



# **Piceance Energy, LLC**

**Mesa County, CO**

**Piceance 28-10 Pad**

**Piceance Federal 28-13E**

**Slot B-7**

**Survey: Survey #1**

## **Survey Report - Geographic**

**23 December, 2015**



Project: Mesa County, CO  
Site: Piceance 28-10 Pad  
Well: Piceance Federal 28-13E  
Wellbore: Slot B-7  
Design: Design #2  
Latitude: 39.246503  
Longitude: -107.774975  
Ground Level: 7679.00  
Well @ 7701.00usft

# 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 28-13E, True North  
Vertical (TVD) Reference: Well @ 7701.00usft  
Section (VS) Reference: Slot - (0.00N, 0.00E)  
Measured Depth Reference: Well @ 7701.00usft  
Calculation Method: Minimum Curvature

### WELL DETAILS: Piceance Federal 28-13E

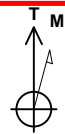
+N-S	+E-W	Northing	Ground Level: Easting	Latitude	Longitude	Slot
0.00	0.00	1522739.592	2355792.654	39.246503	-107.774975	

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

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude	Shape
Piceance 28-13E tgt	8024.00	+N-S 60.81	+E-W 1905.31	1522752.675	2357698.887	39.246669	-107.768247	Circle (Radius: 50.00)

### SECTION DETAILS

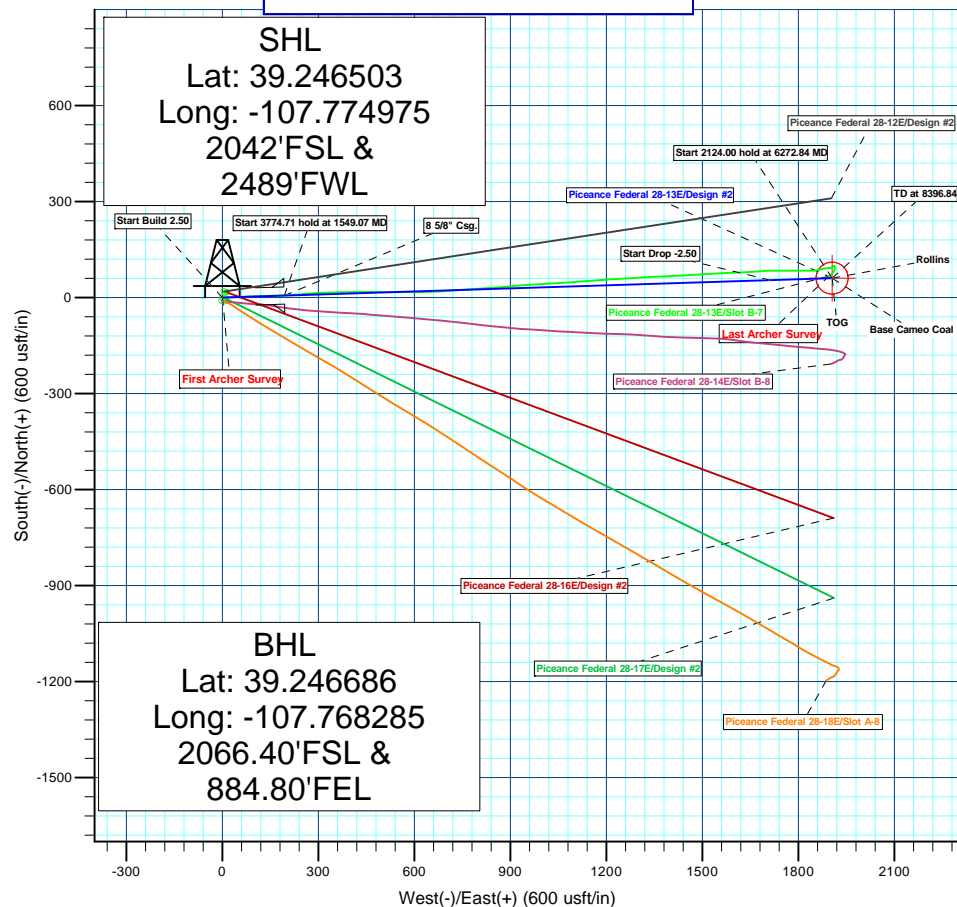
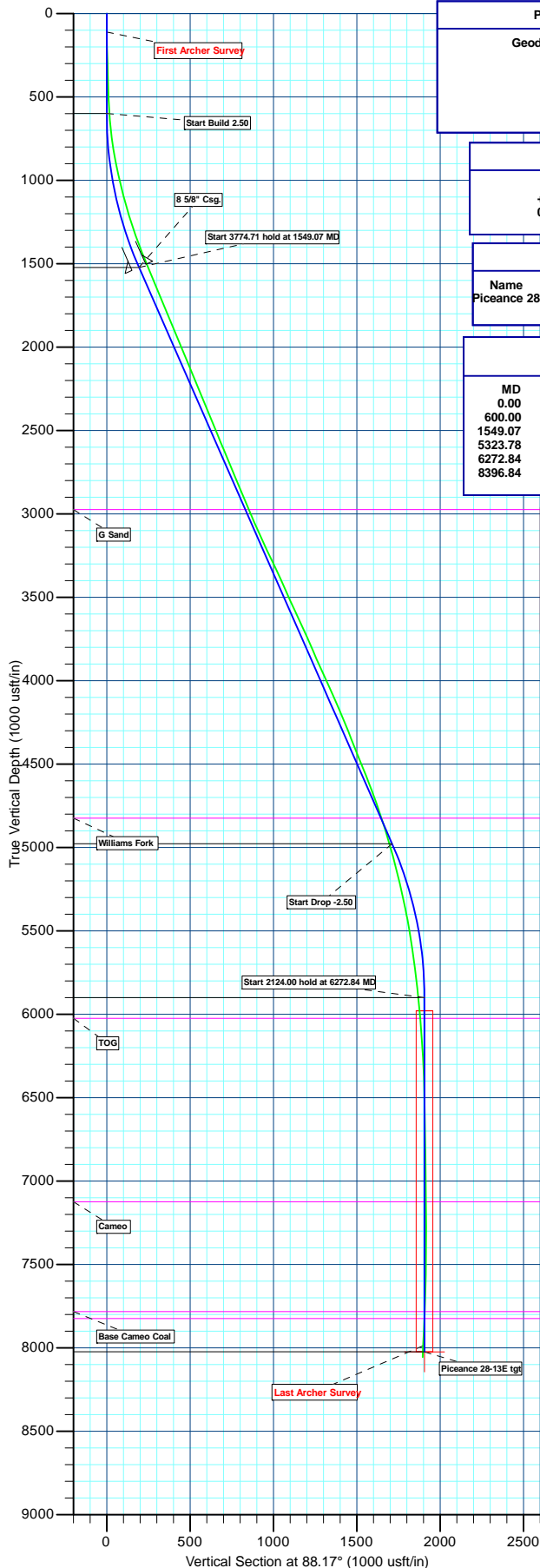
MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSeet	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.50
1549.07	23.73	88.17	1522.17	6.18	193.62	2.50	88.17	193.72	Start 3774.71 hold at 1549.07 MD
5323.78	23.73	88.17	4977.83	54.61	1711.69	0.00	0.00	1712.56	Start Drop -2.50
6272.84	0.00	0.00	5900.00	60.78	1905.31	2.50	180.00	1906.28	Start 2124.00 hold at 6272.84 MD
8396.84	0.00	0.00	8024.00	60.78	1905.31	0.00	0.00	1906.28	TD at 8396.84



Azimuths to True North  
Magnetic North: 9.73°  
Magnetic Field  
Strength: 51746.5snT  
Dip Angle: 65.47°  
Date: 03/31/2015  
Model: IGRF2010

### FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2974.00	3134.94	G Sand
4824.00	5155.75	Williams Fork
6024.00	6396.84	TOG
7124.00	7496.84	Cameo
7782.00	8154.84	Base Cameo Coal
7824.00	8196.84	Rollins



Plan: Design #2 (Piceance Federal 28-13E/Slot B-7)

Created By: Ricky Osburn Date: 13:17, January 21 2016



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-13E
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	Well @ 7701.00usft
<b>Site:</b>	Piceance 28-10 Pad	<b>MD Reference:</b>	Well @ 7701.00usft
<b>Well:</b>	Piceance Federal 28-13E	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot B-7	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot B-7	<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 28-10 Pad			
<b>Site Position:</b>		<b>Northing:</b>	1,522,822.786 usft	<b>Latitude:</b> 39.246733
<b>From:</b>	Lat/Long	<b>Easting:</b>	2,355,826.215 usft	<b>Longitude:</b> -107.774864
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	13-3/16"	<b>Grid Convergence:</b> -1.43 °

Well	Piceance Federal 28-13E					
Well Position	+N/-S	0.00 usft	Northing:	1,522,739.592 usft	Latitude:	39.246503
	+E/-W	0.00 usft	Easting:	2,355,792.654 usft	Longitude:	-107.774975
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,679.00 usft

<b>Wellbore</b>	Slot B-7				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	03/31/15	9.73	65.47	51,746

<b>Design</b>	Slot B-7			
<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	87.56

<b>Survey Program</b>	<b>Date</b>	11/07/15		
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
112.00	8,403.00	Survey #1 (Slot B-7)	MWD	MWD - Standard



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-13E
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	Well @ 7701.00usft
<b>Site:</b>	Piceance 28-10 Pad	<b>MD Reference:</b>	Well @ 7701.00usft
<b>Well:</b>	Piceance Federal 28-13E	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot B-7	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot B-7	<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	1,522,739.592	2,355,792.654	39.246503	-107.774975
<b>First Archer Survey</b>									
112.00	0.40	99.73	112.00	-0.07	0.39	1,522,739.517	2,355,793.038	39.246502	-107.774974
204.00	1.52	82.85	203.98	0.03	1.91	1,522,739.576	2,355,794.567	39.246503	-107.774968
296.00	1.50	85.40	295.95	0.28	4.32	1,522,739.764	2,355,796.984	39.246503	-107.774960
389.00	1.80	89.30	388.91	0.40	7.00	1,522,739.813	2,355,799.659	39.246504	-107.774950
481.00	1.70	91.30	480.87	0.38	9.81	1,522,739.729	2,355,802.467	39.246504	-107.774940
573.00	3.65	86.55	572.77	0.53	14.09	1,522,739.767	2,355,806.757	39.246504	-107.774925
665.00	5.30	86.40	664.48	0.97	21.26	1,522,740.030	2,355,813.931	39.246505	-107.774900
757.00	7.70	86.50	755.89	1.61	31.65	1,522,740.413	2,355,824.337	39.246507	-107.774863
849.00	9.80	88.90	846.81	2.14	45.63	1,522,740.589	2,355,838.328	39.246509	-107.774814
942.00	12.00	88.70	938.13	2.51	63.22	1,522,740.520	2,355,855.913	39.246510	-107.774752
1,034.00	14.10	86.90	1,027.75	3.33	83.97	1,522,740.824	2,355,876.680	39.246512	-107.774679
1,127.00	15.10	87.80	1,117.74	4.41	107.39	1,522,741.315	2,355,900.117	39.246515	-107.774596
1,222.00	16.70	89.20	1,209.10	5.08	133.40	1,522,741.329	2,355,926.140	39.246517	-107.774504
1,316.00	18.90	87.90	1,298.60	5.82	162.12	1,522,741.356	2,355,954.872	39.246519	-107.774403
1,411.00	20.80	86.50	1,387.95	7.42	194.34	1,522,742.142	2,355,987.117	39.246523	-107.774289
1,506.00	22.20	87.20	1,476.34	9.32	229.10	1,522,743.178	2,356,021.918	39.246528	-107.774166
1,546.00	22.80	86.80	1,513.29	10.13	244.39	1,522,743.597	2,356,037.219	39.246530	-107.774112
1,692.00	22.37	84.61	1,648.10	14.32	300.29	1,522,746.384	2,356,093.212	39.246542	-107.773915
1,787.00	23.20	89.62	1,735.69	16.14	337.01	1,522,747.287	2,356,129.960	39.246547	-107.773785
1,882.00	22.68	89.01	1,823.18	16.58	374.03	1,522,746.800	2,356,166.984	39.246548	-107.773654
1,977.00	21.75	88.83	1,911.13	17.25	409.94	1,522,746.577	2,356,202.901	39.246550	-107.773527
2,072.00	23.29	90.33	1,998.88	17.51	446.32	1,522,745.917	2,356,239.277	39.246551	-107.773399
2,167.00	22.63	90.50	2,086.35	17.24	483.38	1,522,744.721	2,356,276.316	39.246550	-107.773268
2,261.00	21.80	90.15	2,173.38	17.03	518.92	1,522,743.628	2,356,311.838	39.246549	-107.773143
2,356.00	22.90	90.33	2,261.24	16.88	555.04	1,522,742.571	2,356,347.947	39.246549	-107.773015
2,451.00	22.19	90.06	2,348.98	16.76	591.47	1,522,741.534	2,356,384.356	39.246549	-107.772886
2,546.00	22.90	88.13	2,436.72	17.34	627.88	1,522,741.206	2,356,420.773	39.246550	-107.772758
2,641.00	22.10	88.13	2,524.49	18.53	664.22	1,522,741.482	2,356,457.127	39.246554	-107.772630
2,736.00	23.42	85.67	2,612.09	20.54	700.91	1,522,742.572	2,356,493.855	39.246559	-107.772500
2,830.00	22.15	86.20	2,698.75	23.12	737.22	1,522,744.247	2,356,530.219	39.246566	-107.772372
2,927.00	23.07	86.02	2,788.30	25.65	774.42	1,522,745.845	2,356,567.477	39.246573	-107.772240
3,022.00	21.71	86.46	2,876.13	28.03	810.53	1,522,747.317	2,356,603.632	39.246580	-107.772113
3,116.00	23.03	84.88	2,963.06	30.74	846.20	1,522,749.138	2,356,639.357	39.246587	-107.771987
3,211.00	24.61	85.49	3,049.96	33.96	884.43	1,522,751.394	2,356,677.656	39.246596	-107.771852
3,305.00	23.91	84.79	3,135.66	37.23	922.91	1,522,753.698	2,356,716.209	39.246605	-107.771716
3,400.00	25.71	86.55	3,221.89	40.21	962.66	1,522,755.690	2,356,756.016	39.246613	-107.771576
3,495.00	25.31	86.19	3,307.63	42.80	1,003.49	1,522,757.257	2,356,796.900	39.246620	-107.771432
3,590.00	24.52	86.55	3,393.79	45.34	1,043.43	1,522,758.791	2,356,836.891	39.246627	-107.771291
3,685.00	23.64	87.07	3,480.52	47.50	1,082.13	1,522,759.982	2,356,875.633	39.246633	-107.771154
3,780.00	25.49	85.40	3,566.92	50.11	1,121.53	1,522,761.607	2,356,915.088	39.246640	-107.771015
3,875.00	24.92	85.84	3,652.87	53.20	1,161.87	1,522,763.688	2,356,955.490	39.246649	-107.770872
3,970.00	23.95	86.19	3,739.36	55.94	1,201.07	1,522,765.438	2,356,994.748	39.246656	-107.770734
4,064.00	23.07	85.76	3,825.56	58.57	1,238.47	1,522,767.131	2,357,032.207	39.246663	-107.770602
4,159.00	24.70	86.99	3,912.42	60.99	1,276.86	1,522,768.587	2,357,070.642	39.246670	-107.770466
4,254.00	24.48	87.34	3,998.81	62.94	1,316.34	1,522,769.554	2,357,110.162	39.246675	-107.770327
4,349.00	23.73	87.51	4,085.52	64.69	1,355.10	1,522,770.327	2,357,148.952	39.246680	-107.770190
4,444.00	23.20	87.16	4,172.66	66.44	1,392.89	1,522,771.137	2,357,186.771	39.246685	-107.770057
4,539.00	22.59	86.37	4,260.18	68.53	1,429.79	1,522,772.295	2,357,223.711	39.246691	-107.769926
4,634.00	21.23	85.23	4,348.32	71.11	1,465.14	1,522,773.995	2,357,259.118	39.246698	-107.769801
4,729.00	21.80	87.16	4,436.70	73.42	1,499.90	1,522,775.428	2,357,293.924	39.246704	-107.769679
4,824.00	22.41	87.69	4,524.71	75.02	1,535.61	1,522,776.137	2,357,329.666	39.246709	-107.769553
4,919.00	21.40	87.60	4,612.85	76.48	1,571.03	1,522,776.706	2,357,365.102	39.246713	-107.769428
5,014.00	19.95	87.34	4,701.73	77.95	1,604.53	1,522,777.345	2,357,398.636	39.246717	-107.769309



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-13E
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	Well @ 7701.00usft
<b>Site:</b>	Piceance 28-10 Pad	<b>MD Reference:</b>	Well @ 7701.00usft
<b>Well:</b>	Piceance Federal 28-13E	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot B-7	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot B-7	<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
5,108.00	18.46	86.55	4,790.50	79.59	1,635.41	1,522,778.211	2,357,429.544	39.246721	-107.769200
5,203.00	17.14	86.72	4,880.95	81.30	1,664.40	1,522,779.190	2,357,458.568	39.246726	-107.769098
5,299.00	17.05	86.19	4,972.71	83.04	1,692.57	1,522,780.229	2,357,486.768	39.246731	-107.768998
5,394.00	14.77	89.18	5,064.07	84.14	1,718.57	1,522,780.677	2,357,512.796	39.246734	-107.768907
5,489.00	12.88	89.27	5,156.31	84.45	1,741.27	1,522,780.416	2,357,535.495	39.246734	-107.768826
5,583.00	13.58	91.20	5,247.81	84.35	1,762.78	1,522,779.780	2,357,556.995	39.246734	-107.768750
5,678.00	12.08	92.70	5,340.44	83.65	1,783.86	1,522,778.551	2,357,578.053	39.246732	-107.768676
5,773.00	10.33	87.16	5,433.63	83.60	1,802.30	1,522,778.043	2,357,596.484	39.246732	-107.768611
5,868.00	9.36	87.43	5,527.23	84.37	1,818.53	1,522,778.405	2,357,612.723	39.246734	-107.768554
5,962.00	8.39	90.94	5,620.10	84.60	1,833.02	1,522,778.272	2,357,627.218	39.246735	-107.768502
6,057.00	7.34	92.79	5,714.21	84.19	1,846.01	1,522,777.538	2,357,640.195	39.246734	-107.768457
6,152.00	6.68	75.74	5,808.51	85.26	1,857.43	1,522,778.317	2,357,651.636	39.246737	-107.768416
6,247.00	5.93	76.09	5,902.93	87.80	1,867.55	1,522,780.604	2,357,661.815	39.246744	-107.768381
6,342.00	5.36	76.79	5,997.47	89.99	1,876.63	1,522,782.569	2,357,670.951	39.246750	-107.768348
6,437.00	4.48	83.29	6,092.12	91.44	1,884.64	1,522,783.816	2,357,678.989	39.246754	-107.768320
6,532.00	3.60	84.96	6,186.88	92.14	1,891.29	1,522,784.345	2,357,685.661	39.246755	-107.768297
6,626.00	3.25	93.14	6,280.72	92.25	1,896.89	1,522,784.318	2,357,691.262	39.246756	-107.768277
6,721.00	1.85	81.36	6,375.62	92.33	1,901.10	1,522,784.295	2,357,695.468	39.246756	-107.768262
6,816.00	1.19	92.17	6,470.59	92.53	1,903.60	1,522,784.426	2,357,697.974	39.246757	-107.768253
6,911.00	0.75	51.48	6,565.57	92.88	1,905.07	1,522,784.738	2,357,699.454	39.246757	-107.768248
7,006.00	1.58	25.29	6,660.55	94.45	1,906.12	1,522,786.283	2,357,700.539	39.246762	-107.768244
7,101.00	1.23	17.55	6,755.53	96.60	1,906.98	1,522,788.417	2,357,701.460	39.246768	-107.768241
7,196.00	2.24	68.79	6,850.49	98.25	1,909.02	1,522,790.010	2,357,703.539	39.246772	-107.768234
7,291.00	1.45	84.96	6,945.44	99.03	1,911.95	1,522,790.713	2,357,706.486	39.246774	-107.768224
7,385.00	0.83	137.70	7,039.42	98.63	1,913.59	1,522,790.273	2,357,708.118	39.246773	-107.768218
7,480.00	1.63	182.26	7,134.40	96.77	1,914.00	1,522,788.404	2,357,708.481	39.246768	-107.768217
7,575.00	1.71	181.64	7,229.36	94.00	1,913.91	1,522,785.641	2,357,708.318	39.246761	-107.768217
7,670.00	2.15	186.65	7,324.30	90.81	1,913.66	1,522,782.461	2,357,707.992	39.246752	-107.768218
7,765.00	2.55	183.75	7,419.22	86.94	1,913.32	1,522,778.592	2,357,707.550	39.246741	-107.768219
7,860.00	1.36	213.99	7,514.17	83.89	1,912.55	1,522,775.569	2,357,706.706	39.246733	-107.768222
7,954.00	1.93	217.59	7,608.13	81.71	1,910.96	1,522,773.430	2,357,705.062	39.246727	-107.768227
8,049.00	2.33	219.44	7,703.06	78.95	1,908.76	1,522,770.727	2,357,702.791	39.246719	-107.768235
8,144.00	3.03	229.37	7,797.96	75.83	1,905.63	1,522,767.680	2,357,699.582	39.246711	-107.768246
8,239.00	3.12	232.44	7,892.82	72.62	1,901.67	1,522,764.569	2,357,695.548	39.246702	-107.768260
<b>Last Archer Survey</b>									
8,334.00	3.16	230.25	7,987.68	69.37	1,897.61	1,522,761.421	2,357,691.405	39.246693	-107.768274
<b>Piceance 28-13E tgt</b>									
8,370.24	3.16	230.25	8,023.86	68.09	1,896.07	1,522,760.183	2,357,689.837	39.246689	-107.768280
<b>PTB</b>									
8,403.00	3.16	230.25	8,056.58	66.93	1,894.68	1,522,759.063	2,357,688.421	39.246686	-107.768285



# Archer

## Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-13E	North Reference:	True
Wellbore:	Slot B-7	Survey Calculation Method:	Minimum Curvature
Design:	Slot B-7	Database:	EDMDBBW

Survey Annotations					
	Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
			+N/-S (usft)	+E/-W (usft)	
	112.00	112.00	-0.07	0.39	First Archer Survey
	8,334.00	7,987.68	69.37	1,897.61	Last Archer Survey
	8,403.00	8,056.58	66.93	1,894.68	PTB

Checked By:	_____	Approved By:	_____	Date:	_____
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