



# **Piceance Energy, LLC**

**Mesa County, CO**

**Piceance 28-10 Pad**

**Piceance Federal 28-09E**

**Slot B-3**

**Survey: Survey #1**

## **Survey Report - Geographic**

**23 December, 2015**





Project: Mesa County, CO  
 Site: Piceance 28-10 Pad  
 Well: Piceance Federal 28-09E  
 Wellbore: Slot B-3  
 Design: Design #2  
 Latitude: 39.246661  
 Longitude: -107.774925  
 Ground Level: 7679.00  
 Well @ 7701.00usft



**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 (NE) Reference: Well Piceance Federal 28-09E, 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 28-09E**

+N-S	+E-W	Northing	Ground Level:	7679.00	Latitude	Slot
0.00	0.00	1522796.887	Easting	2355808.254	39.246661	-107.774925

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

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude	Shape
Piceance 28-09E tgt	8059.00	1002.71	1885.57	1523752.073	2357718.337	39.249414	-107.768267	Circle (Radius: 50.00)

**SECTION DETAILS**

MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	Vsect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.50
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	Start 3903.0 hold at 1523.7 MD
1523.67	25.59	62.00	1489.97	105.57	198.52	2.50	62.00	224.84	Start 2059.0 hold at 6450.3 MD
5426.63	25.59	62.00	5010.03	897.12	1687.05	0.00	0.00	1910.75	Start Drop -2.50
6450.30	0.00	0.00	6000.00	1002.69	1885.57	2.50	180.00	2135.59	Start 2059.0 hold at 6450.3 MD
8509.30	0.00	0.00	8059.00	1002.69	1885.57	0.00	0.00	2135.59	TD at 8509.3

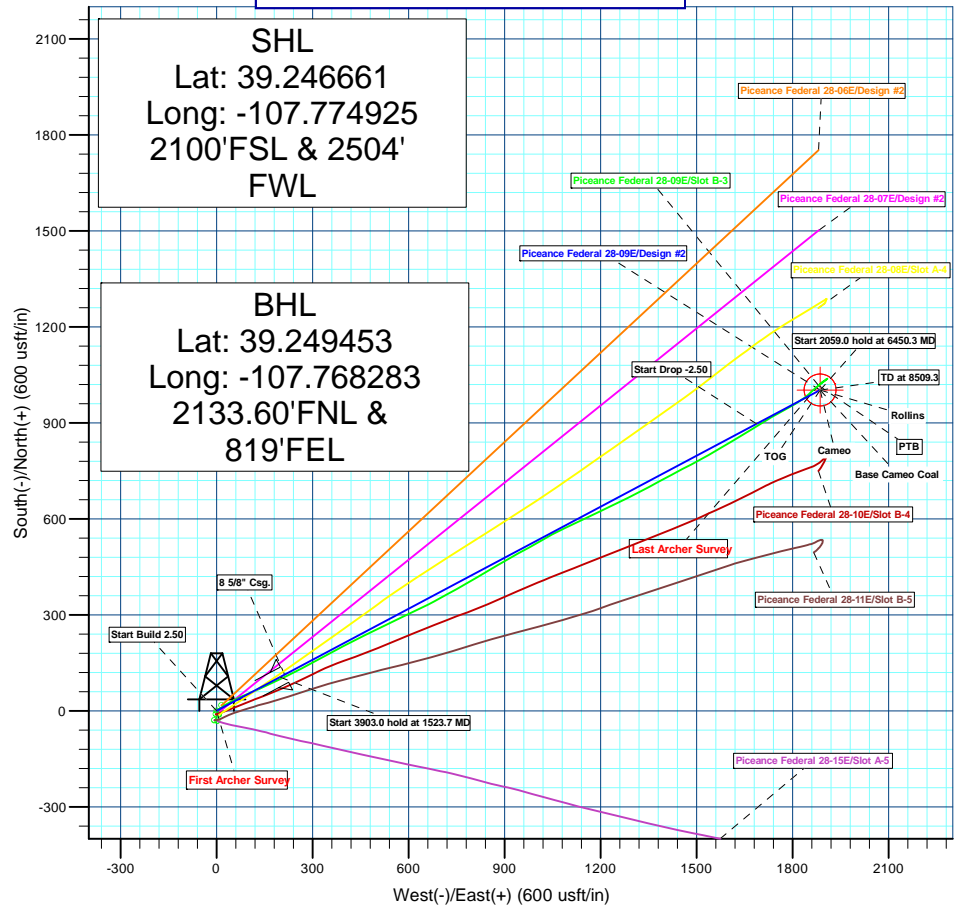
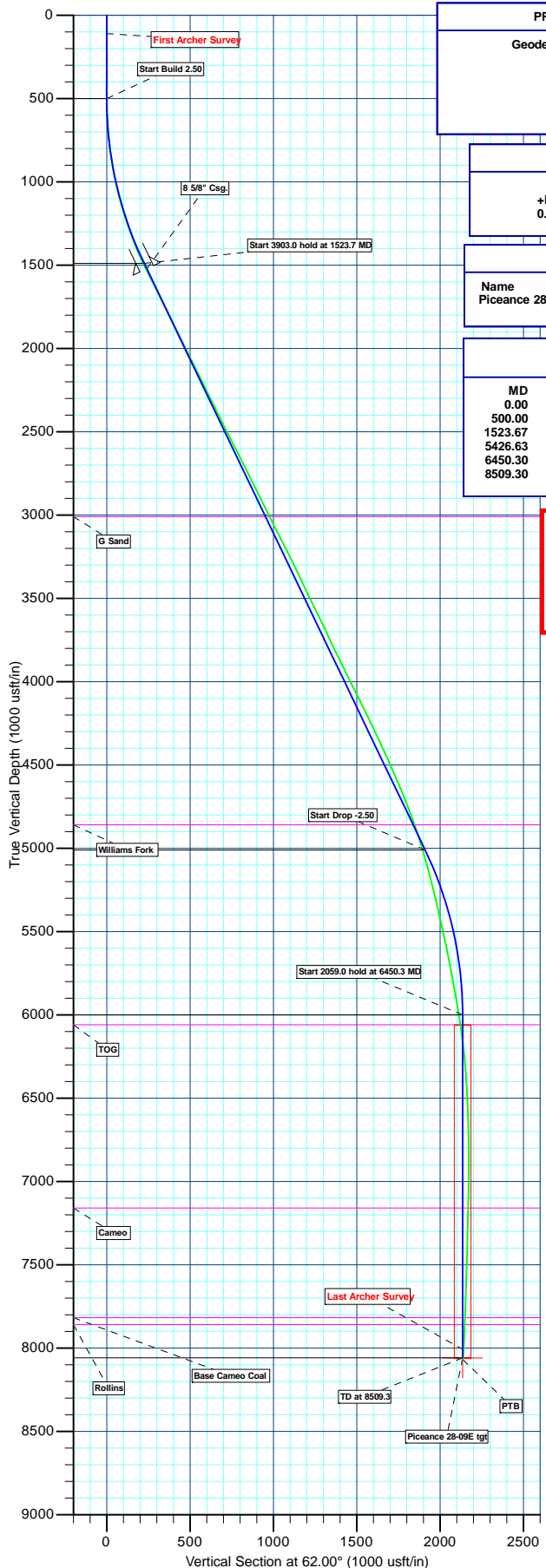
**TM**

Azimuths to True North  
 Magnetic North: 9.64°

Magnetic Field  
 Strength: 51678.3snT  
 Dip Angle: 65.45°  
 Date: 12/03/2015  
 Model: IGRF2010

**FORMATION TOP DETAILS**

TVDPATH	MDPATH	FORMATION
3009.00	3207.94	G Sand
4859.00	5259.17	Williams Fork
6059.00	6509.30	TOG
7159.00	7609.30	Cameo
7817.00	8267.30	Base Cameo Coal
7859.00	8309.30	Rollins





# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-09E
<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 28-09E	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot B-3	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot B-3	<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 °

<b>Well</b>	Piceance Federal 28-09E					
<b>Well Position</b>	<b>+N/-S</b>	0.00 usft	<b>Northing:</b>	1,522,796.887 usft	<b>Latitude:</b>	39.246661
	<b>+E/-W</b>	0.00 usft	<b>Easting:</b>	2,355,808.254 usft	<b>Longitude:</b>	-107.774925
<b>Position Uncertainty</b>		0.00 usft	<b>Wellhead Elevation:</b>	0.00 usft	<b>Ground Level:</b>	7,679.00 usft

<b>Wellbore</b>	Slot B-3				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	12/03/15	9.64	65.45	51,678

<b>Design</b>	Slot B-3				
<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	63.44	

<b>Survey Program</b>	<b>Date</b>	12/13/15			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
111.00	8,513.00	Survey #1 (Slot B-3)	MWD	MWD - Standard	



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-09E
<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 28-09E	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot B-3	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot B-3	<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	1,522,796.887	2,355,808.254	39.246661	-107.774925	
<b>First Archer Survey</b>										
111.00	0.44	168.46	111.00	-0.42	0.09	1,522,796.468	2,355,808.329	39.246660	-107.774925	
203.00	0.40	146.31	203.00	-1.03	0.33	1,522,795.848	2,355,808.562	39.246658	-107.774924	
295.00	0.44	175.40	294.99	-1.65	0.54	1,522,795.224	2,355,808.753	39.246656	-107.774923	
388.00	0.26	190.52	387.99	-2.21	0.53	1,522,794.661	2,355,808.729	39.246655	-107.774923	
480.00	0.31	99.73	479.99	-2.46	0.74	1,522,794.409	2,355,808.930	39.246654	-107.774922	
572.00	2.33	38.91	571.96	-1.05	2.16	1,522,795.786	2,355,810.385	39.246658	-107.774917	
664.00	4.48	46.64	663.80	2.88	5.95	1,522,799.613	2,355,814.269	39.246669	-107.774904	
756.00	5.98	49.10	755.41	8.48	12.18	1,522,805.060	2,355,820.643	39.246684	-107.774882	
848.00	7.91	60.27	846.74	14.76	21.30	1,522,811.107	2,355,829.918	39.246702	-107.774850	
940.00	10.59	60.09	937.53	22.11	34.13	1,522,818.140	2,355,842.926	39.246722	-107.774804	
1,032.00	13.23	60.97	1,027.54	31.44	50.66	1,522,827.049	2,355,859.690	39.246747	-107.774746	
1,127.00	15.11	65.63	1,119.65	41.83	71.45	1,522,836.911	2,355,880.730	39.246776	-107.774673	
1,222.00	17.71	66.77	1,210.77	52.64	96.01	1,522,847.103	2,355,905.554	39.246806	-107.774586	
1,317.00	20.00	66.77	1,300.67	64.74	124.22	1,522,858.501	2,355,934.059	39.246839	-107.774486	
1,412.00	22.46	65.89	1,389.22	78.57	155.72	1,522,871.531	2,355,965.892	39.246877	-107.774375	
1,507.00	24.83	63.08	1,476.24	95.01	190.07	1,522,887.112	2,356,000.648	39.246922	-107.774254	
1,545.00	26.50	63.78	1,510.49	102.37	204.80	1,522,894.099	2,356,015.548	39.246942	-107.774202	
1,694.00	27.29	62.82	1,643.37	132.66	265.00	1,522,922.873	2,356,076.497	39.247025	-107.773989	
1,789.00	26.72	61.85	1,728.01	152.69	303.21	1,522,941.934	2,356,115.191	39.247080	-107.773854	
1,884.00	26.32	62.11	1,813.02	172.61	340.66	1,522,960.918	2,356,153.124	39.247135	-107.773722	
1,979.00	25.80	61.76	1,898.36	192.25	377.48	1,522,979.624	2,356,190.432	39.247189	-107.773592	
2,074.00	26.98	62.99	1,983.46	211.82	414.90	1,522,998.250	2,356,228.324	39.247243	-107.773460	
2,169.00	26.72	63.43	2,068.22	231.16	453.20	1,523,016.625	2,356,267.097	39.247296	-107.773325	
2,263.00	26.01	63.52	2,152.44	249.80	490.55	1,523,034.327	2,356,304.902	39.247347	-107.773193	
2,358.00	25.58	64.05	2,237.97	268.06	527.63	1,523,051.655	2,356,342.434	39.247397	-107.773062	
2,453.00	26.76	64.84	2,323.23	286.13	565.43	1,523,068.771	2,356,380.676	39.247447	-107.772928	
2,548.00	25.80	64.31	2,408.41	304.19	603.42	1,523,085.869	2,356,419.105	39.247496	-107.772794	
2,643.00	27.47	64.13	2,493.33	322.71	641.77	1,523,103.427	2,356,457.904	39.247547	-107.772659	
2,738.00	27.11	61.50	2,577.76	342.60	680.51	1,523,122.340	2,356,497.130	39.247602	-107.772522	
2,832.00	26.06	61.50	2,661.82	362.67	717.48	1,523,141.481	2,356,534.590	39.247657	-107.772391	
2,927.00	26.98	60.79	2,746.82	383.15	754.63	1,523,161.018	2,356,572.239	39.247713	-107.772260	
3,022.00	25.84	59.65	2,831.90	404.12	791.31	1,523,181.072	2,356,609.430	39.247771	-107.772131	
3,117.00	27.25	59.56	2,916.89	425.61	827.92	1,523,201.629	2,356,646.576	39.247830	-107.772001	
3,211.00	26.19	58.95	3,000.85	447.21	864.25	1,523,222.315	2,356,683.431	39.247889	-107.771873	
3,306.00	27.38	60.79	3,085.66	468.68	901.28	1,523,242.856	2,356,720.986	39.247948	-107.771742	
3,400.00	27.07	60.35	3,169.24	489.81	938.73	1,523,263.041	2,356,758.958	39.248006	-107.771610	
3,495.00	26.41	60.97	3,254.08	510.76	975.99	1,523,283.048	2,356,796.731	39.248063	-107.771479	
3,590.00	25.53	60.62	3,339.49	531.05	1,012.31	1,523,302.429	2,356,833.540	39.248119	-107.771350	
3,685.00	24.87	61.50	3,425.45	550.63	1,047.70	1,523,321.112	2,356,869.414	39.248173	-107.771225	
3,780.00	26.50	64.40	3,511.06	569.32	1,084.38	1,523,338.880	2,356,906.544	39.248224	-107.771096	
3,875.00	26.06	64.31	3,596.24	587.53	1,122.29	1,523,356.128	2,356,944.907	39.248274	-107.770962	
3,970.00	25.71	64.66	3,681.71	605.39	1,159.72	1,523,373.051	2,356,982.771	39.248323	-107.770830	
4,065.00	24.92	64.84	3,767.59	622.72	1,196.46	1,523,389.454	2,357,019.933	39.248371	-107.770700	
4,159.00	26.63	64.57	3,852.23	640.19	1,233.41	1,523,405.990	2,357,057.312	39.248419	-107.770570	
4,254.00	25.80	64.40	3,937.46	658.26	1,271.29	1,523,423.112	2,357,095.625	39.248468	-107.770436	
4,349.00	26.67	62.02	4,022.67	677.20	1,308.76	1,523,441.104	2,357,133.562	39.248520	-107.770304	
4,444.00	26.85	61.59	4,107.50	697.41	1,346.46	1,523,460.364	2,357,171.754	39.248576	-107.770170	
4,539.00	26.06	61.50	4,192.55	717.57	1,383.67	1,523,479.590	2,357,209.456	39.248631	-107.770039	
4,634.00	25.36	62.38	4,278.15	736.96	1,420.03	1,523,498.063	2,357,246.296	39.248684	-107.769911	
4,729.00	24.61	62.02	4,364.26	755.68	1,455.53	1,523,515.881	2,357,282.248	39.248736	-107.769785	
4,824.00	24.35	62.64	4,450.72	773.96	1,490.39	1,523,533.283	2,357,317.558	39.248786	-107.769662	
4,919.00	23.77	60.53	4,537.46	792.38	1,524.46	1,523,550.845	2,357,352.072	39.248836	-107.769542	
5,014.00	23.03	60.00	4,624.65	811.09	1,557.22	1,523,568.729	2,357,385.292	39.248888	-107.769426	



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-09E
<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 28-09E	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot B-3	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot B-3	<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
5,109.00	21.88	59.56	4,712.45	829.35	1,588.57	1,523,586.199	2,357,417.095	39.248938	-107.769315
5,204.00	20.26	58.33	4,801.09	846.95	1,617.84	1,523,603.066	2,357,446.789	39.248986	-107.769212
5,299.00	18.50	59.21	4,890.70	863.31	1,644.78	1,523,618.738	2,357,474.139	39.249031	-107.769117
5,394.00	17.27	58.95	4,981.11	878.29	1,669.81	1,523,633.096	2,357,499.536	39.249072	-107.769029
5,489.00	15.95	58.16	5,072.15	892.45	1,692.98	1,523,646.671	2,357,523.054	39.249111	-107.768947
5,584.00	14.72	57.89	5,163.76	905.76	1,714.30	1,523,659.436	2,357,544.693	39.249148	-107.768871
5,678.00	13.67	60.18	5,254.89	917.63	1,734.05	1,523,670.809	2,357,564.737	39.249180	-107.768802
5,773.00	12.34	60.00	5,347.45	928.29	1,752.58	1,523,681.000	2,357,583.530	39.249210	-107.768736
5,868.00	13.27	61.76	5,440.09	938.52	1,770.98	1,523,690.771	2,357,602.178	39.249238	-107.768671
5,963.00	11.82	62.55	5,532.82	948.17	1,789.22	1,523,699.956	2,357,620.654	39.249264	-107.768607
6,058.00	11.90	57.81	5,625.79	957.87	1,806.14	1,523,709.233	2,357,637.816	39.249291	-107.768547
6,153.00	10.41	57.89	5,719.00	967.65	1,821.70	1,523,718.621	2,357,653.616	39.249318	-107.768492
6,248.00	10.81	51.57	5,812.37	977.75	1,835.95	1,523,728.361	2,357,668.113	39.249345	-107.768442
6,343.00	10.55	49.28	5,905.73	988.96	1,849.52	1,523,739.228	2,357,681.960	39.249376	-107.768394
6,439.00	9.32	47.44	6,000.29	999.95	1,861.91	1,523,749.906	2,357,694.619	39.249406	-107.768350
6,534.00	8.31	47.52	6,094.16	1,009.79	1,872.64	1,523,759.474	2,357,705.591	39.249433	-107.768312
6,629.00	6.20	52.71	6,188.40	1,017.54	1,881.79	1,523,766.988	2,357,714.928	39.249455	-107.768280
6,724.00	5.14	53.50	6,282.93	1,023.18	1,889.29	1,523,772.438	2,357,722.569	39.249470	-107.768254
6,819.00	4.35	52.36	6,377.61	1,027.91	1,895.56	1,523,777.011	2,357,728.959	39.249483	-107.768231
6,914.00	3.03	49.02	6,472.41	1,031.76	1,900.31	1,523,780.737	2,357,733.803	39.249494	-107.768215
7,009.00	2.07	47.61	6,567.31	1,034.56	1,903.47	1,523,783.461	2,357,737.035	39.249501	-107.768203
7,104.00	1.41	52.36	6,662.27	1,036.43	1,905.67	1,523,785.276	2,357,739.274	39.249506	-107.768196
7,199.00	0.88	62.20	6,757.25	1,037.48	1,907.24	1,523,786.290	2,357,740.870	39.249509	-107.768190
7,294.00	0.35	84.88	6,852.24	1,037.85	1,908.17	1,523,786.633	2,357,741.814	39.249510	-107.768187
7,389.00	0.26	118.89	6,947.24	1,037.77	1,908.65	1,523,786.543	2,357,742.289	39.249510	-107.768185
7,485.00	0.66	228.49	7,043.24	1,037.30	1,908.43	1,523,786.077	2,357,742.054	39.249509	-107.768186
7,580.00	1.63	234.11	7,138.22	1,036.14	1,906.92	1,523,784.960	2,357,740.521	39.249506	-107.768191
7,674.00	1.63	243.87	7,232.18	1,034.77	1,904.64	1,523,783.645	2,357,738.204	39.249502	-107.768199
7,769.00	1.58	233.85	7,327.15	1,033.40	1,902.37	1,523,782.335	2,357,735.900	39.249498	-107.768207
7,864.00	1.63	235.52	7,422.11	1,031.87	1,900.20	1,523,780.852	2,357,733.691	39.249494	-107.768215
7,960.00	1.58	250.11	7,518.07	1,030.64	1,897.83	1,523,779.688	2,357,731.291	39.249491	-107.768223
8,055.00	1.80	242.55	7,613.03	1,029.51	1,895.27	1,523,778.619	2,357,728.708	39.249487	-107.768232
8,150.00	1.71	224.89	7,707.99	1,027.82	1,892.95	1,523,776.986	2,357,726.342	39.249483	-107.768241
8,245.00	2.29	227.17	7,802.93	1,025.52	1,890.55	1,523,774.752	2,357,723.893	39.249477	-107.768249
8,340.00	2.72	228.67	7,897.84	1,022.74	1,887.47	1,523,772.051	2,357,720.740	39.249469	-107.768260
8,435.00	2.90	229.98	7,992.72	1,019.71	1,883.94	1,523,769.107	2,357,717.132	39.249461	-107.768272
<b>Last Archer Survey</b>									
8,453.00	2.99	228.40	8,010.70	1,019.11	1,883.24	1,523,768.520	2,357,716.417	39.249459	-107.768275
<b>Piceance 28-09E tgt</b>									
8,501.71	2.99	228.40	8,059.34	1,017.42	1,881.34	1,523,766.881	2,357,714.475	39.249454	-107.768282
<b>PTB</b>									
8,513.00	2.99	228.40	8,070.62	1,017.03	1,880.90	1,523,766.501	2,357,714.025	39.249453	-107.768283



# Archer

## Survey Report - Geographic

<b>Company:</b>	Piceance Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Piceance Federal 28-09E
<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 28-09E	<b>North Reference:</b>	True
<b>Wellbore:</b>	Slot B-3	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Slot B-3	<b>Database:</b>	EDMDBBW

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
111.00	111.00	-0.42	0.09	First Archer Survey	
8,453.00	8,010.70	1,019.11	1,883.24	Last Archer Survey	
8,513.00	8,070.62	1,017.03	1,880.90	PTB	

Checked By: _____	Approved By: _____	Date: _____
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