



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 324-17
County & State	Garfield County, CO
SDI Job No.	OP.010433
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 10,474 feet is true and correct as determined from all available records.

Signature

 05-Jun-18

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 RU 324-17 - Slot RU 324-17 (B10)
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 324-17	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 324-17 - Slot RU 324-17 (B10)						
Well Position	+N/-S	0.00 usft	Northing:	1,594,605.20 usft	Latitude:	39.4434387
	+E/-W	0.00 usft	Easting:	2,351,268.50 usft	Longitude:	-107.7973616
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	5/26/2018	9.17	65.57	51,558

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	200.22	

Survey Program		Date 6/5/2018
From (usft)	To (usft)	Survey (Wellbore)
124.00	676.00	Survey #1 - Gyro MWD Survey (OH)
772.00	1,079.00	Survey #2 - Surface MWD Survey (OH)
1,181.00	10,474.00	Survey #3 - Production MWD Survey (OH)
		Tool Name
		Gyro MWD 105
		MWD+HDGM
		MWD+HDGM
		Description
		Gyro MWD Error Model Ver 1.0.5
		OWSG 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
124.00	0.26	350.77	124.00	0.28	-0.05	-0.24	0.21	0.21	0.00	0.00
First SDI Gyro MWD Survey										
216.00	0.26	274.04	216.00	0.50	-0.29	-0.37	0.35	0.00	-83.40	
308.00	0.18	112.59	308.00	0.46	-0.36	-0.30	0.47	-0.09	-175.49	
400.00	2.38	212.08	399.97	-1.22	-1.24	1.57	2.63	2.39	108.14	
492.00	4.31	211.29	491.81	-5.79	-4.05	6.83	2.10	2.10	-0.86	
585.00	7.92	214.80	584.27	-14.04	-9.53	16.47	3.90	3.88	3.77	
676.00	8.97	201.62	674.29	-25.78	-15.72	29.63	2.41	1.15	-14.48	



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Site:	RU 23-17 Pad	MD Reference:	GL 8368.6' & RKB 24' @ 8392.60usft (H&P 318)
Well:	RU 324-17	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)	
Last SDI Gyro MWD Survey										
772.00	9.77	198.37	769.01	-40.47	-21.04	45.25	1.00	0.83	-3.39	
First SDI Surface MWD Survey										
844.00	10.87	193.01	839.84	-52.89	-24.50	58.09	2.03	1.53	-7.44	
938.00	8.95	201.78	932.44	-68.31	-29.21	74.20	2.59	-2.04	9.33	
1,032.00	9.06	204.02	1,025.28	-81.86	-34.93	88.89	0.39	0.12	2.38	
1,079.00	9.41	208.24	1,071.67	-88.63	-38.26	96.39	1.62	0.74	8.98	
Last SDI Surface MWD Survey										
1,181.00	9.87	205.74	1,172.23	-103.85	-46.00	113.35	0.61	0.45	-2.45	
First SDI Production MWD Survey										
1,276.00	9.41	203.80	1,265.89	-118.29	-52.67	129.20	0.59	-0.48	-2.04	
1,370.00	8.53	202.97	1,358.74	-131.74	-58.49	143.84	0.95	-0.94	-0.88	
1,464.00	7.21	196.38	1,451.86	-143.82	-62.88	156.69	1.70	-1.40	-7.01	
1,559.00	9.02	200.71	1,545.90	-156.51	-67.19	170.08	2.01	1.91	4.56	
1,653.00	8.28	193.66	1,638.83	-169.98	-71.39	184.18	1.37	-0.79	-7.50	
1,748.00	9.06	201.46	1,732.75	-183.58	-75.75	198.45	1.48	0.82	8.21	
1,842.00	9.32	199.35	1,825.55	-197.65	-80.98	213.46	0.45	0.28	-2.24	
1,937.00	9.41	199.72	1,919.28	-212.22	-86.15	228.92	0.11	0.09	0.39	
2,031.00	8.81	200.12	2,012.09	-226.22	-91.22	243.80	0.64	-0.64	0.43	
2,126.00	8.62	195.50	2,106.00	-239.91	-95.62	258.17	0.76	-0.20	-4.86	
2,220.00	9.76	203.58	2,198.79	-254.00	-100.69	273.15	1.83	1.21	8.60	
2,315.00	9.50	202.88	2,292.45	-268.60	-106.96	289.02	0.30	-0.27	-0.74	
2,409.00	9.06	200.68	2,385.22	-282.67	-112.59	304.17	0.60	-0.47	-2.34	
2,504.00	8.53	200.07	2,479.11	-296.29	-117.65	318.69	0.57	-0.56	-0.64	
2,598.00	8.35	198.05	2,572.09	-309.33	-122.16	332.48	0.37	-0.19	-2.15	
2,693.00	7.83	198.13	2,666.14	-322.03	-126.31	345.84	0.55	-0.55	0.08	
2,787.00	8.71	204.55	2,759.17	-334.59	-131.26	359.34	1.36	0.94	6.83	
2,882.00	8.27	204.29	2,853.13	-347.36	-137.06	373.33	0.46	-0.46	-0.27	
2,976.00	7.78	203.14	2,946.20	-359.38	-142.34	386.42	0.55	-0.52	-1.22	
3,071.00	9.41	205.43	3,040.14	-372.30	-148.20	400.58	1.75	1.72	2.41	
3,164.00	9.05	205.67	3,131.93	-385.76	-154.63	415.43	0.39	-0.39	0.26	
3,259.00	8.68	205.73	3,225.80	-398.95	-160.98	430.01	0.39	-0.39	0.06	
3,353.00	8.62	203.58	3,318.73	-411.80	-166.88	444.10	0.35	-0.06	-2.29	
3,447.00	7.86	204.59	3,411.76	-424.10	-172.37	457.54	0.82	-0.81	1.07	
3,542.00	7.39	205.08	3,505.92	-435.54	-177.66	470.11	0.50	-0.49	0.52	
3,637.00	9.16	203.80	3,599.92	-447.99	-183.31	483.74	1.87	1.86	-1.35	
3,731.00	9.15	204.55	3,692.73	-461.64	-189.43	498.66	0.13	-0.01	0.80	
3,826.00	8.66	203.69	3,786.58	-475.06	-195.44	513.33	0.53	-0.52	-0.91	
3,920.00	8.35	202.00	3,879.55	-487.87	-200.84	527.22	0.42	-0.33	-1.80	
4,015.00	7.91	206.13	3,973.59	-500.13	-206.31	540.61	0.77	-0.46	4.35	
4,109.00	7.21	205.61	4,066.77	-511.26	-211.70	552.92	0.75	-0.74	-0.55	
4,204.00	8.52	201.91	4,160.88	-523.16	-216.91	565.89	1.48	1.38	-3.89	
4,298.00	8.79	202.09	4,253.81	-536.28	-222.21	580.03	0.29	0.29	0.19	
4,392.00	7.65	200.68	4,346.84	-548.79	-227.12	593.47	1.23	-1.21	-1.50	



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Well:	RU 324-17	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)	
4,487.00	7.25	201.11	4,441.04	-560.30	-231.51	605.78	0.43	-0.42	0.45	
4,581.00	6.61	202.00	4,534.35	-570.85	-235.67	617.12	0.69	-0.68	0.95	
4,676.00	7.65	194.62	4,628.62	-582.04	-239.32	628.88	1.46	1.09	-7.77	
4,770.00	7.09	195.38	4,721.84	-593.68	-242.43	640.89	0.60	-0.60	0.81	
4,865.00	6.51	196.20	4,816.17	-604.51	-245.49	652.10	0.62	-0.61	0.86	
4,959.00	7.91	194.36	4,909.43	-615.89	-248.58	663.85	1.51	1.49	-1.96	
5,053.00	7.39	196.90	5,002.59	-627.94	-251.94	676.32	0.66	-0.55	2.70	
5,147.00	6.68	196.46	5,095.88	-638.97	-255.25	687.81	0.76	-0.76	-0.47	
5,242.00	8.35	192.95	5,190.06	-650.99	-258.36	700.17	1.82	1.76	-3.69	
5,336.00	7.74	189.26	5,283.14	-663.89	-260.91	713.15	0.85	-0.65	-3.93	
5,431.00	7.47	190.40	5,377.30	-676.28	-263.05	725.52	0.33	-0.28	1.20	
5,526.00	6.42	191.93	5,471.60	-687.55	-265.27	736.86	1.12	-1.11	1.61	
5,620.00	7.83	192.86	5,564.88	-698.93	-267.78	748.41	1.50	1.50	0.99	
5,715.00	7.12	190.75	5,659.07	-711.03	-270.32	760.64	0.80	-0.75	-2.22	
5,810.00	8.35	197.34	5,753.20	-723.40	-273.47	773.33	1.59	1.29	6.94	
5,904.00	8.09	198.49	5,846.24	-736.18	-277.60	786.76	0.33	-0.28	1.22	
5,999.00	7.53	195.18	5,940.36	-748.53	-281.35	799.64	0.76	-0.59	-3.48	
6,094.00	8.53	197.17	6,034.43	-761.27	-285.06	812.88	1.09	1.05	2.09	
6,189.00	7.68	198.33	6,128.48	-774.03	-289.14	826.26	0.91	-0.89	1.22	
6,283.00	6.85	201.52	6,221.72	-785.21	-293.17	838.14	0.98	-0.88	3.39	
6,378.00	8.79	195.15	6,315.83	-797.48	-297.15	851.04	2.23	2.04	-6.71	
6,473.00	8.79	196.20	6,409.72	-811.46	-301.07	865.51	0.17	0.00	1.11	
6,567.00	8.53	195.23	6,502.65	-825.08	-304.90	879.62	0.32	-0.28	-1.03	
6,662.00	7.56	190.66	6,596.71	-838.02	-307.91	892.80	1.22	-1.02	-4.81	
6,757.00	7.30	207.10	6,690.92	-849.54	-311.82	904.96	2.25	-0.27	17.31	
6,851.00	8.53	202.79	6,784.03	-861.28	-317.24	917.85	1.45	1.31	-4.59	
6,946.00	8.14	199.64	6,878.03	-874.11	-322.23	931.61	0.63	-0.41	-3.32	
7,041.00	7.91	199.28	6,972.09	-886.62	-326.65	944.88	0.25	-0.24	-0.38	
7,135.00	7.32	194.86	7,065.27	-898.51	-330.32	957.31	0.88	-0.63	-4.70	
7,230.00	6.42	196.03	7,159.58	-909.47	-333.34	968.63	0.96	-0.95	1.23	
7,325.00	5.45	199.98	7,254.07	-918.81	-336.35	978.44	1.11	-1.02	4.16	
7,420.00	4.75	204.29	7,348.70	-926.64	-339.51	986.87	0.84	-0.74	4.54	
7,514.00	4.41	206.88	7,442.40	-933.41	-342.74	994.34	0.42	-0.36	2.76	
7,609.00	3.61	207.36	7,537.16	-939.32	-345.77	1,000.94	0.84	-0.84	0.51	
7,703.00	2.81	214.92	7,631.02	-943.84	-348.44	1,006.10	0.96	-0.85	8.04	
7,798.00	2.39	207.19	7,725.92	-947.51	-350.68	1,010.32	0.57	-0.44	-8.14	
7,893.00	2.20	209.03	7,820.84	-950.87	-352.47	1,014.09	0.21	-0.20	1.94	
7,987.00	1.76	198.84	7,914.79	-953.81	-353.81	1,017.32	0.60	-0.47	-10.84	
8,082.00	1.49	230.65	8,009.75	-955.97	-355.24	1,019.84	0.98	-0.28	33.48	
8,177.00	1.26	262.88	8,104.72	-956.89	-357.23	1,021.39	0.84	-0.24	33.93	
8,271.00	0.97	251.57	8,198.71	-957.27	-359.01	1,022.36	0.39	-0.31	-12.03	
8,366.00	1.14	253.86	8,293.69	-957.78	-360.68	1,023.42	0.18	0.18	2.41	
8,461.00	0.97	253.68	8,388.67	-958.27	-362.36	1,024.46	0.18	-0.18	-0.19	



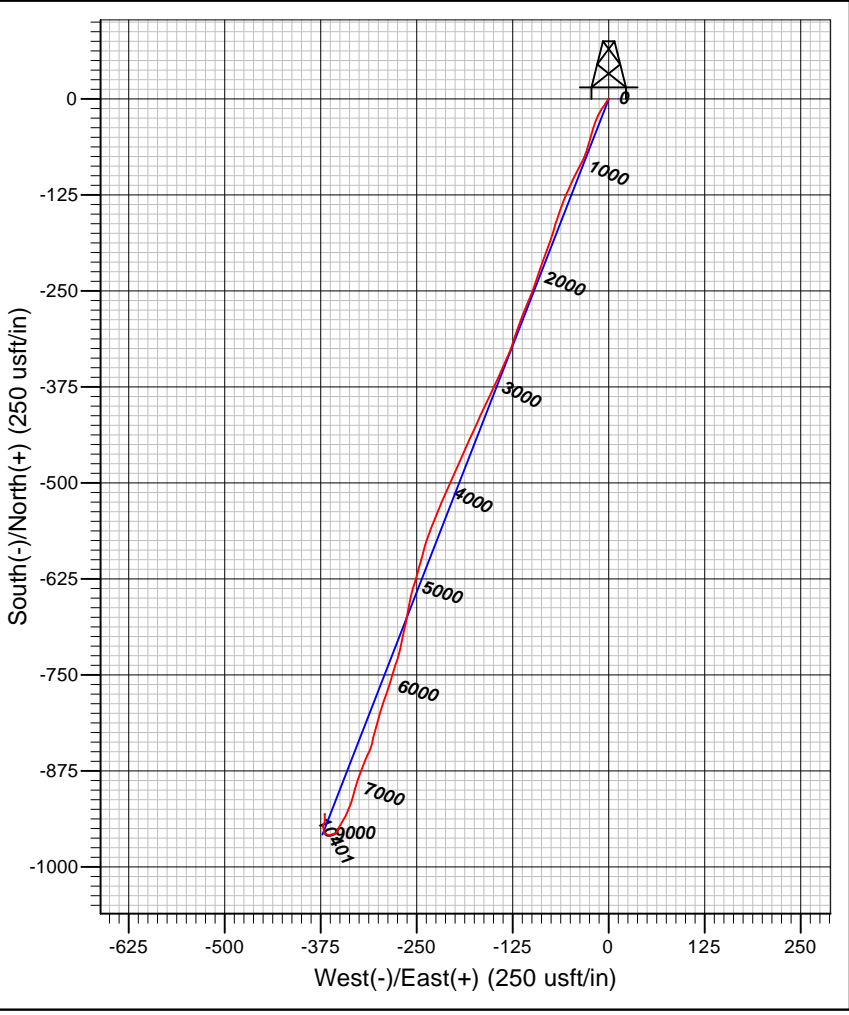
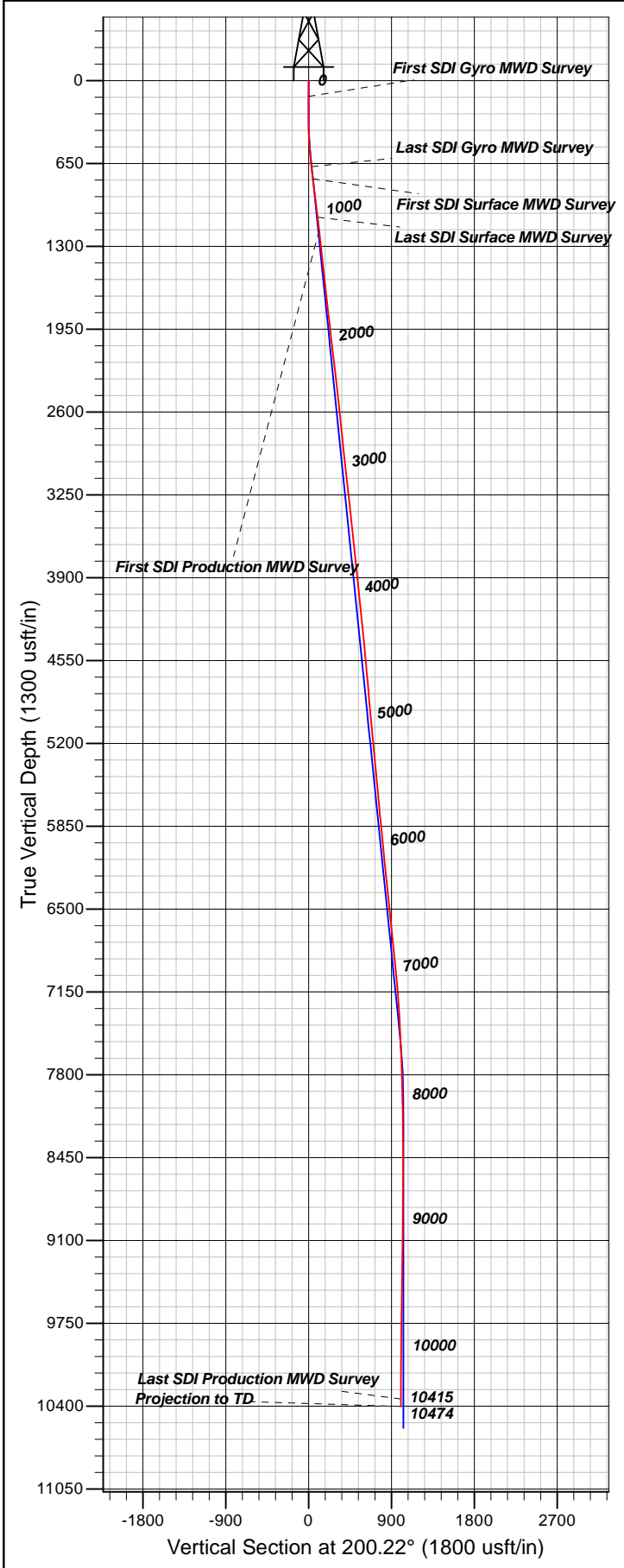
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Well:	RU 324-17	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Survey										
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8,555.00	1.01	273.25	8,482.66	-958.45	-363.95	1,025.17	0.36	0.04	20.82	
8,650.00	1.14	284.53	8,577.64	-958.16	-365.70	1,025.51	0.26	0.14	11.87	
8,745.00	1.14	294.55	8,672.62	-957.54	-367.48	1,025.53	0.21	0.00	10.55	
8,839.00	1.23	301.76	8,766.60	-956.62	-369.19	1,025.26	0.19	0.10	7.67	
8,934.00	0.79	324.61	8,861.59	-955.54	-370.43	1,024.69	0.62	-0.46	24.05	
9,029.00	1.23	353.96	8,956.58	-954.00	-370.92	1,023.40	0.70	0.46	30.89	
9,123.00	1.32	1.88	9,050.55	-951.91	-370.99	1,021.47	0.21	0.10	8.43	
9,218.00	1.41	342.19	9,145.53	-949.71	-371.31	1,019.51	0.50	0.09	-20.73	
9,313.00	1.67	341.13	9,240.49	-947.28	-372.12	1,017.52	0.28	0.27	-1.12	
9,407.00	0.97	38.53	9,334.47	-945.36	-372.07	1,015.70	1.50	-0.74	61.06	
9,501.00	0.62	54.26	9,428.46	-944.44	-371.16	1,014.52	0.44	-0.37	16.73	
9,596.00	0.97	17.26	9,523.45	-943.38	-370.50	1,013.29	0.64	0.37	-38.95	
9,690.00	1.23	7.76	9,617.43	-941.62	-370.13	1,011.51	0.34	0.28	-10.11	
9,784.00	1.49	8.55	9,711.41	-939.41	-369.81	1,009.33	0.28	0.28	0.84	
9,879.00	1.38	0.63	9,806.38	-937.04	-369.61	1,007.04	0.24	-0.12	-8.34	
9,973.00	1.23	350.01	9,900.35	-934.92	-369.78	1,005.11	0.30	-0.16	-11.30	
10,068.00	0.97	357.83	9,995.34	-933.11	-369.98	1,003.48	0.32	-0.27	8.23	
10,162.00	0.70	359.77	10,089.33	-931.74	-370.02	1,002.21	0.29	-0.29	2.06	
10,256.00	0.18	189.70	10,183.32	-931.31	-370.04	1,001.81	0.93	-0.55	-180.93	
10,351.00	0.18	29.03	10,278.32	-931.33	-370.00	1,001.81	0.37	0.00	-169.13	
10,415.00	0.44	58.21	10,342.32	-931.11	-369.74	1,001.52	0.46	0.41	45.59	
Last SDI Production MWD Survey										
10,474.00	0.44	58.21	10,401.32	-930.87	-369.35	1,001.16	0.00	0.00	0.00	
Projection to TD - PBHL(RU_324-17)										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
124.00	124.00	0.28	-0.05	First SDI Gyro MWD Survey	
676.00	674.29	-25.78	-15.72	Last SDI Gyro MWD Survey	
772.00	769.01	-40.47	-21.04	First SDI Surface MWD Survey	
1,079.00	1,071.67	-88.63	-38.26	Last SDI Surface MWD Survey	
1,181.00	1,172.23	-103.85	-46.00	First SDI Production MWD Survey	
10,415.00	10,342.32	-931.11	-369.74	Last SDI Production MWD Survey	
10,474.00	10,401.32	-930.87	-369.35	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____



Well Details: RU 324-17					
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	1594605.20	2351268.50	39.4434386	-107.7973618
REFERENCE INFORMATION					
Co-ordinate (N/E) Reference: Well RU 324-17 - Slot RU 324-17 (B10), True North					
Vertical (TVD) Reference: GL 8368.6' & RKB 24' @ 8392.60usft (H&P 318)					
Section (VS) Reference: Slot - RU 324-17 (B10)(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					