



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.	RU 513-17
County & State	Garfield County, CO
SDI Job No.	OP.00656
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 124 feet to a measured depth of 10,710 feet is true and correct as determined from all available records.

Signature

 26-Apr-18

Date

Mel Mireles Jr.

Grand Junction Assistant Well Planner
Scientific Drilling - Colorado District

Company:	TEP Rocky Mountain LLC	Local Co-ordinate Reference:	Well RU 513-17 - Slot RU 513-17 (A9)
Project:	Garfield County, CO NAD83	TVD Reference:	GL 8368.6' & RKB 24' @ 8392.60usft (H&P 318)
Site:	RU 23-17 Pad	MD Reference:	GL 8368.6' & RKB 24' @ 8392.60usft (H&P 318)
Well:	RU 513-17	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	RU 23-17 Pad				
Site Position:		Northing:	1,594,634.40 usft	Latitude:	39.4435163
From:	Map	Easting:	2,351,232.80 usft	Longitude:	-107.7974906
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.45 °

Well	RU 513-17 - Slot RU 513-17 (A9)					
Well Position	+N/-S	0.00 usft	Northing:	1,594,605.00 usft	Latitude:	39.4434373
	+E/-W	0.00 usft	Easting:	2,351,256.00 usft	Longitude:	-107.7974058
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	8,368.60 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/20/2018	9.18	65.57	51,569

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	263.60	

Survey Program	Date	4/26/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
124.00	959.00	Survey #1 - Gyro MWD Survey (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
1,035.00	1,076.00	Survey #2 - Surface MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
1,149.00	10,710.00	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	0.00
124.00	0.18	133.24	124.00	-0.13	0.14	-0.13	0.15	0.15	0.00	
First SDI Gyro MWD Survey										
217.00	0.97	247.15	217.00	-0.54	-0.48	0.53	1.14	0.85	122.48	
309.00	2.73	264.29	308.94	-1.06	-3.38	3.47	1.98	1.91	18.63	
400.00	5.19	266.13	399.72	-1.55	-9.64	9.75	2.71	2.70	2.02	
492.00	8.01	268.68	491.10	-1.98	-20.20	20.30	3.08	3.07	2.77	
585.00	10.65	266.04	582.86	-2.72	-35.25	35.34	2.88	2.84	-2.84	
676.00	13.99	267.54	671.76	-3.78	-54.64	54.72	3.69	3.67	1.65	

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Site:	RU 23-17 Pad	MD Reference:	GL 8368.6' & RKB 24' @ 8392.60usft (H&P 318)
Well:	RU 513-17	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)	
771.00	17.33	264.99	763.22	-5.51	-80.21	80.33	3.59	3.52	-2.68	
865.00	18.83	261.83	852.58	-8.89	-109.18	109.49	1.91	1.60	-3.36	
959.00	19.79	261.56	941.29	-13.38	-139.94	140.55	1.03	1.02	-0.29	
Last SDI Gyro MW Survey										
1,035.00	20.66	261.25	1,012.60	-17.30	-165.91	166.81	1.15	1.14	-0.41	
First SDI Surface MWD Survey										
1,076.00	21.28	259.05	1,050.88	-19.82	-180.37	181.45	2.44	1.51	-5.37	
Last SDI Surface MWD Survey										
1,149.00	22.19	258.72	1,118.69	-25.03	-206.89	208.39	1.26	1.25	-0.45	
First SDI Production MWD Survey										
1,275.00	21.46	257.44	1,235.66	-34.70	-252.72	255.02	0.69	-0.58	-1.02	
1,369.00	20.94	257.90	1,323.30	-41.96	-285.93	288.83	0.58	-0.55	0.49	
1,464.00	19.27	255.09	1,412.51	-49.55	-317.68	321.23	2.03	-1.76	-2.96	
1,555.00	20.19	260.22	1,498.17	-56.08	-347.67	351.76	2.15	1.01	5.64	
1,653.00	19.52	258.70	1,590.35	-62.16	-380.39	384.95	0.86	-0.68	-1.55	
1,747.00	19.28	262.95	1,679.02	-67.15	-411.20	416.12	1.52	-0.26	4.52	
1,842.00	18.77	261.94	1,768.83	-71.21	-441.89	447.08	0.64	-0.54	-1.06	
1,936.00	20.40	268.37	1,857.40	-73.80	-473.25	478.53	2.87	1.73	6.84	
2,031.00	20.26	268.18	1,946.48	-74.79	-506.24	511.42	0.16	-0.15	-0.20	
2,125.00	20.14	268.02	2,034.70	-75.87	-538.68	543.78	0.14	-0.13	-0.17	
2,220.00	19.72	267.89	2,124.01	-77.03	-571.04	576.07	0.44	-0.44	-0.14	
2,314.00	19.32	267.48	2,212.60	-78.29	-602.43	607.40	0.45	-0.43	-0.44	
2,409.00	18.95	268.40	2,302.36	-79.41	-633.55	638.45	0.50	-0.39	0.97	
2,503.00	18.91	267.40	2,391.27	-80.53	-664.02	668.86	0.35	-0.04	-1.06	
2,597.00	18.76	266.72	2,480.24	-82.09	-694.33	699.15	0.28	-0.16	-0.72	
2,692.00	19.09	267.67	2,570.10	-83.59	-725.10	729.90	0.48	0.35	1.00	
2,787.00	18.64	268.37	2,660.00	-84.66	-755.80	760.52	0.53	-0.47	0.74	
2,881.00	17.99	268.17	2,749.24	-85.55	-785.32	789.96	0.69	-0.69	-0.21	
2,976.00	19.63	264.78	2,839.16	-87.47	-815.88	820.54	2.07	1.73	-3.57	
3,070.00	18.87	263.98	2,927.91	-90.50	-846.72	851.53	0.86	-0.81	-0.85	
3,165.00	18.62	263.38	3,017.87	-93.86	-877.06	882.06	0.33	-0.26	-0.63	
3,259.00	18.34	263.11	3,107.02	-97.36	-906.65	911.86	0.31	-0.30	-0.29	
3,353.00	17.96	262.43	3,196.34	-101.05	-935.70	941.13	0.46	-0.40	-0.72	
3,448.00	17.61	264.04	3,286.80	-104.47	-964.51	970.15	0.64	-0.37	1.69	
3,542.00	19.06	261.18	3,376.03	-108.30	-993.82	999.70	1.81	1.54	-3.04	
3,637.00	18.93	262.70	3,465.86	-112.63	-1,024.44	1,030.61	0.54	-0.14	1.60	
3,731.00	18.08	261.71	3,555.00	-116.67	-1,054.00	1,060.43	0.96	-0.90	-1.05	
3,826.00	18.24	263.08	3,645.27	-120.59	-1,083.34	1,090.03	0.48	0.17	1.44	
3,920.00	17.56	263.06	3,734.72	-124.08	-1,112.02	1,118.92	0.72	-0.72	-0.02	
4,015.00	19.37	260.00	3,824.82	-128.54	-1,141.77	1,148.98	2.16	1.91	-3.22	
4,110.00	19.05	259.83	3,914.53	-134.02	-1,172.54	1,180.17	0.34	-0.34	-0.18	
4,204.00	18.29	261.27	4,003.59	-138.97	-1,202.22	1,210.22	0.95	-0.81	1.53	
4,299.00	18.05	262.05	4,093.85	-143.26	-1,231.53	1,239.83	0.36	-0.25	0.82	
4,393.00	17.15	261.87	4,183.45	-147.24	-1,259.67	1,268.24	0.96	-0.96	-0.19	

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Well:	RU 513-17	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
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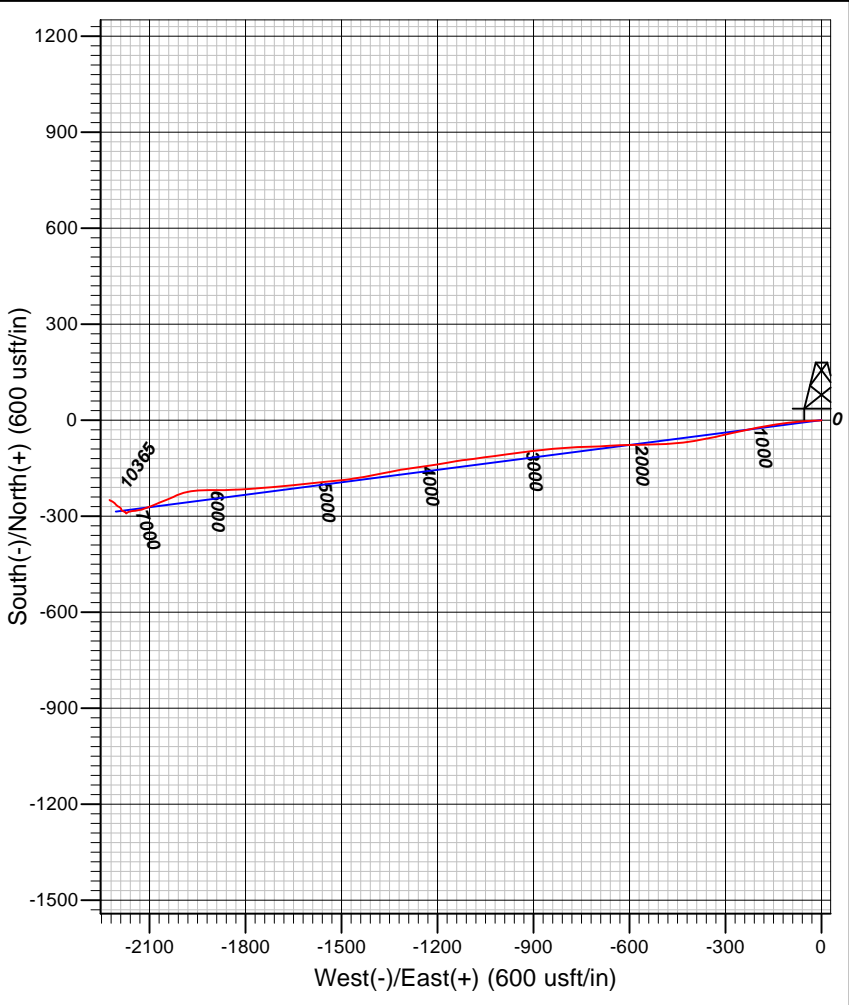
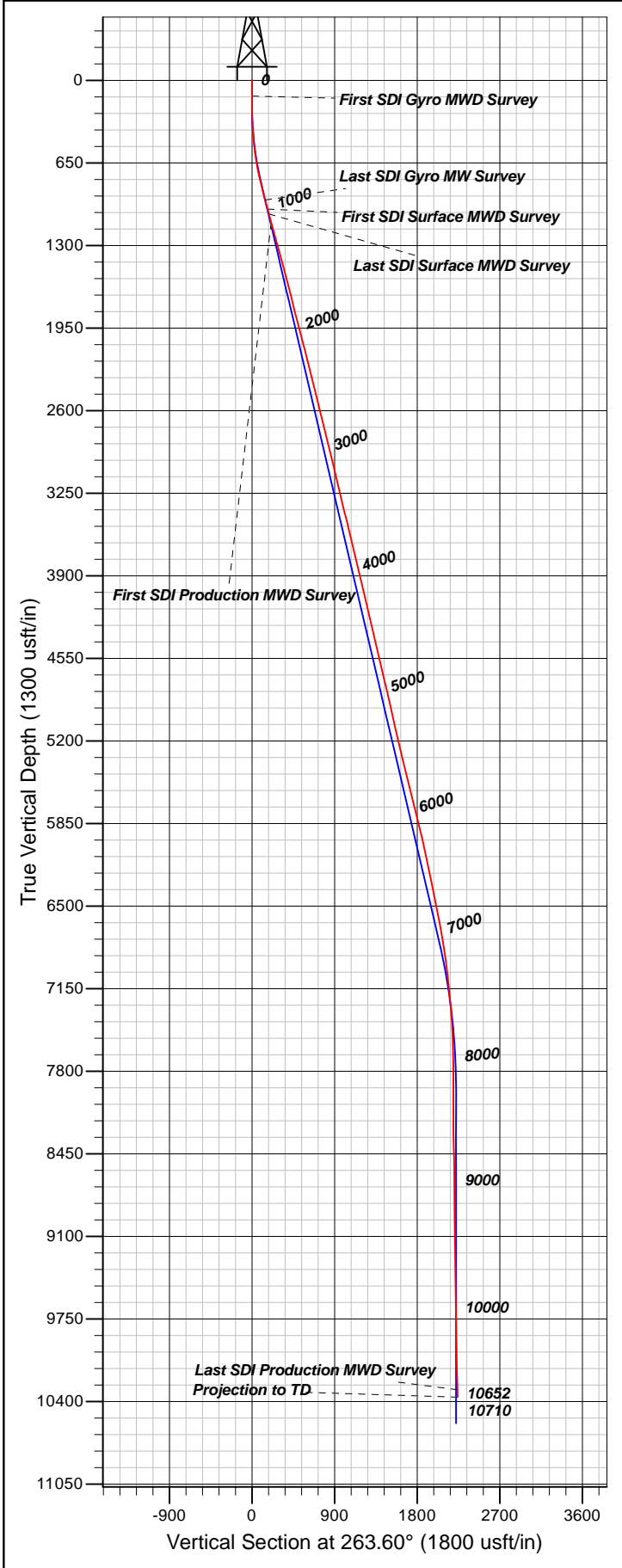
Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,488.00	16.97	262.48	4,274.27	-151.03	-1,287.28	1,296.10	0.27	-0.19	0.64	
4,582.00	18.47	258.79	4,363.81	-155.72	-1,315.49	1,324.65	1.99	1.60	-3.93	
4,677.00	18.36	259.28	4,453.95	-161.43	-1,344.96	1,354.57	0.20	-0.12	0.52	
4,771.00	17.86	259.60	4,543.29	-166.79	-1,373.68	1,383.71	0.54	-0.53	0.34	
4,866.00	17.28	259.18	4,633.86	-172.07	-1,401.87	1,412.31	0.62	-0.61	-0.44	
4,960.00	18.90	259.44	4,723.21	-177.48	-1,430.55	1,441.42	1.73	1.72	0.28	
5,055.00	18.40	261.15	4,813.22	-182.60	-1,460.49	1,471.74	0.78	-0.53	1.80	
5,149.00	17.38	263.00	4,902.67	-186.60	-1,489.08	1,500.60	1.24	-1.09	1.97	
5,244.00	16.44	263.80	4,993.56	-189.78	-1,516.53	1,528.23	1.02	-0.99	0.84	
5,338.00	17.99	265.22	5,083.35	-192.43	-1,544.22	1,556.05	1.71	1.65	1.51	
5,433.00	17.15	264.77	5,173.92	-194.92	-1,572.79	1,584.72	0.90	-0.88	-0.47	
5,527.00	19.42	263.58	5,263.17	-197.94	-1,602.12	1,614.20	2.45	2.41	-1.27	
5,621.00	18.91	263.80	5,351.96	-201.33	-1,632.80	1,645.06	0.55	-0.54	0.23	
5,716.00	18.11	263.80	5,442.04	-204.59	-1,662.78	1,675.22	0.84	-0.84	0.00	
5,810.00	17.52	265.37	5,531.53	-207.30	-1,691.41	1,703.97	0.81	-0.63	1.67	
5,904.00	19.35	264.94	5,620.71	-209.82	-1,721.02	1,733.69	1.95	1.95	-0.46	
5,999.00	19.40	265.74	5,710.33	-212.38	-1,752.44	1,765.19	0.28	0.05	0.84	
6,093.00	19.17	265.80	5,799.05	-214.67	-1,783.40	1,796.21	0.25	-0.24	0.06	
6,187.00	18.96	266.97	5,887.90	-216.61	-1,814.04	1,826.88	0.46	-0.22	1.24	
6,282.00	17.83	268.62	5,978.04	-217.77	-1,843.99	1,856.77	1.31	-1.19	1.74	
6,377.00	16.27	269.03	6,068.86	-218.35	-1,871.84	1,884.51	1.65	-1.64	0.43	
6,472.00	15.92	268.75	6,160.14	-218.86	-1,898.17	1,910.74	0.38	-0.37	-0.29	
6,566.00	15.88	270.10	6,250.54	-219.12	-1,923.92	1,936.35	0.40	-0.04	1.44	
6,661.00	16.62	266.35	6,341.75	-219.96	-1,950.48	1,962.84	1.35	0.78	-3.95	
6,755.00	16.43	258.77	6,431.88	-223.41	-1,976.93	1,989.52	2.30	-0.20	-8.06	
6,850.00	15.56	248.86	6,523.22	-230.62	-2,002.00	2,015.23	3.01	-0.92	-10.43	
6,945.00	15.04	248.15	6,614.85	-239.80	-2,025.33	2,039.43	0.58	-0.55	-0.75	
7,039.00	14.39	246.53	6,705.77	-248.99	-2,047.36	2,062.36	0.82	-0.69	-1.72	
7,134.00	12.22	246.66	6,798.21	-257.68	-2,067.42	2,083.26	2.28	-2.28	0.14	
7,229.00	12.05	248.24	6,891.09	-265.34	-2,085.86	2,102.44	0.39	-0.18	1.66	
7,324.00	10.11	250.26	6,984.31	-271.83	-2,102.92	2,120.12	2.08	-2.04	2.13	
7,418.00	9.23	250.26	7,076.98	-277.16	-2,117.78	2,135.48	0.94	-0.94	0.00	
7,513.00	7.74	258.26	7,170.94	-281.04	-2,131.22	2,149.27	2.00	-1.57	8.42	
7,608.00	7.74	262.22	7,265.07	-283.21	-2,143.82	2,162.03	0.56	0.00	4.17	
7,702.00	5.98	263.71	7,358.40	-284.60	-2,154.96	2,173.26	1.88	-1.87	1.59	
7,797.00	4.40	254.04	7,453.01	-286.15	-2,163.38	2,181.80	1.90	-1.66	-10.18	
7,892.00	3.08	234.18	7,547.81	-288.64	-2,168.96	2,187.62	1.93	-1.39	-20.91	
7,986.00	1.67	231.72	7,641.72	-290.97	-2,172.08	2,190.98	1.50	-1.50	-2.62	
8,081.00	0.09	303.17	7,736.71	-291.78	-2,173.23	2,192.21	1.73	-1.66	75.21	
8,176.00	0.65	332.18	7,831.71	-291.27	-2,173.54	2,192.47	0.60	0.59	30.54	
8,270.00	0.70	324.09	7,925.70	-290.33	-2,174.13	2,192.94	0.11	0.05	-8.61	
8,365.00	1.32	337.54	8,020.68	-288.85	-2,174.89	2,193.53	0.69	0.65	14.16	
8,460.00	0.35	330.68	8,115.67	-287.58	-2,175.45	2,193.95	1.02	-1.02	-7.22	

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
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Survey										
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8,554.00	0.88	281.64	8,209.67	-287.19	-2,176.30	2,194.75	0.75	0.56	-52.17	
8,649.00	1.49	290.43	8,304.65	-286.61	-2,178.17	2,196.54	0.67	0.64	9.25	
8,744.00	1.49	295.35	8,399.62	-285.65	-2,180.44	2,198.70	0.13	0.00	5.18	
8,838.00	1.76	292.28	8,493.58	-284.58	-2,182.88	2,201.00	0.30	0.29	-3.27	
8,933.00	1.93	296.14	8,588.53	-283.32	-2,185.67	2,203.63	0.22	0.18	4.06	
9,028.00	1.93	329.10	8,683.48	-281.24	-2,187.93	2,205.64	1.15	0.00	34.69	
9,122.00	1.41	352.74	8,777.44	-278.74	-2,188.88	2,206.31	0.91	-0.55	25.15	
9,217.00	1.49	335.34	8,872.41	-276.46	-2,189.55	2,206.72	0.47	0.08	-18.32	
9,312.00	1.23	312.40	8,967.38	-274.65	-2,190.82	2,207.78	0.63	-0.27	-24.15	
9,406.00	1.32	304.84	9,061.36	-273.35	-2,192.45	2,209.26	0.20	0.10	-8.04	
9,502.00	1.32	312.67	9,157.33	-271.97	-2,194.17	2,210.81	0.19	0.00	8.16	
9,595.00	1.29	291.56	9,250.31	-270.86	-2,195.93	2,212.44	0.52	-0.03	-22.70	
9,690.00	1.76	296.14	9,345.28	-269.82	-2,198.24	2,214.61	0.51	0.49	4.82	
9,785.00	1.67	308.36	9,440.23	-268.32	-2,200.63	2,216.83	0.40	-0.09	12.86	
9,880.00	1.76	316.18	9,535.19	-266.41	-2,202.73	2,218.70	0.26	0.09	8.23	
9,974.00	1.67	313.28	9,629.15	-264.43	-2,204.72	2,220.46	0.13	-0.10	-3.09	
10,069.00	1.93	319.52	9,724.10	-262.26	-2,206.77	2,222.25	0.34	0.27	6.57	
10,164.00	1.85	321.28	9,819.05	-259.85	-2,208.77	2,223.97	0.10	-0.08	1.85	
10,258.00	1.23	297.64	9,913.02	-258.20	-2,210.61	2,225.61	0.93	-0.66	-25.15	
10,353.00	1.68	302.51	10,007.99	-256.97	-2,212.69	2,227.54	0.49	0.47	5.13	
10,447.00	2.64	298.34	10,101.92	-255.21	-2,215.75	2,230.39	1.03	1.02	-4.44	
10,542.00	2.22	297.37	10,196.83	-253.32	-2,219.31	2,233.72	0.44	-0.44	-1.02	
10,636.00	2.55	300.71	10,290.75	-251.42	-2,222.73	2,236.90	0.38	0.35	3.55	
10,652.00	2.46	303.44	10,306.74	-251.05	-2,223.32	2,237.45	0.93	-0.56	17.06	
Last SDI Production MWD Survey										
10,710.00	2.46	303.44	10,364.68	-249.67	-2,225.40	2,239.36	0.00	0.00	0.00	
Projection to TD - PBHL(RU_513-17)										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
124.00	124.00	-0.13	0.14	First SDI Gyro MWD Survey	
959.00	941.29	-13.38	-139.94	Last SDI Gyro MW Survey	
1,035.00	1,012.60	-17.30	-165.91	First SDI Surface MWD Survey	
1,076.00	1,050.88	-19.82	-180.37	Last SDI Surface MWD Survey	
1,149.00	1,118.69	-25.03	-206.89	First SDI Production MWD Survey	
10,652.00	10,306.74	-251.05	-2,223.32	Last SDI Production MWD Survey	
10,710.00	10,364.68	-249.67	-2,225.40	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____



Well Details: RU 513-17					
TVD Reference: GL 8368.6' & RKB 24' @ 8392.60usft (H&P 318) Level: 8368.60					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	1594605.00	2351256.00	39.4434372	-107.7974058RU 513-17 (A9)
REFERENCE INFORMATION					
Co-ordinate (N/E) Reference: Well RU 513-17 - Slot RU 513-17 (A9), True North					
Vertical (TVD) Reference: GL 8368.6' & RKB 24' @ 8392.60usft (H&P 318)					
Section (VS) Reference: Slot - RU 513-17 (A9)(0.00N, 0.00E)					
Measured Depth Reference: GL 8368.6' & RKB 24' @ 8392.60usft (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					