



Well Details: GM 443-8

TVD Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318) Level: 6280.00					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	1599857.8200	2256701.0700	39.4508104	-108.1326178 GM 443-8 (A9)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 443-8 - Slot GM 443-8 (A9), True North
 Vertical (TVD) Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
 Section (VS) Reference: Slot - GM 443-8 (A9)(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

17:09, November 13 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 433-8
County & State Garfield County, CO
SDI Job No. OP.022106
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 7,258 feet is true and correct as determined from all available records.

Signature

13-Nov-19

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 443-8 - Slot GM 443-8 (A9)
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 443-8	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 443-8 - Slot GM 443-8 (A9)			
Well Position	+N/-S 0.00 usft	Northing: 1,599,857.8200 usft	Latitude: 39.4508104
	+E/-W 0.00 usft	Easting: 2,256,701.0700 usft	Longitude: -108.1326179
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	11/8/2019	9.38	65.62	51,534

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	100.84	

Survey Program		Date 11/13/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
120.00	953.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5
976.00	976.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM
1,080.00	7,258.00	Survey #3 - 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	0.00
120.00	0.44	54.40	120.00	0.27	0.37	0.32	0.37	0.37	0.37	0.00
First SDI Gyro MWD Survey										
212.00	4.05	90.53	211.91	0.44	3.91	3.76	4.03	3.92	39.27	
304.00	8.36	95.71	303.35	-0.25	13.82	13.62	4.72	4.68	5.63	
395.00	13.02	93.69	392.75	-1.57	30.64	30.39	5.14	5.12	-2.22	
487.00	17.51	97.56	481.48	-4.06	54.72	54.50	5.00	4.88	4.21	
578.00	20.50	99.32	567.52	-8.44	84.02	84.11	3.35	3.29	1.93	
670.00	24.11	99.84	652.62	-14.26	118.44	119.01	3.93	3.92	0.57	



Scientific Drilling, Intl Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 443-8 - Slot GM 443-8 (A9)
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 443-8	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	26.92	97.12	737.44	-20.18	158.48	159.45	3.24	2.99	-2.89	
859.00	29.74	99.67	821.06	-26.81	203.06	204.48	3.23	2.97	2.68	
953.00	31.85	96.77	901.81	-33.65	250.68	252.54	2.74	2.24	-3.09	
Last SDI Gyro MWD Survey										
976.00	32.27	96.39	921.30	-35.05	262.81	264.71	2.03	1.83	-1.65	
SDI Surface MWD Survey										
1,080.00	32.80	94.17	1,008.98	-40.19	318.50	320.37	1.26	0.51	-2.13	
First SDI Production MWD Survey										
1,174.00	31.96	93.74	1,088.36	-43.66	368.72	370.35	0.93	-0.89	-0.46	
1,268.00	30.93	95.63	1,168.56	-47.66	417.58	419.10	1.52	-1.10	2.01	
1,363.00	32.52	98.54	1,249.37	-53.84	467.14	468.93	2.32	1.67	3.06	
1,457.00	30.86	96.92	1,329.35	-60.50	516.06	518.23	1.98	-1.77	-1.72	
1,551.00	32.36	97.27	1,409.40	-66.59	564.95	567.40	1.61	1.60	0.37	
1,646.00	30.22	95.21	1,490.58	-71.98	613.99	616.57	2.52	-2.25	-2.17	
1,740.00	31.80	99.82	1,571.16	-78.35	661.96	664.88	3.03	1.68	4.90	
1,835.00	29.17	97.67	1,653.02	-85.71	709.58	713.04	3.00	-2.77	-2.26	
1,929.00	30.60	98.59	1,734.52	-92.34	755.94	759.82	1.60	1.52	0.98	
2,023.00	31.72	100.86	1,814.96	-100.57	803.87	808.44	1.73	1.19	2.41	
2,118.00	31.57	102.81	1,895.84	-110.79	852.65	858.27	1.09	-0.16	2.05	
2,213.00	32.33	103.89	1,976.44	-122.40	901.56	908.49	1.00	0.80	1.14	
2,307.00	32.77	104.15	2,055.68	-134.66	950.62	958.99	0.49	0.47	0.28	
2,401.00	30.66	101.53	2,135.64	-145.67	998.78	1,008.36	2.68	-2.24	-2.79	
2,495.00	32.26	104.60	2,215.83	-156.78	1,046.55	1,057.36	2.41	1.70	3.27	
2,590.00	29.55	101.75	2,297.34	-167.95	1,094.03	1,106.10	3.24	-2.85	-3.00	
2,684.00	31.57	104.63	2,378.28	-178.89	1,140.54	1,153.83	2.65	2.15	3.06	
2,779.00	33.06	105.53	2,458.56	-192.11	1,189.57	1,204.48	1.65	1.57	0.95	
2,873.00	30.16	103.69	2,538.61	-204.56	1,237.23	1,253.62	3.25	-3.09	-1.96	
2,968.00	30.85	103.75	2,620.46	-216.00	1,284.08	1,301.79	0.73	0.73	0.06	
3,062.00	30.86	105.44	2,701.16	-228.15	1,330.73	1,349.89	0.92	0.01	1.80	
3,156.00	32.26	105.76	2,781.25	-241.38	1,378.11	1,398.92	1.50	1.49	0.34	
3,250.00	32.54	105.44	2,860.62	-254.92	1,426.62	1,449.11	0.35	0.30	-0.34	
3,345.00	30.71	105.87	2,941.51	-268.36	1,474.59	1,498.75	1.94	-1.93	0.45	
3,439.00	32.15	105.42	3,021.71	-281.57	1,521.79	1,547.59	1.55	1.53	-0.48	
3,533.00	32.57	106.99	3,101.12	-295.62	1,570.10	1,597.68	1.00	0.45	1.67	
3,627.00	33.04	106.15	3,180.13	-310.14	1,618.91	1,648.35	0.70	0.50	-0.89	
3,721.00	32.29	106.83	3,259.26	-324.54	1,667.56	1,698.84	0.89	-0.80	0.72	
3,816.00	32.99	103.00	3,339.27	-337.70	1,717.05	1,749.92	2.30	0.74	-4.03	
3,910.00	33.45	100.96	3,417.91	-348.39	1,767.42	1,801.41	1.29	0.49	-2.17	
4,004.00	31.55	101.28	3,497.18	-358.12	1,816.98	1,851.91	2.03	-2.02	0.34	
4,098.00	29.15	101.34	3,578.29	-367.44	1,863.55	1,899.40	2.55	-2.55	0.06	
4,193.00	28.13	97.31	3,661.68	-374.84	1,908.45	1,944.89	2.30	-1.07	-4.24	
4,287.00	28.49	97.63	3,744.43	-380.63	1,952.65	1,989.40	0.42	0.38	0.34	
4,382.00	27.35	97.77	3,828.37	-386.59	1,996.73	2,033.81	1.20	-1.20	0.15	
4,476.00	25.98	98.84	3,912.38	-392.68	2,038.48	2,075.95	1.54	-1.46	1.14	



Scientific Drilling, Intl Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 443-8 - Slot GM 443-8 (A9)
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 443-8	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)	
4,570.00	23.90	100.78	3,997.61	-399.40	2,077.53	2,115.57	2.38	-2.21	2.06	
4,664.00	20.25	101.03	4,084.70	-406.08	2,112.21	2,150.89	3.88	-3.88	0.27	
4,759.00	18.35	98.83	4,174.36	-411.52	2,143.13	2,182.28	2.14	-2.00	-2.32	
4,853.00	19.27	94.72	4,263.34	-415.07	2,173.21	2,212.50	1.72	0.98	-4.37	
4,948.00	19.34	94.89	4,353.00	-417.70	2,204.51	2,243.73	0.09	0.07	0.18	
5,042.00	16.87	95.86	4,442.34	-420.42	2,233.59	2,272.80	2.65	-2.63	1.03	
5,137.00	16.71	97.56	4,533.29	-423.62	2,260.84	2,300.17	0.54	-0.17	1.79	
5,231.00	15.75	97.89	4,623.54	-427.15	2,286.88	2,326.40	1.03	-1.02	0.35	
5,325.00	13.09	96.91	4,714.57	-430.18	2,310.08	2,349.77	2.84	-2.83	-1.04	
5,407.12	10.66	92.81	4,794.93	-431.68	2,326.91	2,366.57	3.13	-2.95	-4.99	
GM 443-8 BTV										
5,420.00	10.29	92.00	4,807.60	-431.77	2,329.25	2,368.89	3.13	-2.91	-6.32	
5,514.00	7.30	81.63	4,900.49	-431.20	2,343.55	2,382.83	3.59	-3.18	-11.03	
5,608.00	4.88	62.53	4,993.96	-428.48	2,353.01	2,391.61	3.32	-2.57	-20.32	
5,703.00	1.41	36.80	5,088.80	-425.68	2,357.30	2,395.29	3.85	-3.65	-27.08	
5,797.00	0.40	1.18	5,182.79	-424.43	2,358.00	2,395.74	1.18	-1.07	-37.89	
5,891.00	0.54	188.39	5,276.79	-424.54	2,357.94	2,395.71	1.00	0.15	-183.82	
5,985.00	0.77	209.37	5,370.78	-425.53	2,357.56	2,395.52	0.35	0.24	22.32	
6,080.00	1.26	202.08	5,465.77	-427.05	2,356.86	2,395.12	0.53	0.52	-7.67	
6,174.00	1.96	214.83	5,559.73	-429.33	2,355.55	2,394.26	0.83	0.74	13.56	
6,269.00	2.03	224.00	5,654.67	-431.87	2,353.45	2,392.68	0.34	0.07	9.65	
6,363.00	2.19	231.04	5,748.61	-434.20	2,350.90	2,390.61	0.32	0.17	7.49	
6,457.00	3.01	221.90	5,842.51	-437.17	2,347.86	2,388.18	0.97	0.87	-9.72	
6,552.00	2.90	224.86	5,937.39	-440.73	2,344.50	2,385.55	0.20	-0.12	3.12	
6,647.00	3.17	225.85	6,032.25	-444.26	2,340.92	2,382.70	0.29	0.28	1.04	
6,741.00	3.06	228.12	6,126.11	-447.74	2,337.18	2,379.68	0.18	-0.12	2.41	
6,836.00	2.62	226.05	6,221.00	-450.94	2,333.73	2,376.90	0.48	-0.46	-2.18	
6,930.00	2.41	235.51	6,314.91	-453.55	2,330.56	2,374.27	0.49	-0.22	10.06	
7,025.00	2.53	223.80	6,409.82	-456.20	2,327.46	2,371.72	0.54	0.13	-12.33	
7,120.00	2.96	213.62	6,504.71	-459.75	2,324.65	2,369.63	0.68	0.45	-10.72	
7,200.00	3.69	223.04	6,584.58	-463.36	2,321.75	2,367.46	1.14	0.91	11.78	
Last SDI Production MWD Survey										
7,258.00	3.69	223.04	6,642.46	-466.08	2,319.20	2,365.47	0.00	0.00	0.00	
Projection to TD - GM 443-8 PBHL										



Scientific Drilling, Intl
Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 443-8 - Slot GM 443-8 (A9)
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 443-8	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	0.27	0.37	First SDI Gyro MWD Survey
953.00	901.81	-33.65	250.68	Last SDI Gyro MWD Survey
976.00	921.30	-35.05	262.81	SDI Surface MWD Survey
1,080.00	1,008.98	-40.19	318.50	First SDI Production MWD Survey
7,200.00	6,584.58	-463.36	2,321.75	Last SDI Production MWD Survey
7,258.00	6,642.46	-466.08	2,319.20	Projection to TD

Checked By: _____ Approved By: _____ Date: _____