82	0.42	0.28	-21.83
5,618.00	0.98	168.91	4,551.27	589.80	-2,673.70	2,737.93	0.43	0.02	25.54
5,713.00	1.16	192.09	4,646.26	588.06	-2,673.74	2,737.61	0.49	0.19	24.40
5,807.00	1.55	194.91	4,740.23	585.90	-2,674.27	2,737.67	0.42	0.41	3.00
5,901.00	1.70	210.19	4,834.19	583.47	-2,675.30	2,738.16	0.49	0.16	16.26
5,995.00	1.68	207.16	4,928.15	581.03	-2,676.63	2,738.96	0.10	-0.02	-3.22
6,089.00	1.91	215.60	5,022.11	578.53	-2,678.17	2,739.94	0.37	0.24	8.98
6,184.00	2.37	215.70	5,117.04	575.65	-2,680.23	2,741.36	0.48	0.48	0.11
6,278.00	2.66	217.18	5,210.95	572.34	-2,682.69	2,743.06	0.32	0.31	1.57
6,373.00	3.19	218.10	5,305.82	568.50	-2,685.65	2,745.15	0.56	0.56	0.97
6,467.00	2.74	221.96	5,399.70	564.77	-2,688.77	2,747.42	0.52	-0.48	4.11
6,562.00	2.90	226.07	5,494.58	561.42	-2,692.01	2,749.89	0.27	0.17	4.33
6,615.00	2.90	233.36	5,547.52	559.68	-2,694.06	2,751.52	0.70	0.00	13.75
Last SDI Production MWD Survey									
6,690.00	2.90	233.36	5,622.42	557.42	-2,697.10	2,754.03	0.00	0.00	0.00
Projection to TD - GM 413-14 PBHL									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
123.00	123.00	0.27	-0.39	First SDI Gyro MWD Survey
957.00	912.52	46.25	-222.79	Last SDI Gyro MWD Survey
1,083.00	1,015.27	63.23	-293.70	First SDI Production MWD Survey
6,615.00	5,547.52	559.68	-2,694.06	Last SDI Production MWD Survey
6,690.00	5,622.42	557.42	-2,697.10	Projection to TD

Checked By: _____ Approved By: _____ Date: _____