



Piceance Energy, LLC

Mesa County, CO

Piceance 28-10 Pad

Piceance Federal 28-20E

Slot A-10

Survey: Survey #1

Survey Report - Geographic

23 December, 2015



Project: Mesa County, CO
Site: Piceance 28-10 Pad
Well: Piceance Federal 28-20E
Wellbore: Slot A-10
Design: Design #2
Latitude: 39.246389
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 28-20E, 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 28-20E

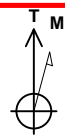
+N/-S	+E/-W	Northing	Ground Level: Easting	Latitude	Longitude	Slot
0.00	0.00	1522698.148	2355791.616	39.246389	-107.774975	

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance 28-20E tgt	7941.00	-1646.98	1915.66	1521003.714	2357665.441	39.241867	-107.768211	Circle (Radius: 50.00)

SECTION DETAILS

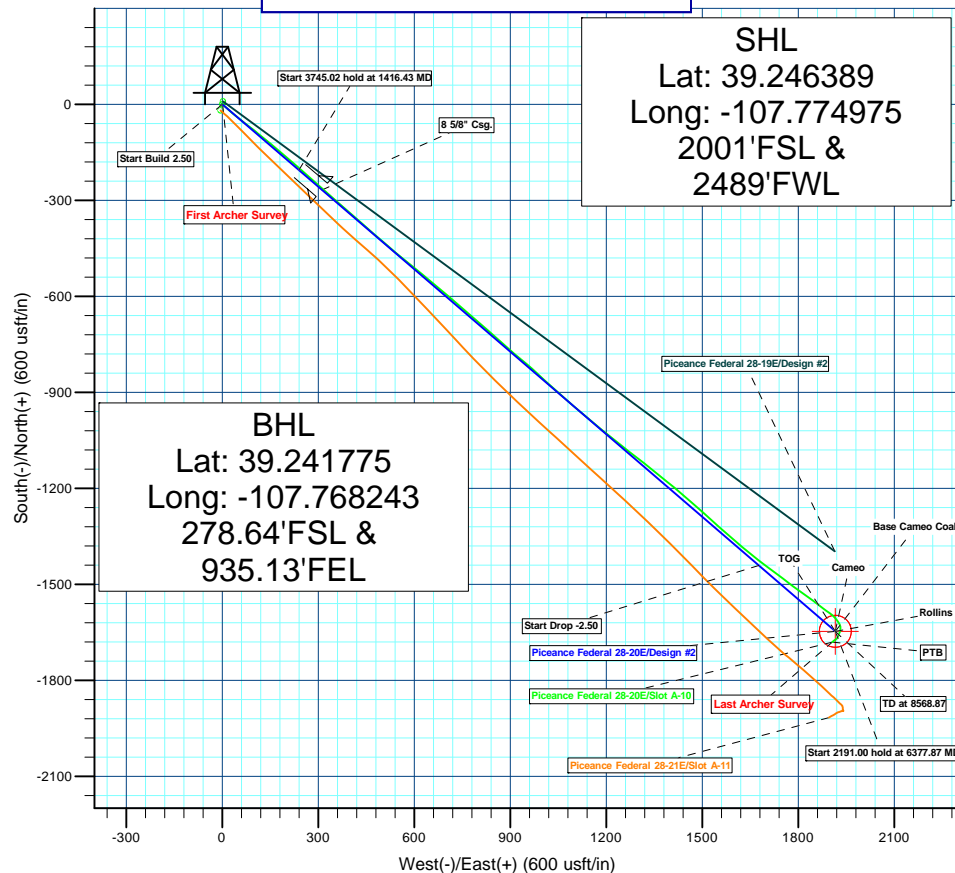
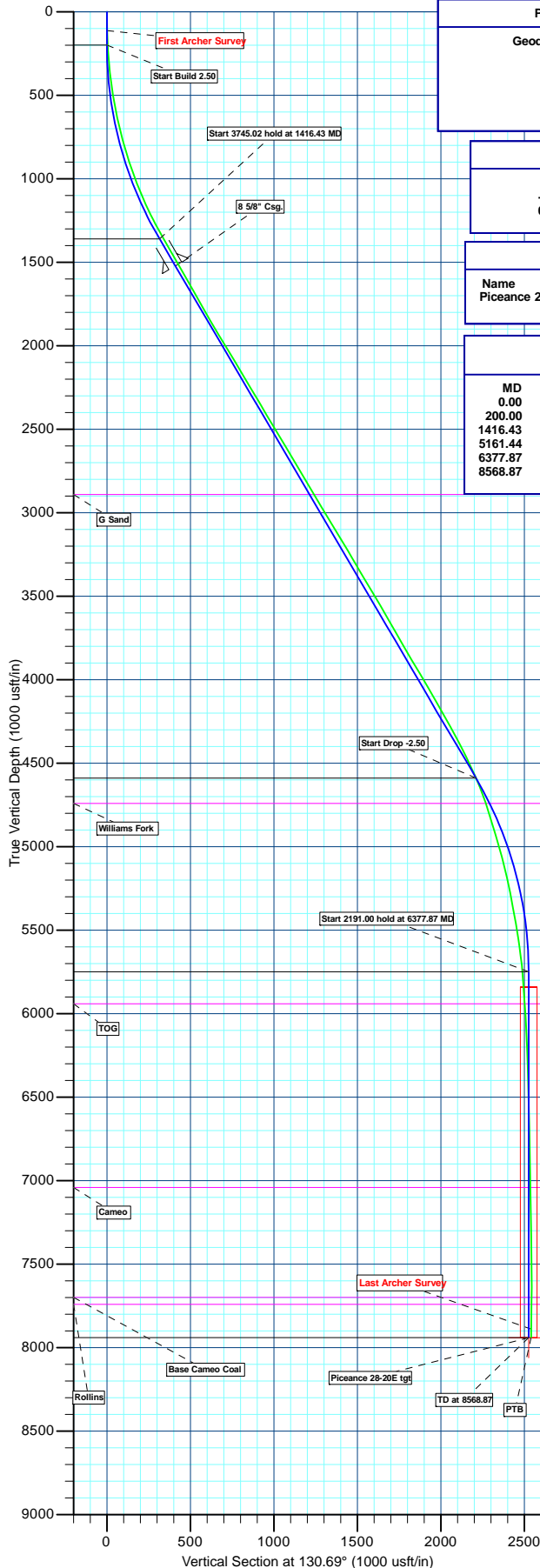
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.50
1416.43	30.41	130.69	1360.11	-205.56	239.09	2.50	130.69	315.31	Start 3745.02 hold at 1416.43 MD
5161.44	30.41	130.69	4589.89	-1441.43	1676.57	0.00	0.00	2211.02	Start Drop -2.50
6377.87	0.00	0.00	5750.00	-1646.99	1915.66	2.50	180.00	2526.33	Start 2191.00 hold at 6377.87 MD
8568.87	0.00	0.00	7941.00	-1646.99	1915.66	0.00	0.00	2526.33	TD at 8568.87



Azimuths to True North
Magnetic North: 9.73°
Magnetic Field
Strength: 51746.4snT
Dip Angle: 65.47°
Date: 03/31/2015
Model: IGRF2010

FORMATION TOP DETAILS

TVDPATH	MDPATH	Formation
2891.00	3191.53	G Sand
4741.00	5333.05	Williams Fork
5941.00	6568.87	TOG
7041.00	7668.87	Cameo
7699.00	8326.87	Base Cameo Coal
7741.00	8368.87	Rollins



Plan: Design #2 (Piceance Federal 28-20E/Slot A-10)

Created By: Ricky Osburn Date: 13:25, January 21 2016



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-20E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-20E	North Reference:	True
Wellbore:	Slot A-10	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-10	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 28-10 Pad				
Site Position:		Northing:	1,522,822.786 usft	Latitude:	39.246733
From:	Lat/Long	Easting:	2,355,826.215 usft	Longitude:	-107.774864
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	-1.43 °

Well	Piceance Federal 28-20E					
Well Position	+N/-S	0.00 usft	Northing:	1,522,698.148 usft	Latitude:	39.246389
	+E/-W	0.00 usft	Easting:	2,355,791.616 usft	Longitude:	-107.774975
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,679.00 usft

Wellbore	Slot A-10				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	03/31/15	9.73	65.47	51,746

Design	Slot A-10				
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	130.19

Survey Program	Date	10/19/15			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
113.00	8,540.00	Survey #1 (Slot A-10)	MWD	MWD - Standard	



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-20E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-20E	North Reference:	True
Wellbore:	Slot A-10	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-10	Database:	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	1,522,698.148	2,355,791.616	39.246389	-107.774975
First Archer Survey									
113.00	1.58	129.00	112.99	-0.98	1.21	1,522,697.137	2,355,792.802	39.246386	-107.774971
205.00	3.16	131.72	204.90	-3.47	4.09	1,522,694.580	2,355,795.618	39.246379	-107.774961
297.00	4.79	131.19	296.68	-7.68	8.87	1,522,690.244	2,355,800.294	39.246368	-107.774944
389.00	7.43	130.58	388.15	-14.08	16.28	1,522,683.660	2,355,807.541	39.246350	-107.774918
482.00	7.95	132.07	480.31	-22.30	25.62	1,522,675.208	2,355,816.674	39.246328	-107.774885
574.00	10.94	131.11	571.05	-32.31	36.93	1,522,664.923	2,355,827.723	39.246300	-107.774845
666.00	13.54	127.59	660.96	-44.62	52.04	1,522,652.236	2,355,842.524	39.246266	-107.774791
758.00	14.11	127.68	750.29	-58.05	69.45	1,522,638.380	2,355,859.591	39.246229	-107.774730
850.00	16.57	127.77	839.01	-72.94	88.70	1,522,623.011	2,355,878.461	39.246189	-107.774662
942.00	18.94	129.79	926.62	-90.53	110.54	1,522,604.877	2,355,899.859	39.246140	-107.774585
1,034.00	21.31	129.44	1,013.00	-110.71	134.93	1,522,584.095	2,355,923.733	39.246085	-107.774499
1,130.00	22.80	129.35	1,101.97	-133.59	162.79	1,522,560.527	2,355,951.008	39.246022	-107.774400
1,224.00	25.58	130.32	1,187.71	-158.27	192.35	1,522,535.111	2,355,979.943	39.245954	-107.774296
1,319.00	28.08	131.11	1,272.47	-186.25	224.84	1,522,506.330	2,356,011.721	39.245877	-107.774181
1,414.00	29.31	131.02	1,355.80	-216.21	259.23	1,522,475.515	2,356,045.351	39.245795	-107.774060
1,509.00	29.97	131.37	1,438.37	-247.15	294.58	1,522,443.695	2,356,079.916	39.245710	-107.773935
1,609.00	29.93	132.16	1,525.02	-280.41	331.82	1,522,409.521	2,356,116.309	39.245619	-107.773803
1,695.00	30.06	131.63	1,599.50	-309.12	363.82	1,522,380.019	2,356,147.583	39.245540	-107.773690
1,790.00	29.14	131.55	1,682.10	-340.26	398.92	1,522,348.002	2,356,181.887	39.245455	-107.773566
1,885.00	29.66	130.67	1,764.87	-370.92	434.05	1,522,316.471	2,356,216.247	39.245370	-107.773442
1,980.00	29.93	130.58	1,847.31	-401.66	469.88	1,522,284.848	2,356,251.295	39.245286	-107.773316
2,075.00	30.76	131.02	1,929.29	-433.02	506.21	1,522,252.587	2,356,286.827	39.245200	-107.773188
2,170.00	31.73	130.05	2,010.52	-465.04	543.67	1,522,219.639	2,356,323.467	39.245112	-107.773055
2,264.00	31.25	129.78	2,090.67	-496.55	581.32	1,522,187.200	2,356,360.326	39.245025	-107.772922
2,359.00	30.19	129.09	2,172.34	-527.38	618.80	1,522,155.443	2,356,397.020	39.244941	-107.772790
2,454.00	30.71	128.73	2,254.24	-557.61	656.27	1,522,124.275	2,356,433.714	39.244858	-107.772658
2,549.00	31.28	130.93	2,335.67	-588.95	693.82	1,522,092.009	2,356,470.476	39.244772	-107.772525
2,644.00	30.32	130.23	2,417.27	-620.60	730.77	1,522,059.448	2,356,506.614	39.244685	-107.772395
2,739.00	30.63	130.84	2,499.15	-651.91	767.38	1,522,027.228	2,356,542.435	39.244599	-107.772265
2,834.00	31.60	131.37	2,580.48	-684.19	804.37	1,521,994.035	2,356,578.603	39.244510	-107.772135
2,928.00	30.45	131.55	2,661.03	-716.26	840.68	1,521,961.059	2,356,614.097	39.244422	-107.772007
3,023.00	30.76	131.46	2,742.80	-748.31	876.90	1,521,928.111	2,356,649.504	39.244334	-107.771879
3,118.00	31.25	130.84	2,824.23	-780.51	913.75	1,521,894.999	2,356,685.535	39.244246	-107.771749
3,212.00	29.79	129.96	2,905.20	-811.46	950.10	1,521,863.155	2,356,721.096	39.244161	-107.771620
3,307.00	30.59	132.51	2,987.32	-842.95	986.01	1,521,830.774	2,356,756.205	39.244074	-107.771493
3,401.00	32.04	132.51	3,067.62	-875.96	1,022.02	1,521,796.870	2,356,791.381	39.243984	-107.771366
3,496.00	31.03	131.81	3,148.59	-909.31	1,058.85	1,521,762.606	2,356,827.362	39.243892	-107.771236
3,591.00	31.03	130.67	3,230.00	-941.59	1,095.67	1,521,729.413	2,356,863.365	39.243804	-107.771106
3,686.00	29.88	129.70	3,311.89	-972.67	1,132.45	1,521,697.428	2,356,899.355	39.243718	-107.770976
3,781.00	30.94	130.05	3,393.82	-1,003.50	1,169.35	1,521,665.683	2,356,935.474	39.243634	-107.770846
3,876.00	30.98	129.00	3,475.28	-1,034.60	1,207.05	1,521,633.647	2,356,972.379	39.243548	-107.770713
3,971.00	30.45	128.21	3,556.96	-1,064.88	1,244.96	1,521,602.430	2,357,009.526	39.243465	-107.770579
4,066.00	29.62	127.33	3,639.20	-1,094.01	1,282.55	1,521,572.371	2,357,046.368	39.243385	-107.770446
4,160.00	30.15	129.00	3,720.70	-1,122.95	1,319.36	1,521,542.515	2,357,082.449	39.243306	-107.770316
4,255.00	29.75	128.29	3,803.02	-1,152.57	1,356.41	1,521,511.978	2,357,118.737	39.243224	-107.770186
4,350.00	30.63	129.09	3,885.13	-1,182.43	1,393.69	1,521,481.188	2,357,155.262	39.243142	-107.770054
4,445.00	30.72	131.19	3,966.84	-1,213.67	1,430.74	1,521,449.030	2,357,191.513	39.243056	-107.769923
4,540.00	30.28	130.32	4,048.70	-1,245.15	1,467.26	1,521,416.647	2,357,227.235	39.242970	-107.769794
4,635.00	30.01	132.07	4,130.85	-1,276.57	1,503.15	1,521,384.342	2,357,262.335	39.242884	-107.769668
4,730.00	29.18	131.99	4,213.45	-1,307.98	1,538.00	1,521,352.067	2,357,296.387	39.242797	-107.769544
4,825.00	28.83	131.72	4,296.54	-1,338.72	1,572.31	1,521,320.481	2,357,329.916	39.242713	-107.769423
4,920.00	27.92	130.05	4,380.13	-1,368.27	1,606.44	1,521,290.080	2,357,363.288	39.242632	-107.769303
5,015.00	26.19	129.44	4,464.73	-1,395.90	1,639.65	1,521,261.626	2,357,395.804	39.242556	-107.769186



Archer

Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-20E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-20E	North Reference:	True
Wellbore:	Slot A-10	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-10	Database:	EDMDBBW

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,110.00	24.48	128.47	4,550.59	-1,421.47	1,671.26	1,521,235.278	2,357,426.758	39.242486	-107.769074
5,205.00	22.28	126.36	4,637.78	-1,444.39	1,701.18	1,521,211.612	2,357,456.091	39.242423	-107.768968
5,300.00	18.81	126.71	4,726.73	-1,464.23	1,727.96	1,521,191.109	2,357,482.375	39.242368	-107.768874
5,395.00	17.05	126.89	4,817.11	-1,481.75	1,751.38	1,521,173.012	2,357,505.348	39.242320	-107.768791
5,490.00	16.74	126.10	4,908.01	-1,498.17	1,773.58	1,521,156.040	2,357,527.123	39.242275	-107.768713
5,585.00	16.35	127.59	4,999.08	-1,514.39	1,795.23	1,521,139.285	2,357,548.360	39.242231	-107.768636
5,680.00	13.97	125.75	5,090.76	-1,529.24	1,815.13	1,521,123.932	2,357,567.887	39.242190	-107.768566
5,774.00	13.10	124.43	5,182.15	-1,541.90	1,833.13	1,521,110.833	2,357,585.560	39.242155	-107.768503
5,869.00	11.25	126.54	5,275.01	-1,553.50	1,849.45	1,521,098.823	2,357,601.591	39.242123	-107.768445
5,963.00	10.46	127.59	5,367.33	-1,564.17	1,863.58	1,521,087.808	2,357,615.448	39.242094	-107.768395
6,058.00	9.54	127.68	5,460.89	-1,574.24	1,876.65	1,521,077.411	2,357,628.256	39.242066	-107.768349
6,153.00	8.96	126.98	5,554.65	-1,583.50	1,888.79	1,521,067.848	2,357,640.160	39.242041	-107.768306
6,248.00	7.25	125.48	5,648.70	-1,591.43	1,899.58	1,521,059.650	2,357,650.750	39.242019	-107.768268
6,343.00	4.88	131.81	5,743.16	-1,597.61	1,907.47	1,521,053.280	2,357,658.488	39.242002	-107.768240
6,438.00	4.35	137.08	5,837.85	-1,602.94	1,912.94	1,521,047.813	2,357,663.818	39.241988	-107.768221
6,533.00	3.78	137.70	5,932.61	-1,607.89	1,917.50	1,521,042.746	2,357,668.253	39.241974	-107.768205
6,628.00	3.56	145.96	6,027.42	-1,612.65	1,921.26	1,521,037.893	2,357,671.892	39.241961	-107.768191
6,722.00	2.94	148.25	6,121.27	-1,617.12	1,924.16	1,521,033.353	2,357,674.681	39.241949	-107.768181
6,817.00	2.11	145.17	6,216.17	-1,620.63	1,926.44	1,521,029.790	2,357,676.873	39.241939	-107.768173
6,912.00	2.15	150.79	6,311.11	-1,623.62	1,928.31	1,521,026.753	2,357,678.666	39.241931	-107.768166
7,007.00	1.58	152.38	6,406.06	-1,626.34	1,929.79	1,521,024.001	2,357,680.075	39.241923	-107.768161
7,102.00	1.71	172.33	6,501.02	-1,628.90	1,930.58	1,521,021.417	2,357,680.807	39.241916	-107.768158
7,197.00	1.98	168.28	6,595.97	-1,631.91	1,931.10	1,521,018.393	2,357,681.254	39.241908	-107.768157
7,292.00	2.15	186.48	6,690.91	-1,635.29	1,931.24	1,521,015.013	2,357,681.301	39.241899	-107.768156
7,387.00	1.36	176.46	6,785.86	-1,638.19	1,931.11	1,521,012.122	2,357,681.097	39.241891	-107.768157
7,481.00	1.54	179.45	6,879.83	-1,640.56	1,931.19	1,521,009.744	2,357,681.119	39.241884	-107.768156
7,576.00	2.29	184.37	6,974.78	-1,643.73	1,931.05	1,521,006.579	2,357,680.907	39.241876	-107.768157
7,671.00	2.59	195.00	7,069.69	-1,647.70	1,930.35	1,521,002.632	2,357,680.108	39.241865	-107.768159
7,766.00	2.42	211.97	7,164.61	-1,651.47	1,928.74	1,520,998.899	2,357,678.396	39.241854	-107.768165
7,861.00	2.46	207.75	7,259.52	-1,654.98	1,926.73	1,520,995.445	2,357,676.298	39.241845	-107.768172
7,955.00	2.37	197.55	7,353.44	-1,658.62	1,925.20	1,520,991.846	2,357,674.682	39.241835	-107.768177
8,050.00	2.64	189.82	7,448.35	-1,662.64	1,924.23	1,520,987.842	2,357,673.616	39.241824	-107.768181
8,145.00	1.98	205.46	7,543.27	-1,666.28	1,923.16	1,520,984.233	2,357,672.446	39.241814	-107.768185
8,240.00	2.81	228.84	7,638.19	-1,669.30	1,920.70	1,520,981.281	2,357,669.913	39.241805	-107.768193
8,335.00	3.47	232.36	7,733.04	-1,672.59	1,916.67	1,520,978.094	2,357,665.802	39.241796	-107.768208
8,430.00	3.60	233.59	7,827.86	-1,676.11	1,911.99	1,520,974.686	2,357,661.038	39.241787	-107.768224
Last Archer Survey									
8,492.00	3.60	230.07	7,889.74	-1,678.52	1,908.93	1,520,972.359	2,357,657.920	39.241780	-107.768235
PTB - Piceance 28-20E tgt									
8,540.00	3.60	230.07	7,937.65	-1,680.45	1,906.62	1,520,970.483	2,357,655.561	39.241775	-107.768243



Archer

Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-20E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-20E	North Reference:	True
Wellbore:	Slot A-10	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-10	Database:	EDMDBBW

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
113.00	112.99	-0.98	1.21	First Archer Survey	
8,492.00	7,889.74	-1,678.52	1,908.93	Last Archer Survey	
8,540.00	7,937.65	-1,680.45	1,906.62	PTB	

Checked By:	_____	Approved By:	_____	Date:	_____
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