



Well Details: GM 513-8

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	1599856.0900	2256688.6900	39.4508047	-108.1326615 GM 513-8 (B8)

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GM 513-8 - Slot GM 513-8 (B8), True North
 Vertical (TVD) Reference: GL 6280' & RKB 24' @ 6304.00usft (H&P 318)
 Section (VS) Reference: Slot - GM 513-8 (B8)(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

10:46, 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	<u>TEP Rocky Mountain, LLC.</u>
Well Name & No.	<u>GM 513-8</u>
County & State	<u>Garfield County, CO</u>
SDI Job No.	<u>OP.022058</u>
Rig	<u>H&P 318</u>

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 6,715 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 513-8 - Slot GM 513-8 (B8)
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 513-8	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 513-8 - Slot GM 513-8 (B8)						
Well Position	+N/-S	0.00 usft	Northing:	1,599,856.0900 usft	Latitude:	39.4508047
	+E/-W	0.00 usft	Easting:	2,256,688.6900 usft	Longitude:	-108.1326615
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	11/6/2019	9.38	65.62	51,535

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	236.52	

Survey Program		Date 11/13/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
120.00	487.00	Survey #1 - Gyro MWD Survey (OH)	Gyro MWD 105	Gyro MWD Error Model Ver 1.0.5
558.00	956.00	Survey #2 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM
1,080.00	6,715.00	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	0.53	205.14	120.00	-0.50	-0.24	0.47	0.44	0.44	0.00	
First SDI Gyro MWD Survey										
212.00	3.34	228.69	211.94	-2.66	-2.43	3.49	3.11	3.05	25.60	
304.00	6.07	236.60	303.62	-7.10	-8.51	11.01	3.04	2.97	8.60	
395.00	8.71	241.26	393.86	-13.07	-18.57	22.69	2.97	2.90	5.12	
487.00	10.56	236.16	484.56	-21.11	-31.68	38.07	2.21	2.01	-5.54	
Last SDI Gyro MWD Survey										



Scientific Drilling, Intl Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 513-8 - Slot GM 513-8 (B8)
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 513-8	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)	
558.00	12.51	238.18	554.12	-28.79	-43.62	52.26	2.80	2.75	2.85	
First SDI Surface MWD Survey										
650.00	14.87	236.60	643.50	-40.54	-61.94	74.03	2.60	2.57	-1.72	
744.00	16.15	233.59	734.08	-54.94	-82.53	99.15	1.61	1.36	-3.20	
839.00	17.17	234.01	825.09	-71.03	-104.51	126.35	1.08	1.07	0.44	
933.00	17.58	235.80	914.80	-87.16	-127.48	154.41	0.72	0.44	1.90	
956.00	18.03	235.61	936.70	-91.12	-133.29	161.44	1.97	1.96	-0.83	
Last SDI Surface MWD Survey										
1,080.00	18.76	235.53	1,054.36	-113.25	-165.56	200.57	0.59	0.59	-0.06	
First SDI Production MWD Survey										
1,174.00	17.62	235.61	1,143.66	-129.84	-189.77	229.90	1.21	-1.21	0.09	
1,269.00	18.23	236.06	1,234.05	-146.26	-213.96	259.14	0.66	0.64	0.47	
1,363.00	16.84	235.40	1,323.68	-162.20	-237.37	287.46	1.49	-1.48	-0.70	
1,457.00	17.63	233.83	1,413.46	-178.33	-260.07	315.29	0.98	0.84	-1.67	
1,552.00	16.84	233.70	1,504.19	-194.97	-282.77	343.41	0.83	-0.83	-0.14	
1,646.00	17.89	235.69	1,593.91	-211.17	-305.67	371.44	1.28	1.12	2.12	
1,740.00	17.23	235.08	1,683.53	-227.28	-329.01	399.80	0.73	-0.70	-0.65	
1,835.00	16.57	233.07	1,774.42	-243.47	-351.38	427.39	0.93	-0.69	-2.12	
1,929.00	16.14	237.65	1,864.62	-258.51	-373.13	453.83	1.45	-0.46	4.87	
2,024.00	15.29	235.30	1,956.07	-272.71	-394.58	479.55	1.12	-0.89	-2.47	
2,118.00	15.31	241.36	2,046.75	-285.72	-415.67	504.31	1.70	0.02	6.45	
2,213.00	14.68	238.63	2,138.51	-297.99	-436.95	528.84	1.00	-0.66	-2.87	
2,307.00	14.03	238.31	2,229.58	-310.18	-456.82	552.13	0.70	-0.69	-0.34	
2,402.00	12.85	236.93	2,321.97	-321.99	-475.47	574.21	1.29	-1.24	-1.45	
2,496.00	14.42	242.34	2,413.33	-333.13	-494.60	596.30	2.15	1.67	5.76	
2,590.00	15.00	244.32	2,504.25	-343.84	-515.93	620.00	0.82	0.62	2.11	
2,684.00	13.26	242.37	2,595.40	-354.11	-536.44	642.78	1.92	-1.85	-2.07	
2,779.00	14.32	239.96	2,687.66	-365.04	-556.27	665.35	1.27	1.12	-2.54	
2,873.00	12.98	239.39	2,779.00	-376.24	-575.42	687.49	1.43	-1.43	-0.61	
2,968.00	15.99	237.52	2,870.97	-388.70	-595.64	711.24	3.21	3.17	-1.97	
3,062.00	15.42	236.28	2,961.46	-402.59	-616.96	736.68	0.70	-0.61	-1.32	
3,156.00	14.90	236.17	3,052.19	-416.26	-637.39	761.26	0.55	-0.55	-0.12	
3,250.00	14.47	236.46	3,143.12	-429.47	-657.22	785.09	0.46	-0.46	0.31	
3,345.00	14.36	235.42	3,235.13	-442.72	-676.81	808.74	0.30	-0.12	-1.09	
3,439.00	13.77	235.64	3,326.31	-455.65	-695.65	831.58	0.63	-0.63	0.23	
3,533.00	14.48	237.84	3,417.47	-468.22	-714.83	854.51	0.95	0.76	2.34	
3,627.00	14.04	236.01	3,508.57	-480.85	-734.23	877.67	0.67	-0.47	-1.95	
3,721.00	12.98	234.24	3,599.97	-493.39	-752.25	899.62	1.21	-1.13	-1.88	
3,816.00	12.17	232.52	3,692.69	-505.72	-768.86	920.27	0.94	-0.85	-1.81	
3,910.00	11.36	230.59	3,784.72	-517.63	-783.87	939.36	0.96	-0.86	-2.05	
4,004.00	10.88	229.49	3,876.95	-529.27	-797.77	957.37	0.56	-0.51	-1.17	
4,098.00	10.22	236.17	3,969.37	-539.67	-811.44	974.52	1.48	-0.70	7.11	
4,193.00	9.11	244.51	4,063.02	-547.60	-825.24	990.39	1.88	-1.17	8.78	
4,287.00	7.18	249.90	4,156.07	-552.82	-837.47	1,003.48	2.21	-2.05	5.73	



Scientific Drilling, Intl
Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 513-8 - Slot GM 513-8 (B8)
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 513-8	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)	
4,382.00	5.20	258.28	4,250.51	-555.74	-847.26	1,013.25	2.29	-2.08	8.82	
4,476.00	5.13	253.76	4,344.13	-557.78	-855.47	1,021.22	0.44	-0.07	-4.81	
4,570.00	4.93	247.02	4,437.77	-560.53	-863.22	1,029.21	0.66	-0.21	-7.17	
4,665.00	2.45	259.25	4,532.57	-562.50	-868.98	1,035.10	2.72	-2.61	12.87	
4,759.00	2.33	252.40	4,626.49	-563.46	-872.77	1,038.79	0.33	-0.13	-7.29	
4,853.00	2.60	249.21	4,720.40	-564.79	-876.58	1,042.71	0.32	0.29	-3.39	
4,948.00	2.62	236.49	4,815.30	-566.76	-880.41	1,046.98	0.61	0.02	-13.39	
5,042.00	0.60	157.89	4,909.27	-568.40	-882.02	1,049.22	2.73	-2.15	-83.62	
5,063.85	0.62	146.59	4,931.12	-568.60	-881.91	1,049.25	0.56	0.10	-51.69	
GM 513-8 BTV										
5,137.00	0.83	118.30	5,004.26	-569.18	-881.22	1,049.00	0.56	0.29	-38.68	
5,231.00	1.11	134.68	5,098.25	-570.15	-879.98	1,048.49	0.42	0.30	17.43	
5,325.00	1.37	148.32	5,192.22	-571.74	-878.74	1,048.34	0.42	0.28	14.51	
5,420.00	1.46	157.14	5,287.19	-573.83	-877.67	1,048.60	0.25	0.09	9.28	
5,514.00	1.65	163.44	5,381.16	-576.23	-876.82	1,049.21	0.27	0.20	6.70	
5,608.00	1.93	157.24	5,475.11	-578.98	-875.82	1,049.90	0.36	0.30	-6.60	
5,703.00	2.27	169.39	5,570.05	-582.31	-874.86	1,050.93	0.59	0.36	12.79	
5,797.00	2.94	172.02	5,663.95	-586.52	-874.18	1,052.69	0.72	0.71	2.80	
5,891.00	2.40	172.44	5,757.85	-590.86	-873.59	1,054.59	0.57	-0.57	0.45	
5,985.00	2.52	186.17	5,851.76	-594.87	-873.55	1,056.77	0.64	0.13	14.61	
6,080.00	3.04	185.94	5,946.65	-599.45	-874.04	1,059.70	0.55	0.55	-0.24	
6,174.00	2.64	190.60	6,040.54	-604.06	-874.69	1,062.79	0.49	-0.43	4.96	
6,269.00	2.93	189.45	6,135.43	-608.60	-875.49	1,065.96	0.31	0.31	-1.21	
6,363.00	2.90	193.77	6,229.30	-613.28	-876.45	1,069.35	0.24	-0.03	4.60	
6,457.00	3.47	190.64	6,323.16	-618.39	-877.54	1,073.07	0.63	0.61	-3.33	
6,552.00	3.51	190.58	6,417.98	-624.07	-878.61	1,077.10	0.04	0.04	-0.06	
6,662.00	4.22	193.77	6,527.73	-631.31	-880.19	1,082.41	0.67	0.65	2.90	
Last SDI Production MWD Survey										
6,715.00	4.22	193.77	6,580.59	-635.10	-881.12	1,085.27	0.00	0.00	0.00	
Projection to TD - GM 513-8 PBHL										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
120.00	120.00	-0.50	-0.24	First SDI Gyro MWD Survey	
487.00	484.56	-21.11	-31.68	Last SDI Gyro MWD Survey	
558.00	554.12	-28.79	-43.62	First SDI Surface MWD Survey	
956.00	936.70	-91.12	-133.29	Last SDI Surface MWD Survey	
1,080.00	1,054.36	-113.25	-165.56	First SDI Production MWD Survey	
6,662.00	6,527.73	-631.31	-880.19	Last SDI Production MWD Survey	
6,715.00	6,580.59	-635.10	-881.12	Projection to TD	



Scientific Drilling, Intl
Survey Report

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well GM 513-8 - Slot GM 513-8 (B8)
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 513-8	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------