



# **Piceance Energy, LLC**

**Mesa County, CO**

**Piceance 28-05**

**Piceance 28-02W**

**Slot A-2**

**Survey: Survey #1**

## **Survey Report - Geographic**

**20 October, 2015**



Project: Mesa County, CO  
Site: Piceance 28-05  
Well: Piceance 28-02W  
Wellbore: Slot A-2  
Design: Design #2  
Latitude: 39° 15' 4.200 N  
Longitude: 107° 46' 46.630 W  
Ground Level: 7556.0  
Well @ 7578.0usft

# Archer

### PROJECT DETAILS: Mesa County, CO

Geodetic System: US State Plane 1983  
Datum: North American Datum 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Central Zone  
System Datum: Mean Sea Level

### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Piceance 28-02W, True North  
Vertical (TVD) Reference: Well @ 7578.0usft  
Section (VS) Reference: Slot - (0.0N, 0.0E)  
Measured Depth Reference: Well @ 7578.0usft  
Calculation Method: Minimum Curvature

### WELL DETAILS: Piceance 28-02W

+N/-S	+E/-W	Northing	Ground Level:	7556.0	Latitude	Longitude	Slot
0.0	0.0	1524470.71	Easting	2354520.38	39° 15' 4.200 N	107° 46' 46.630 W	

### WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance Federal 28-02W	7888.0	1150.3	-314.6	1525628.58	2354234.71	39° 15' 15.570 N	107° 46' 50.630 W	Circle (Radius: 50.0)

### SECTION DETAILS

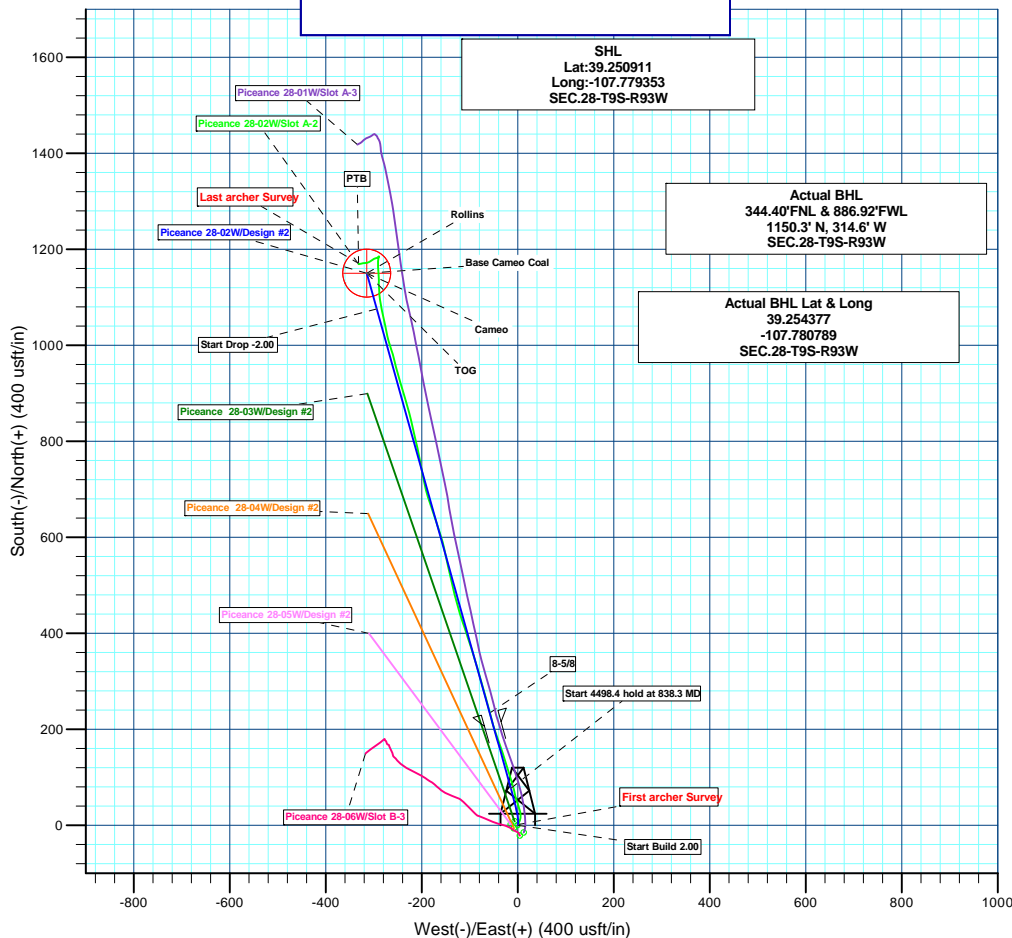
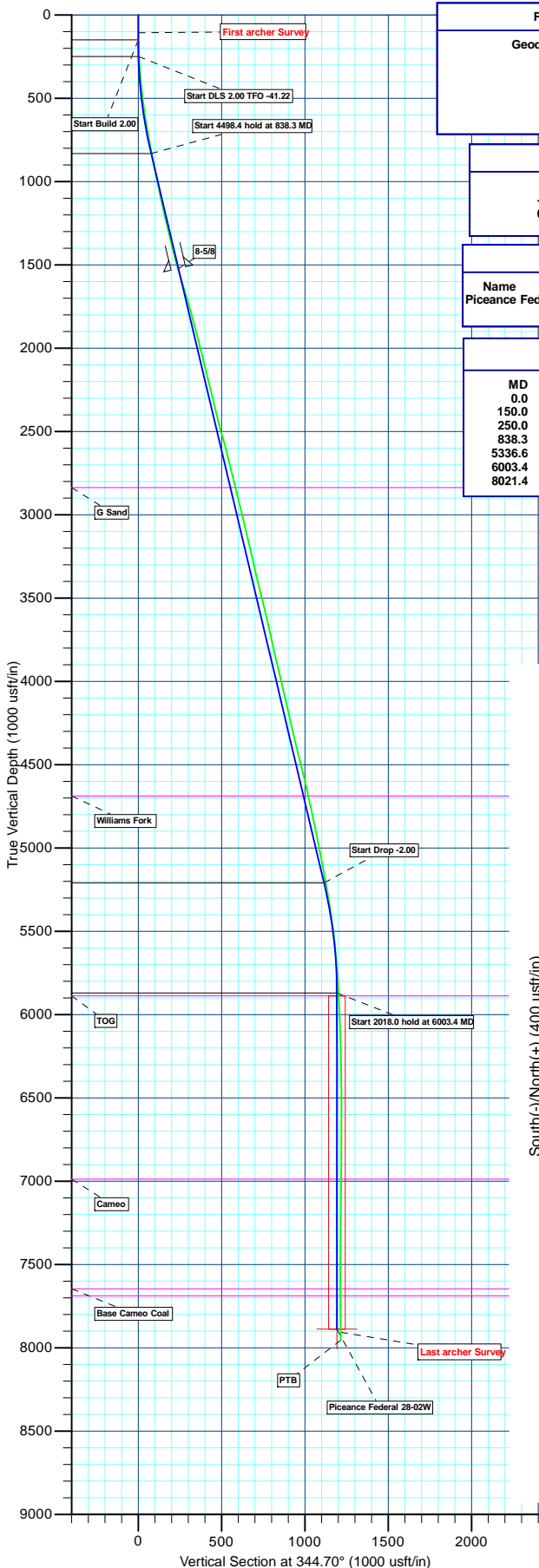
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
150.0	0.00	0.00	150.0	0.0	0.0	0.00	0.00	0.0	Start Build 2.00
250.0	2.00	20.00	250.0	1.6	0.6	2.00	20.00	1.4	Start DLS 2.00 TFO -41.22
838.3	13.33	344.37	832.2	76.9	-14.2	2.00	-41.22	77.9	Start 4498.4 hold at 838.3 MD
5336.6	13.33	344.37	5209.3	1076.0	-293.8	0.00	0.00	1115.4	Start Drop -2.00
6003.4	0.00	0.00	5870.0	1150.3	-314.6	2.00	180.00	1192.6	Start 2018.0 hold at 6003.4 MD
8021.4	0.00	0.00	7888.0	1150.3	-314.6	0.00	0.00	1192.6	TD at 8021.4



Azimuths to True North  
Magnetic North: 9.72°  
Magnetic Field  
Strength: 51741.9snT  
Dip Angle: 65.47°  
Date: 2015/04/27  
Model: IGRF2010

### FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2838.0	2899.7	G Sand
4688.0	4800.9	Williams Fork
5888.0	6021.4	TOG
6988.0	7121.4	Cameo
7646.0	7779.4	Base Cameo Coal
7688.0	7821.4	Rollins



Plan: Design #2 (Piceance 28-02W/Slot A-2)

Created By: Ricky Osburn Date: 10:29, October 21 2015



# Archer

## Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance 28-02W
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance 28-02W	North Reference:	True
Wellbore:	Slot A-2	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-2	Database:	EDMDBBW

Project	Mesa County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site	Piceance 28-05				
Site Position:		Northing:	1,524,375.785 usft	Latitude:	39.250911
From:	Lat/Long	Easting:	2,354,593.535 usft	Longitude:	-107.779353
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	-1.44 °

Well	Piceance 28-02W					
Well Position	+N/-S	0.00 usft	Northing:	1,524,470.715 usft	Latitude:	39.251167
	+E/-W	0.00 usft	Easting:	2,354,520.378 usft	Longitude:	-107.779619
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,556.00 usft

Wellbore	Slot A-2				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2015/04/27	9.73	65.47	51,742

Design	Slot A-2				
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	19.96

Survey Program	Date	2015/09/21			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
108.00	8,091.00	Survey #1 (Slot A-2)	MWD	MWD - Standard	



## Archer

### Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance 28-02W
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	Well @ 7578.00usft
<b>Site:</b>	Piceance 28-05	<b>MD Reference:</b>	Well @ 7578.00usft
<b>Well:</b>	Piceance 28-02W	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot A-2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot A-2	<b>Database:</b>	EDMDBBW

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	1,524,470.715	2,354,520.378	39.251167	-107.779619	
First archer Survey										
108.00	1.41	16.41	107.99	1.27	0.38	1,524,471.980	2,354,520.786	39.251170	-107.779618	
200.00	2.72	23.97	199.93	4.36	1.58	1,524,475.029	2,354,522.069	39.251179	-107.779614	
292.00	4.17	27.57	291.76	9.32	4.02	1,524,479.926	2,354,524.628	39.251192	-107.779605	
385.00	5.01	3.67	384.47	16.37	5.84	1,524,486.929	2,354,526.630	39.251212	-107.779599	
477.00	6.81	351.89	475.98	25.78	5.33	1,524,496.349	2,354,526.353	39.251237	-107.779601	
569.00	8.31	341.78	567.18	37.49	2.48	1,524,508.133	2,354,523.800	39.251270	-107.779611	
661.00	9.62	339.67	658.05	51.02	-2.27	1,524,521.772	2,354,519.391	39.251307	-107.779627	
754.00	10.11	350.22	749.69	66.35	-6.35	1,524,537.201	2,354,515.690	39.251349	-107.779642	
846.00	10.85	343.54	840.16	82.61	-10.18	1,524,553.555	2,354,512.274	39.251393	-107.779655	
938.00	11.82	341.69	930.36	99.86	-15.59	1,524,570.935	2,354,507.295	39.251441	-107.779675	
1,031.00	12.39	343.89	1,021.29	118.49	-21.35	1,524,589.702	2,354,502.003	39.251492	-107.779695	
1,126.00	11.78	343.19	1,114.19	137.56	-26.99	1,524,608.912	2,354,496.851	39.251544	-107.779715	
1,220.00	13.01	340.64	1,205.99	156.73	-33.27	1,524,628.232	2,354,491.051	39.251597	-107.779737	
1,315.00	13.01	339.32	1,298.56	176.83	-40.59	1,524,648.503	2,354,484.236	39.251652	-107.779763	
1,411.00	14.19	342.66	1,391.86	198.17	-47.91	1,524,670.022	2,354,477.451	39.251711	-107.779789	
1,506.00	15.21	344.21	1,483.75	221.27	-54.78	1,524,693.294	2,354,471.171	39.251774	-107.779813	
1,559.00	16.40	345.12	1,534.75	235.20	-58.59	1,524,707.308	2,354,467.708	39.251812	-107.779826	
1,632.00	17.09	345.56	1,604.65	255.54	-63.91	1,524,727.782	2,354,462.899	39.251868	-107.779845	
1,696.00	16.61	344.86	1,665.91	273.48	-68.65	1,524,745.832	2,354,458.617	39.251917	-107.779862	
1,790.00	15.78	344.68	1,756.17	298.78	-75.53	1,524,771.294	2,354,452.367	39.251987	-107.779886	
1,885.00	15.07	342.84	1,847.75	323.04	-82.59	1,524,795.722	2,354,445.922	39.252054	-107.779911	
1,980.00	14.68	342.48	1,939.57	346.32	-89.86	1,524,819.176	2,354,439.240	39.252117	-107.779937	
2,073.00	14.11	342.84	2,029.65	368.39	-96.75	1,524,841.411	2,354,432.904	39.252178	-107.779961	
2,170.00	13.62	342.48	2,123.82	390.57	-103.67	1,524,863.767	2,354,426.536	39.252239	-107.779986	
2,265.00	13.14	340.99	2,216.24	411.45	-110.56	1,524,884.809	2,354,420.178	39.252296	-107.780010	
2,360.00	14.24	343.98	2,308.54	432.89	-117.30	1,524,906.412	2,354,413.976	39.252355	-107.780034	
2,455.00	13.58	342.66	2,400.76	454.77	-123.85	1,524,928.446	2,354,407.978	39.252415	-107.780057	
2,549.00	15.47	343.19	2,491.75	477.30	-130.77	1,524,951.150	2,354,401.630	39.252477	-107.780081	
2,644.00	15.47	348.72	2,583.31	501.86	-136.91	1,524,975.851	2,354,396.106	39.252545	-107.780103	
2,739.00	14.50	348.28	2,675.08	525.93	-141.80	1,525,000.037	2,354,391.817	39.252611	-107.780120	
2,834.00	13.58	347.67	2,767.24	548.47	-146.60	1,525,022.692	2,354,387.586	39.252673	-107.780137	
2,928.00	12.44	347.05	2,858.83	569.12	-151.23	1,525,043.450	2,354,383.480	39.252729	-107.780153	
3,024.00	14.06	344.15	2,952.27	590.42	-156.73	1,525,064.878	2,354,378.514	39.252788	-107.780173	
3,118.00	13.89	342.84	3,043.49	612.18	-163.18	1,525,086.798	2,354,372.615	39.252847	-107.780196	
3,213.00	13.58	341.52	3,135.77	633.65	-170.07	1,525,108.437	2,354,366.256	39.252906	-107.780220	
3,308.00	13.18	341.34	3,228.19	654.49	-177.08	1,525,129.446	2,354,359.781	39.252964	-107.780245	
3,403.00	12.39	341.43	3,320.84	674.42	-183.79	1,525,149.531	2,354,353.571	39.253018	-107.780268	
3,498.00	13.67	344.15	3,413.39	694.88	-190.10	1,525,170.144	2,354,347.775	39.253074	-107.780291	
3,593.00	14.02	349.60	3,505.63	717.00	-195.24	1,525,192.384	2,354,343.188	39.253135	-107.780309	
3,688.00	13.40	349.78	3,597.93	739.15	-199.27	1,525,214.630	2,354,339.715	39.253196	-107.780323	
3,783.00	12.83	348.37	3,690.45	760.31	-203.35	1,525,235.890	2,354,336.167	39.253254	-107.780338	
3,877.00	12.08	346.44	3,782.24	780.10	-207.76	1,525,255.780	2,354,332.255	39.253308	-107.780353	
3,972.00	14.02	348.02	3,874.78	801.02	-212.48	1,525,276.814	2,354,328.062	39.253366	-107.780370	
4,067.00	13.18	347.14	3,967.11	822.84	-217.28	1,525,298.743	2,354,323.811	39.253426	-107.780387	
4,162.00	12.96	345.82	4,059.65	843.72	-222.30	1,525,319.750	2,354,319.317	39.253483	-107.780404	
4,257.00	12.30	345.47	4,152.35	863.85	-227.45	1,525,339.997	2,354,314.675	39.253538	-107.780423	
4,352.00	14.11	344.15	4,244.84	884.78	-233.15	1,525,361.070	2,354,309.500	39.253596	-107.780443	
4,447.00	13.36	343.36	4,337.12	906.44	-239.46	1,525,382.877	2,354,303.740	39.253655	-107.780465	
4,541.00	13.05	342.66	4,428.64	926.98	-245.73	1,525,403.564	2,354,297.984	39.253712	-107.780487	
4,636.00	14.28	346.09	4,520.95	948.59	-251.74	1,525,425.320	2,354,292.515	39.253771	-107.780508	
4,731.00	13.40	344.68	4,613.19	970.58	-257.47	1,525,447.447	2,354,287.343	39.253831	-107.780529	
4,826.00	12.26	343.36	4,705.81	990.86	-263.27	1,525,467.868	2,354,282.057	39.253887	-107.780549	
4,921.00	11.29	343.27	4,798.81	1,009.43	-268.83	1,525,486.572	2,354,276.959	39.253938	-107.780569	



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance 28-02W
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	Well @ 7578.00usft
<b>Site:</b>	Piceance 28-05	<b>MD Reference:</b>	Well @ 7578.00usft
<b>Well:</b>	Piceance 28-02W	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot A-2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot A-2	<b>Database:</b>	EDMDBBW

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,016.00	12.08	348.72	4,891.85	1,028.08	-273.45	1,525,505.337	2,354,272.807	39.253989	-107.780585
5,110.00	11.69	348.46	4,983.83	1,047.06	-277.28	1,525,524.404	2,354,269.455	39.254041	-107.780599
5,205.00	10.77	347.93	5,077.01	1,065.17	-281.06	1,525,542.603	2,354,266.129	39.254091	-107.780612
5,300.00	9.67	346.61	5,170.50	1,081.61	-284.77	1,525,559.133	2,354,262.839	39.254136	-107.780625
5,395.00	10.24	354.96	5,264.08	1,097.79	-287.36	1,525,575.367	2,354,260.656	39.254181	-107.780634
5,490.00	9.14	356.28	5,357.72	1,113.73	-288.59	1,525,591.334	2,354,259.825	39.254224	-107.780639
5,585.00	8.53	356.99	5,451.59	1,128.29	-289.45	1,525,605.917	2,354,259.331	39.254264	-107.780642
5,680.00	6.33	1.64	5,545.79	1,140.57	-289.67	1,525,618.191	2,354,259.419	39.254298	-107.780642
5,774.00	5.27	358.13	5,639.31	1,150.06	-289.66	1,525,627.682	2,354,259.665	39.254324	-107.780642
5,869.00	4.44	355.40	5,733.97	1,158.09	-290.10	1,525,635.717	2,354,259.429	39.254346	-107.780644
5,964.00	3.52	354.79	5,828.74	1,164.66	-290.66	1,525,642.299	2,354,259.034	39.254364	-107.780646
6,059.00	2.77	350.13	5,923.59	1,169.82	-291.32	1,525,647.480	2,354,258.506	39.254378	-107.780648
6,153.00	2.68	7.97	6,017.49	1,174.24	-291.40	1,525,651.894	2,354,258.532	39.254391	-107.780649
6,248.00	2.37	6.83	6,112.40	1,178.39	-290.86	1,525,656.029	2,354,259.177	39.254402	-107.780647
6,343.00	1.45	26.87	6,207.34	1,181.41	-290.08	1,525,659.032	2,354,260.030	39.254410	-107.780644
6,438.00	0.97	9.03	6,302.32	1,183.28	-289.41	1,525,660.881	2,354,260.746	39.254415	-107.780641
6,533.00	0.53	0.77	6,397.31	1,184.51	-289.28	1,525,662.110	2,354,260.909	39.254419	-107.780641
6,628.00	0.35	39.61	6,492.31	1,185.17	-289.09	1,525,662.768	2,354,261.116	39.254421	-107.780640
6,722.00	0.13	52.44	6,586.31	1,185.46	-288.82	1,525,663.048	2,354,261.391	39.254421	-107.780639
6,817.00	0.44	236.31	6,681.31	1,185.32	-289.04	1,525,662.916	2,354,261.170	39.254421	-107.780640
6,912.00	0.75	227.87	6,776.30	1,184.70	-289.80	1,525,662.316	2,354,260.390	39.254419	-107.780643
7,007.00	0.88	222.07	6,871.29	1,183.74	-290.75	1,525,661.382	2,354,259.416	39.254417	-107.780646
7,103.00	1.80	247.74	6,967.27	1,182.63	-292.64	1,525,660.311	2,354,257.499	39.254414	-107.780653
7,198.00	2.33	250.64	7,062.21	1,181.42	-295.85	1,525,659.187	2,354,254.267	39.254410	-107.780664
7,292.00	2.33	245.80	7,156.13	1,180.00	-299.39	1,525,657.859	2,354,250.687	39.254406	-107.780677
7,387.00	2.15	237.19	7,251.06	1,178.25	-302.65	1,525,656.185	2,354,247.385	39.254402	-107.780688
7,482.00	2.20	231.92	7,345.99	1,176.16	-305.58	1,525,654.169	2,354,244.400	39.254396	-107.780699
7,577.00	2.55	239.56	7,440.91	1,173.96	-308.84	1,525,652.056	2,354,241.089	39.254390	-107.780710
7,672.00	3.12	257.58	7,535.79	1,172.33	-313.19	1,525,650.538	2,354,236.703	39.254385	-107.780725
7,766.00	2.86	260.75	7,629.66	1,171.41	-318.00	1,525,649.732	2,354,231.868	39.254383	-107.780742
7,861.00	2.37	263.82	7,724.56	1,170.82	-322.29	1,525,649.248	2,354,227.562	39.254381	-107.780758
7,956.00	2.24	260.22	7,819.49	1,170.29	-326.08	1,525,648.816	2,354,223.768	39.254380	-107.780771
<b>Piceance Federal 28-02W</b>									
8,024.18	2.24	257.29	7,887.62	1,169.77	-328.69	1,525,648.362	2,354,221.143	39.254378	-107.780780
<b>Last archer Survey</b>									
8,044.00	2.24	256.44	7,907.42	1,169.59	-329.44	1,525,648.205	2,354,220.385	39.254378	-107.780783
<b>PTB</b>									
8,091.00	2.24	256.44	7,954.38	1,169.16	-331.23	1,525,647.820	2,354,218.589	39.254377	-107.780789



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance 28-02W
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	Well @ 7578.00usft
<b>Site:</b>	Piceance 28-05	<b>MD Reference:</b>	Well @ 7578.00usft
<b>Well:</b>	Piceance 28-02W	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot A-2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot A-2	<b>Database:</b>	EDMDBBW

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
108.00	107.99	1.27	0.38	First archer Survey	
8,044.00	7,907.42	1,169.59	-329.44	Last archer Survey	
8,091.00	7,954.38	1,169.16	-331.23	PTB	

Checked By: _____	Approved By: _____	Date: _____
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