



# **Piceance Energy, LLC**

**Mesa County, CO**

**Piceance 28-05**

**Piceance Federal 28-02M**

**Slot A-5**

**Survey: Survey #1**

## **Survey Report - Geographic**

**20 October, 2015**



Project: Mesa County, CO  
Site: Piceance 28-05  
Well: Piceance Federal 28-02M  
Wellbore: Slot A-5  
Design: Design #2  
Latitude: 39° 15' 3.820 N  
Longitude: 107° 46' 46.230 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 Federal 28-02M, 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 Federal 28-02M

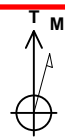
+N/-S	+E/-W	Northing	Ground Level:	7556.0	Latitude	Longitude	Slot
0.0	0.0	1524431.50	Easting	2354550.87	39° 15' 3.820 N	107° 46' 46.230 W	

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance Federal 28-02M tgt	7916.0	1168.6	1413.5	1525564.24	2355993.23	39° 15' 15.370 N	107° 46' 28.260 W	Circle (Radius: 50.0)

### SECTION DETAILS

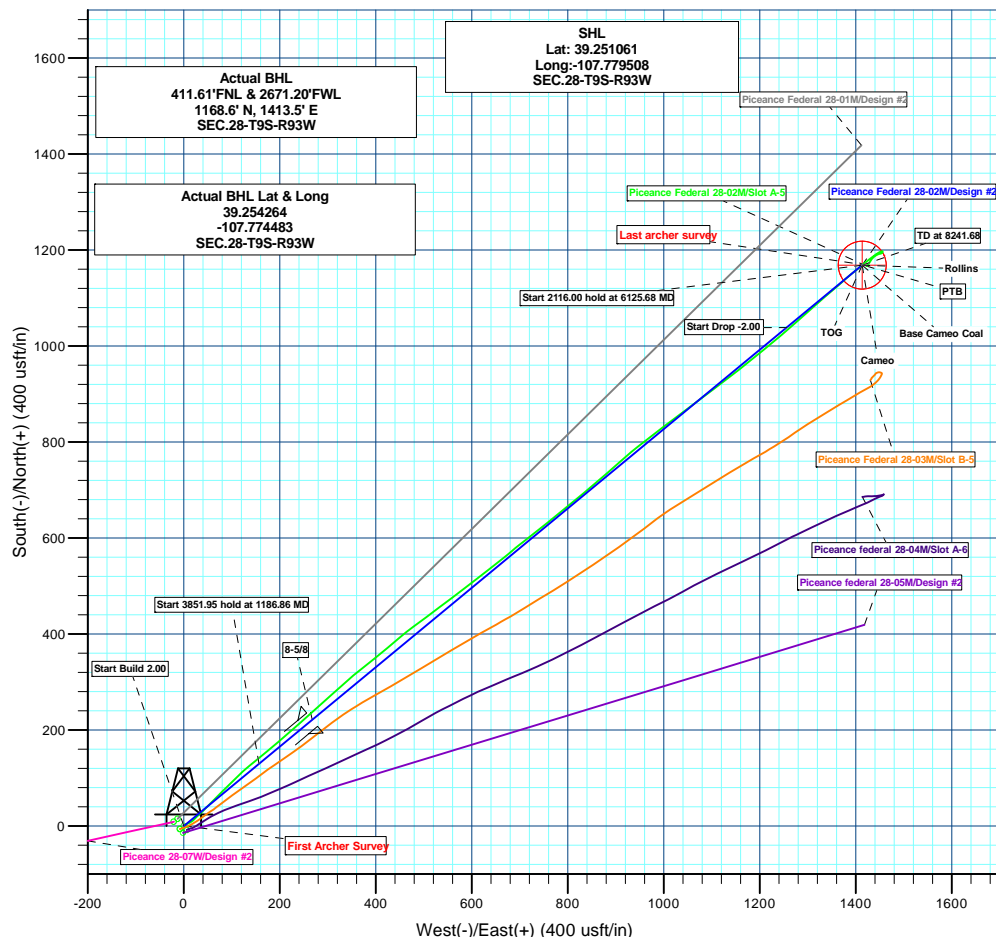
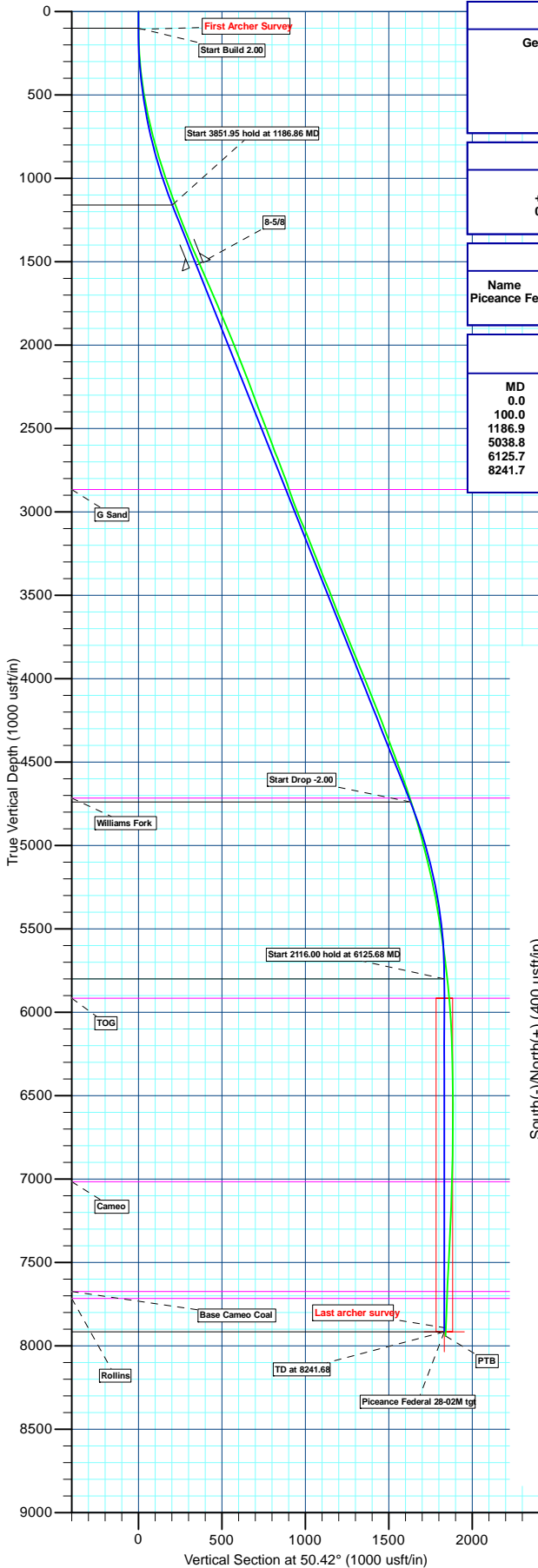
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
100.0	0.00	0.00	100.0	0.0	0.0	0.00	0.00	0.0	Start Build 2.00
1186.9	21.74	50.42	1161.0	129.8	157.0	2.00	50.42	203.7	Start 3851.95 hold at 1186.86 MD
5038.8	21.74	50.42	4739.0	1038.8	1256.5	0.00	0.00	1630.3	Start Drop -2.00
6125.7	0.00	0.00	5800.0	1168.6	1413.5	2.00	180.00	1834.0	Start 2116.00 hold at 6125.68 MD
8241.7	0.00	0.00	7916.0	1168.6	1413.5	0.00	0.00	1834.0	TD at 8241.68



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
2866.0	3022.4	G Sand
4716.0	5014.0	Williams Fork
5916.0	6241.7	TOG
7016.0	7341.7	Cameo
7674.0	7999.7	Base Cameo Coal
7716.0	8041.7	Rollins



Plan: Design #2 (Piceance Federal 28-02M/Slot A-5)

Created By: Ricky Osburn Date: 11:17, October 21 2015



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-02M
<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 Federal 28-02M	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot A-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot A-5	<b>Database:</b>	EDMDBBW

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

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

Well	Piceance Federal 28-02M					
Well Position	+N/-S	0.00 usft	Northing:	1,524,431.497 usft	Latitude:	39.251061
	+E/-W	0.00 usft	Easting:	2,354,550.869 usft	Longitude:	-107.779508
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,556.00 usft

<b>Wellbore</b>	Slot A-5				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	2015/04/27	9.73	65.47	51,742

<b>Design</b>	Slot A-5			
<b>Audit Notes:</b>				
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b> 0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	55.87

<b>Survey Program</b>	<b>Date</b>	2015/09/01		
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
108.00	8,266.00	Survey #1 (Slot A-5)	MWD	MWD - Standard



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-02M
<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 Federal 28-02M	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot A-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot A-5	<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	1,524,431.497	2,354,550.869	39.251061	-107.779508	
First Archer Survey										
108.00	1.23	47.69	107.99	0.78	0.86	1,524,432.255	2,354,551.745	39.251063	-107.779505	
200.00	2.86	64.30	199.93	2.44	3.66	1,524,433.845	2,354,554.585	39.251068	-107.779495	
292.00	4.00	64.04	291.76	4.84	8.61	1,524,436.120	2,354,559.597	39.251074	-107.779478	
385.00	6.33	57.88	384.38	8.99	15.87	1,524,440.083	2,354,566.958	39.251086	-107.779452	
477.00	8.88	42.50	475.57	16.92	24.96	1,524,447.786	2,354,576.249	39.251108	-107.779420	
569.00	10.63	48.39	566.24	27.79	36.11	1,524,458.374	2,354,587.661	39.251137	-107.779381	
661.00	13.45	43.73	656.21	41.16	49.85	1,524,471.394	2,354,601.736	39.251174	-107.779332	
753.00	15.47	46.72	745.29	57.31	66.18	1,524,487.125	2,354,618.467	39.251218	-107.779275	
846.00	16.17	44.35	834.77	75.07	84.26	1,524,504.429	2,354,636.989	39.251267	-107.779211	
938.00	17.27	44.26	922.88	94.01	102.75	1,524,522.901	2,354,655.945	39.251319	-107.779145	
1,030.00	18.46	47.95	1,010.45	113.55	123.10	1,524,541.921	2,354,676.777	39.251373	-107.779074	
1,125.00	20.52	51.29	1,100.00	134.04	147.26	1,524,561.798	2,354,701.448	39.251429	-107.778988	
1,220.00	20.96	49.89	1,188.84	155.40	173.25	1,524,582.499	2,354,727.964	39.251488	-107.778897	
1,315.00	21.40	49.71	1,277.43	177.55	199.47	1,524,603.989	2,354,754.727	39.251549	-107.778804	
1,410.00	22.15	49.01	1,365.65	200.51	226.21	1,524,626.266	2,354,782.033	39.251612	-107.778710	
1,505.00	23.64	48.22	1,453.16	224.95	253.93	1,524,650.002	2,354,810.361	39.251679	-107.778612	
1,576.00	23.75	48.83	1,518.18	243.84	275.31	1,524,668.356	2,354,832.206	39.251731	-107.778536	
1,631.00	24.13	46.46	1,568.45	258.88	291.79	1,524,682.973	2,354,849.065	39.251772	-107.778478	
1,694.00	24.17	48.74	1,625.93	276.26	310.82	1,524,699.867	2,354,868.526	39.251820	-107.778411	
1,789.00	23.59	48.39	1,712.80	301.71	339.66	1,524,724.585	2,354,897.988	39.251889	-107.778309	
1,884.00	22.85	52.00	1,800.11	325.69	368.41	1,524,747.837	2,354,927.330	39.251955	-107.778207	
1,979.00	22.50	51.03	1,887.77	348.47	397.07	1,524,769.899	2,354,956.561	39.252018	-107.778106	
2,073.00	21.88	50.33	1,974.80	370.97	424.54	1,524,791.695	2,354,984.583	39.252080	-107.778009	
2,168.00	21.14	49.27	2,063.19	393.45	451.15	1,524,813.499	2,355,011.746	39.252141	-107.777915	
2,263.00	21.45	53.67	2,151.71	414.92	478.12	1,524,834.285	2,355,039.253	39.252200	-107.777820	
2,358.00	20.87	53.05	2,240.30	435.38	505.64	1,524,854.051	2,355,067.275	39.252256	-107.777723	
2,453.00	20.13	52.70	2,329.28	455.46	532.17	1,524,873.458	2,355,094.298	39.252312	-107.777629	
2,548.00	21.63	53.23	2,418.04	475.84	559.20	1,524,893.162	2,355,121.832	39.252368	-107.777534	
2,643.00	20.79	52.43	2,506.61	496.61	586.59	1,524,913.230	2,355,149.733	39.252425	-107.777437	
2,737.00	20.08	52.26	2,594.69	516.66	612.57	1,524,932.620	2,355,176.212	39.252480	-107.777345	
2,832.00	21.66	52.08	2,683.46	537.41	639.30	1,524,952.701	2,355,203.453	39.252537	-107.777251	
2,927.00	20.70	51.38	2,772.04	558.67	666.25	1,524,973.273	2,355,230.927	39.252595	-107.777156	
3,022.00	18.68	50.33	2,861.48	578.86	691.08	1,524,992.837	2,355,256.257	39.252650	-107.777068	
3,117.00	20.87	52.26	2,950.87	598.93	716.18	1,525,012.273	2,355,281.848	39.252705	-107.776979	
3,212.00	22.81	51.38	3,039.05	620.79	743.95	1,525,033.422	2,355,310.160	39.252765	-107.776881	
3,307.00	22.19	50.76	3,126.82	643.63	772.23	1,525,055.547	2,355,339.006	39.252828	-107.776781	
3,401.00	21.62	50.85	3,214.03	665.79	799.41	1,525,077.021	2,355,366.731	39.252889	-107.776685	
3,497.00	20.92	50.68	3,303.49	687.82	826.38	1,525,098.363	2,355,394.250	39.252950	-107.776590	
3,591.00	22.24	49.45	3,390.90	710.02	852.89	1,525,119.891	2,355,421.299	39.253010	-107.776496	
3,686.00	21.88	49.01	3,478.95	733.32	879.91	1,525,142.505	2,355,448.897	39.253074	-107.776401	
3,781.00	21.05	48.13	3,567.36	756.31	905.97	1,525,164.842	2,355,475.533	39.253138	-107.776309	
3,876.00	21.71	49.62	3,655.82	779.08	932.06	1,525,186.951	2,355,502.186	39.253200	-107.776217	
3,971.00	22.46	52.70	3,743.85	801.47	959.89	1,525,208.627	2,355,530.560	39.253262	-107.776119	
4,066.00	21.66	52.26	3,831.89	823.19	988.19	1,525,229.639	2,355,559.397	39.253321	-107.776019	
4,161.00	22.81	53.84	3,919.83	844.79	1,016.92	1,525,250.508	2,355,588.663	39.253380	-107.775917	
4,255.00	22.50	52.96	4,006.58	866.38	1,045.99	1,525,271.358	2,355,618.263	39.253440	-107.775815	
4,350.00	22.19	52.79	4,094.44	888.18	1,074.78	1,525,292.427	2,355,647.598	39.253500	-107.775713	
4,445.00	21.49	52.52	4,182.62	909.61	1,102.88	1,525,313.153	2,355,676.224	39.253558	-107.775614	
4,540.00	20.39	53.58	4,271.35	930.03	1,130.01	1,525,332.880	2,355,703.855	39.253615	-107.775518	
4,635.00	20.87	51.38	4,360.26	950.41	1,156.55	1,525,352.595	2,355,730.896	39.253670	-107.775424	
4,730.00	20.48	51.03	4,449.14	971.43	1,182.69	1,525,372.947	2,355,757.558	39.253728	-107.775332	
4,824.00	20.52	50.50	4,537.19	992.25	1,208.19	1,525,393.122	2,355,783.570	39.253785	-107.775242	
4,919.00	19.69	50.24	4,626.40	1,013.08	1,233.34	1,525,413.312	2,355,809.236	39.253843	-107.775153	



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-02M
<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 Federal 28-02M	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot A-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot A-5	<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
5,014.00	18.15	48.74	4,716.26	1,033.07	1,256.77	1,525,432.713	2,355,833.157	39.253897	-107.775070
5,109.00	16.83	49.01	4,806.87	1,051.85	1,278.27	1,525,450.947	2,355,855.127	39.253949	-107.774994
5,204.00	15.21	49.01	4,898.18	1,069.05	1,298.06	1,525,467.641	2,355,875.341	39.253996	-107.774924
5,299.00	14.81	48.57	4,989.93	1,085.26	1,316.57	1,525,483.380	2,355,894.252	39.254041	-107.774859
5,394.00	13.80	47.51	5,081.99	1,100.94	1,334.03	1,525,498.625	2,355,912.098	39.254084	-107.774797
5,489.00	12.48	49.80	5,174.50	1,115.22	1,350.22	1,525,512.494	2,355,928.648	39.254123	-107.774740
5,584.00	11.47	49.89	5,267.43	1,127.94	1,365.29	1,525,524.823	2,355,944.026	39.254158	-107.774687
5,678.00	10.11	49.01	5,359.77	1,139.37	1,378.66	1,525,535.917	2,355,957.685	39.254189	-107.774640
5,772.00	9.14	49.45	5,452.44	1,149.63	1,390.57	1,525,545.881	2,355,969.840	39.254217	-107.774598
5,867.00	8.57	50.76	5,546.31	1,159.02	1,401.78	1,525,554.979	2,355,981.287	39.254243	-107.774558
5,962.00	7.42	51.64	5,640.39	1,167.30	1,412.07	1,525,563.003	2,355,991.784	39.254266	-107.774522
6,057.00	6.42	51.64	5,734.69	1,174.41	1,421.05	1,525,569.879	2,356,000.934	39.254285	-107.774490
6,152.00	5.63	50.94	5,829.17	1,180.64	1,428.83	1,525,575.915	2,356,008.872	39.254303	-107.774462
6,247.00	5.27	50.59	5,923.74	1,186.34	1,435.82	1,525,581.444	2,356,016.002	39.254318	-107.774438
6,341.00	4.70	53.58	6,017.38	1,191.37	1,442.25	1,525,586.308	2,356,022.560	39.254332	-107.774415
6,436.00	2.11	59.91	6,112.21	1,194.56	1,446.90	1,525,589.378	2,356,027.285	39.254341	-107.774399
6,531.00	1.63	68.08	6,207.15	1,195.94	1,449.67	1,525,590.690	2,356,030.085	39.254345	-107.774389
6,626.00	1.41	72.74	6,302.12	1,196.79	1,452.04	1,525,591.481	2,356,032.475	39.254347	-107.774381
6,721.00	0.92	82.84	6,397.10	1,197.23	1,453.91	1,525,591.876	2,356,034.359	39.254348	-107.774374
6,816.00	0.79	90.93	6,492.09	1,197.32	1,455.32	1,525,591.925	2,356,035.772	39.254348	-107.774369
6,911.00	0.31	138.92	6,587.09	1,197.11	1,456.15	1,525,591.700	2,356,036.590	39.254348	-107.774366
7,006.00	0.53	183.13	6,682.08	1,196.48	1,456.29	1,525,591.064	2,356,036.719	39.254346	-107.774366
7,101.00	0.66	199.48	6,777.08	1,195.53	1,456.08	1,525,590.115	2,356,036.489	39.254343	-107.774366
7,196.00	0.83	213.63	6,872.07	1,194.44	1,455.52	1,525,589.041	2,356,035.898	39.254340	-107.774368
7,291.00	1.21	245.35	6,967.06	1,193.45	1,454.23	1,525,588.082	2,356,034.581	39.254338	-107.774373
7,385.00	1.98	257.57	7,061.02	1,192.68	1,451.74	1,525,587.381	2,356,032.075	39.254336	-107.774382
7,480.00	2.55	252.47	7,155.95	1,191.69	1,448.12	1,525,586.483	2,356,028.433	39.254333	-107.774394
7,575.00	2.99	242.37	7,250.83	1,189.91	1,443.91	1,525,584.803	2,356,024.179	39.254328	-107.774409
7,670.00	2.77	230.59	7,345.72	1,187.30	1,439.94	1,525,582.297	2,356,020.147	39.254321	-107.774423
7,765.00	3.12	225.32	7,440.59	1,184.03	1,436.33	1,525,579.114	2,356,016.454	39.254312	-107.774436
7,860.00	2.77	218.28	7,535.46	1,180.41	1,433.07	1,525,575.577	2,356,013.103	39.254302	-107.774448
7,955.00	2.37	206.86	7,630.37	1,176.85	1,430.76	1,525,572.081	2,356,010.705	39.254292	-107.774456
8,050.00	2.20	215.56	7,725.29	1,173.62	1,428.81	1,525,568.896	2,356,008.677	39.254283	-107.774463
8,145.00	2.50	216.44	7,820.21	1,170.47	1,426.52	1,525,565.804	2,356,006.308	39.254275	-107.774471
Last archer survey - Piceance Federal 28-02M tgt									
8,218.00	2.46	223.29	7,893.15	1,168.04	1,424.50	1,525,563.434	2,356,004.228	39.254268	-107.774478
PTB									
8,266.00	2.46	223.29	7,941.10	1,166.55	1,423.09	1,525,561.970	2,356,002.778	39.254264	-107.774483



# Archer

## Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance Federal 28-02M	North Reference:	True
Wellbore:	Slot A-5	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-5	Database:	EDMDBBW

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
108.00	107.99	0.78	0.86	First Archer Survey	
8,218.00	7,893.15	1,168.04	1,424.50	Last archer survey	
8,266.00	7,941.10	1,166.55	1,423.09	PTB	

Checked By:	_____	Approved By:	_____	Date:	_____
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