



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.	PA 414-24
County & State	Garfield County, CO
SDI Job No.	OP.008076
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 154 feet to a measured depth of 8,925 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

1-Mar-18

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well PA 414-24 - Slot PA 414-24 (A14)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Site:	PA 22-25 Pad	MD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Well:	PA 414-24	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		PA 22-25 Pad			
Site Position:		Northing:	1,615,186.77 usft	Latitude:	39.4968742
From:	Map	Easting:	2,308,728.18 usft	Longitude:	-107.9499045
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.55 °

Well		PA 414-24 - Slot PA 414-24 (A14), A14				
Well Position	+N/-S	0.00 usft	Northing:	1,615,187.66 usft	Latitude:	39.4968842
	+E/-W	0.00 usft	Easting:	2,308,830.26 usft	Longitude:	-107.9495430
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	5,224.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/13/2018	9.40	65.77	51,657

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	336.76	

Survey Program	Date	3/1/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
154.00	859.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
934.00	1,070.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
1,175.00	8,925.00	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	
SHL (PA 414-24)										
154.00	1.76	342.60	153.98	2.26	-0.71	2.35	1.14	1.14	0.00	
First SDI Gyro MWD Survey										
215.00	2.64	341.02	214.93	4.48	-1.44	4.69	1.45	1.44	-2.59	
307.00	2.46	344.88	306.84	8.39	-2.65	8.75	0.27	-0.20	4.20	
400.00	2.11	333.02	399.77	11.84	-3.95	12.44	0.63	-0.38	-12.75	
491.00	3.26	335.57	490.66	15.69	-5.78	16.70	1.27	1.26	2.80	

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Site:	PA 22-25 Pad	MD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Well:	PA 414-24	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)	
582.00	5.63	336.01	581.38	22.13	-8.66	23.75	2.60	2.60	0.48	
674.00	8.53	338.91	672.67	32.62	-12.95	35.08	3.18	3.15	3.15	
766.00	11.70	339.52	763.23	47.72	-18.67	51.22	3.45	3.45	0.66	
859.00	14.78	331.52	853.76	66.99	-27.63	72.46	3.85	3.31	-8.60	
Last SDI Gyro MWD Survey										
934.00	17.10	336.11	925.87	85.49	-36.66	93.01	3.52	3.09	6.12	
First SDI Surface MWD Survey										
1,028.00	19.79	337.06	1,015.03	112.78	-48.46	122.75	2.88	2.86	1.01	
1,070.00	20.75	336.62	1,054.43	126.16	-54.19	137.30	2.31	2.29	-1.05	
Last SDI Surface MWD Survey										
1,175.00	22.36	335.35	1,152.09	161.39	-69.90	175.87	1.60	1.53	-1.21	
First SDI Production MWD Survey										
1,269.00	24.13	340.14	1,238.46	195.71	-83.88	212.93	2.75	1.88	5.10	
1,364.00	27.03	341.48	1,324.14	234.45	-97.34	253.84	3.11	3.05	1.41	
1,458.00	30.10	340.41	1,406.69	276.93	-112.03	298.66	3.31	3.27	-1.14	
1,552.00	34.04	339.73	1,486.33	323.83	-129.06	348.48	4.21	4.19	-0.72	
1,647.00	37.11	338.96	1,563.59	375.53	-148.56	403.68	3.27	3.23	-0.81	
1,741.00	39.88	339.61	1,637.15	430.26	-169.25	462.13	2.98	2.95	0.69	
1,836.00	41.32	337.43	1,709.28	487.77	-191.90	523.91	2.13	1.52	-2.29	
1,930.00	39.85	336.53	1,780.67	544.06	-215.80	585.06	1.68	-1.56	-0.96	
2,024.00	39.87	337.97	1,852.83	599.61	-239.10	645.30	0.98	0.02	1.53	
2,119.00	41.37	339.19	1,924.94	657.19	-261.68	707.12	1.79	1.58	1.28	
2,213.00	40.69	337.89	1,995.85	714.62	-284.25	768.79	1.16	-0.72	-1.38	
2,307.00	40.50	337.60	2,067.22	771.23	-307.41	829.95	0.28	-0.20	-0.31	
2,402.00	39.85	337.50	2,139.81	827.87	-330.82	891.23	0.69	-0.68	-0.11	
2,496.00	41.03	339.23	2,211.35	884.55	-353.28	952.17	1.73	1.26	1.84	
2,591.00	40.22	339.11	2,283.46	942.36	-375.28	1,013.97	0.86	-0.85	-0.13	
2,684.00	39.73	338.95	2,354.73	998.15	-396.66	1,073.67	0.54	-0.53	-0.17	
2,779.00	38.25	338.70	2,428.56	1,053.88	-418.25	1,133.40	1.57	-1.56	-0.26	
2,873.00	40.17	339.22	2,501.39	1,109.34	-439.58	1,192.78	2.07	2.04	0.55	
2,967.00	39.08	339.73	2,573.80	1,165.49	-460.60	1,252.66	1.21	-1.16	0.54	
3,061.00	40.54	339.08	2,646.00	1,221.82	-481.77	1,312.78	1.62	1.55	-0.69	
3,155.00	42.54	338.84	2,716.36	1,279.99	-504.15	1,375.06	2.13	2.13	-0.26	
3,249.00	41.41	339.22	2,786.24	1,338.70	-526.65	1,437.88	1.23	-1.20	0.40	
3,343.00	40.01	338.37	2,857.49	1,395.85	-548.82	1,499.15	1.60	-1.49	-0.90	
3,438.00	39.85	337.35	2,930.34	1,452.33	-571.80	1,560.11	0.71	-0.17	-1.07	
3,532.00	40.59	337.85	3,002.12	1,508.45	-594.93	1,620.80	0.86	0.79	0.53	
3,626.00	39.52	336.57	3,074.07	1,564.22	-618.35	1,681.29	1.44	-1.14	-1.36	
3,721.00	40.81	338.76	3,146.67	1,620.89	-641.62	1,742.54	2.01	1.36	2.31	
3,816.00	40.05	337.94	3,218.98	1,678.16	-664.35	1,804.13	0.98	-0.80	-0.86	
3,910.00	39.74	336.43	3,291.10	1,733.73	-687.72	1,864.41	1.08	-0.33	-1.61	
4,005.00	38.83	335.07	3,364.63	1,788.57	-712.42	1,924.55	1.32	-0.96	-1.43	
4,100.00	38.16	338.47	3,438.99	1,842.89	-735.75	1,983.66	2.34	-0.71	3.58	
4,194.00	38.01	338.29	3,512.98	1,896.79	-757.11	2,041.62	0.20	-0.16	-0.19	

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Well:	PA 414-24	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

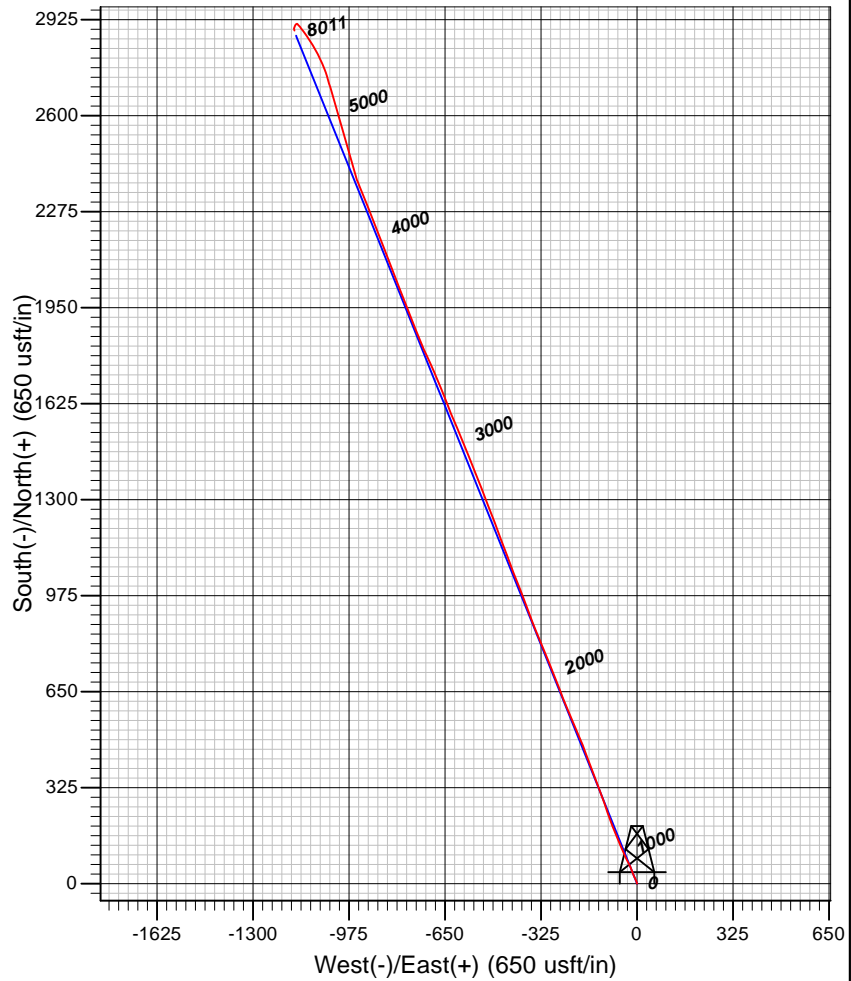
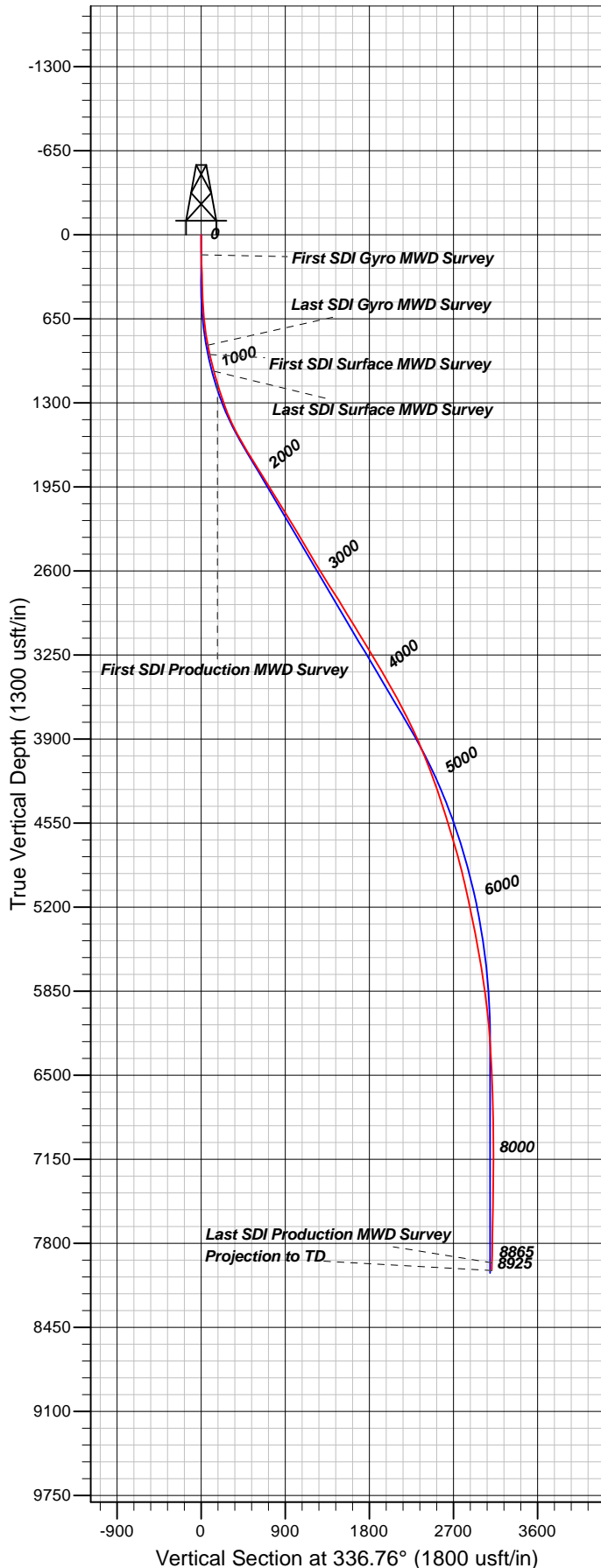
Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,288.00	37.51	338.37	3,587.30	1,950.28	-778.36	2,099.16	0.53	-0.53	0.09
4,383.00	35.34	338.29	3,663.73	2,002.70	-799.19	2,155.55	2.28	-2.28	-0.08
4,477.00	35.05	338.56	3,740.55	2,053.08	-819.11	2,209.70	0.35	-0.31	0.29
4,572.00	32.46	339.54	3,819.53	2,102.37	-838.00	2,262.44	2.79	-2.73	1.03
4,667.00	31.66	339.05	3,900.04	2,149.54	-855.83	2,312.82	0.89	-0.84	-0.52
4,781.00	29.70	338.99	3,998.08	2,203.85	-876.65	2,370.93	1.72	-1.72	-0.05
4,875.00	29.07	338.94	4,079.98	2,246.90	-893.21	2,417.02	0.67	-0.67	-0.05
4,950.00	28.21	338.18	4,145.81	2,280.36	-906.34	2,452.95	1.25	-1.15	-1.01
5,044.00	26.90	337.39	4,229.14	2,320.61	-922.78	2,496.43	1.45	-1.39	-0.84
5,139.00	24.81	337.27	4,314.63	2,358.84	-938.74	2,537.85	2.20	-2.20	-0.13
5,233.00	23.76	343.13	4,400.32	2,395.16	-951.86	2,576.40	2.80	-1.12	6.23
5,328.00	23.06	343.30	4,487.50	2,431.30	-962.76	2,613.90	0.74	-0.74	0.18
5,422.00	23.93	344.90	4,573.71	2,467.34	-973.02	2,651.07	1.15	0.93	1.70
5,446.61	23.79	344.87	4,596.22	2,476.95	-975.61	2,660.92	0.59	-0.59	-0.14
PA 414-24 MVRD									
5,516.00	23.38	344.77	4,659.81	2,503.74	-982.88	2,688.41	0.59	-0.59	-0.14
5,610.00	21.93	343.94	4,746.55	2,538.60	-992.64	2,724.29	1.58	-1.54	-0.88
5,705.00	19.89	343.91	4,835.29	2,571.18	-1,002.03	2,757.93	2.15	-2.15	-0.03
5,800.00	19.63	342.95	4,924.70	2,601.97	-1,011.18	2,789.83	0.44	-0.27	-1.01
5,894.00	18.31	343.38	5,013.59	2,631.21	-1,020.04	2,820.20	1.41	-1.40	0.46
5,989.00	16.47	343.23	5,104.25	2,658.41	-1,028.19	2,848.40	1.94	-1.94	-0.16
6,083.00	15.64	345.61	5,194.58	2,683.44	-1,035.19	2,874.16	1.13	-0.88	2.53
6,178.00	16.54	342.87	5,285.86	2,708.77	-1,042.35	2,900.26	1.24	0.95	-2.88
6,272.00	15.66	343.87	5,376.17	2,733.74	-1,049.82	2,926.16	0.98	-0.94	1.06
6,367.00	14.96	337.38	5,467.81	2,757.38	-1,058.10	2,951.14	1.95	-0.74	-6.83
6,460.00	13.58	335.93	5,557.93	2,778.43	-1,067.17	2,974.07	1.53	-1.48	-1.56
6,554.00	11.96	335.96	5,649.61	2,797.40	-1,075.63	2,994.84	1.72	-1.72	0.03
6,648.00	11.81	330.97	5,741.59	2,814.71	-1,084.27	3,014.15	1.10	-0.16	-5.31
6,742.00	11.25	330.87	5,833.70	2,831.13	-1,093.40	3,032.84	0.60	-0.60	-0.11
6,836.00	9.81	326.48	5,926.11	2,845.81	-1,102.29	3,049.84	1.75	-1.53	-4.67
6,931.00	8.62	326.66	6,019.88	2,858.51	-1,110.67	3,064.82	1.25	-1.25	0.19
7,025.00	7.39	324.83	6,112.97	2,869.34	-1,118.03	3,077.67	1.34	-1.31	-1.95
7,119.00	5.79	324.48	6,206.34	2,878.14	-1,124.26	3,088.21	1.70	-1.70	-0.37
7,213.00	5.10	322.03	6,299.92	2,885.29	-1,129.59	3,096.89	0.77	-0.73	-2.61
7,308.00	4.22	321.68	6,394.60	2,891.36	-1,134.35	3,104.35	0.93	-0.93	-0.37
7,402.00	3.52	326.33	6,488.39	2,896.48	-1,138.10	3,110.53	0.82	-0.74	4.95
7,496.00	2.99	320.71	6,582.24	2,900.78	-1,141.25	3,115.72	0.66	-0.56	-5.98
7,589.00	2.65	318.04	6,675.12	2,904.25	-1,144.22	3,120.09	0.39	-0.37	-2.87
7,683.00	1.76	321.24	6,769.05	2,906.99	-1,146.58	3,123.54	0.96	-0.95	3.40
7,777.00	1.63	318.42	6,863.01	2,909.12	-1,148.37	3,126.20	0.16	-0.14	-3.00
7,871.00	1.11	298.35	6,956.99	2,910.55	-1,150.06	3,128.18	0.74	-0.55	-21.35
7,965.00	1.21	261.12	7,050.97	2,910.83	-1,151.84	3,129.14	0.79	0.11	-39.61
8,059.00	1.30	253.22	7,144.95	2,910.37	-1,153.84	3,129.50	0.21	0.10	-8.40
8,154.00	1.85	211.73	7,239.91	2,908.75	-1,155.68	3,128.75	1.29	0.58	-43.67

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Site:	PA 22-25 Pad	MD Reference:	GL 5224' & RKB 24' @ 5248.00usft
Well:	PA 414-24	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)
8,248.00	1.98	204.39	7,333.86	2,905.98	-1,157.15	3,126.78	0.30	0.14	-7.81
8,341.00	2.18	202.55	7,426.80	2,902.89	-1,158.49	3,124.46	0.23	0.22	-1.98
8,436.00	1.78	203.12	7,521.74	2,899.86	-1,159.76	3,122.19	0.42	-0.42	0.60
8,530.00	1.81	201.23	7,615.70	2,897.14	-1,160.87	3,120.12	0.07	0.03	-2.01
8,625.00	1.14	171.61	7,710.66	2,894.80	-1,161.28	3,118.14	1.05	-0.71	-31.18
8,719.00	1.37	166.31	7,804.64	2,892.79	-1,160.88	3,116.12	0.27	0.24	-5.64
8,813.00	1.32	158.73	7,898.62	2,890.68	-1,160.22	3,113.93	0.20	-0.05	-8.06
8,865.00	1.32	166.90	7,950.60	2,889.54	-1,159.87	3,112.74	0.36	0.00	15.71
Last SDI Production MWD Survey									
8,925.00	1.32	166.90	8,010.59	2,888.20	-1,159.55	3,111.38	0.00	0.00	0.00
Projection to TD - PBHL (PA 414-24) - PA 414-24 PBHL									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
154.00	153.98	2.26	-0.71	First SDI Gyro MWD Survey
859.00	853.76	66.99	-27.63	Last SDI Gyro MWD Survey
934.00	925.87	85.49	-36.66	First SDI Surface MWD Survey
1,070.00	1,054.43	126.16	-54.19	Last SDI Surface MWD Survey
1,175.00	1,152.09	161.39	-69.90	First SDI Production MWD Survey
8,865.00	7,950.60	2,889.54	-1,159.87	Last SDI Production MWD Survey
8,925.00	8,010.59	2,888.20	-1,159.55	Projection to TD

Checked By: _____ Approved By: _____ Date: _____



Well Details: PA 414-24

TVD Reference: GL 5224' & RKB 24' @ 5248.00usft		Ground Level: 5224.00	
+N/-S	+E/-W	North	East
0.00	0.00	1615187.66	2308830.26
		Latitude	Longitude
		39.4968841	-107.9495430

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well PA 414-24 - Slot PA 414-24 (A14), True North
 Vertical (TVD) Reference: GL 5224' & RKB 24' @ 5248.00usft
 Section (VS) Reference: Slot - PA 414-24 (A14) (0.00N, 0.00E)
 Measured Depth Reference: GL 5224' & RKB 24' @ 5248.00usft
 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

17:19, March 01 2018
 Created By: Mel Mireles Jr.