



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance Federal 28-01M

Slot A-4

Survey: Survey #1

Survey Report - Geographic

20 October, 2015



Project: Mesa County, CO
Site: Piceance 28-05
Well: Piceance Federal 28-01M
Wellbore: Slot A-4
Design: Design #2
Latitude: 39° 15' 3.970 N
Longitude: 107° 46' 46.390 W
Ground Level: 7556.0
Well @ 7578.0usft

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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 28-01M, 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 28-01M

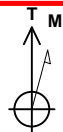
+N/-S	+E/-W	Northing	Ground Level:	Latitude	Longitude	Slot
0.0	0.0	1524446.98	7556.0	39° 15' 3.970 N	107° 46' 46.390 W	
			Easting			
			2354538.67			

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance Federal 28-01M tgt	7920.0	1403.3	1424.5	1525814.10	2355997.91	39° 15' 17.840 N	107° 46' 28.280 W	Circle (Radius: 50.0)

SECTION DETAILS

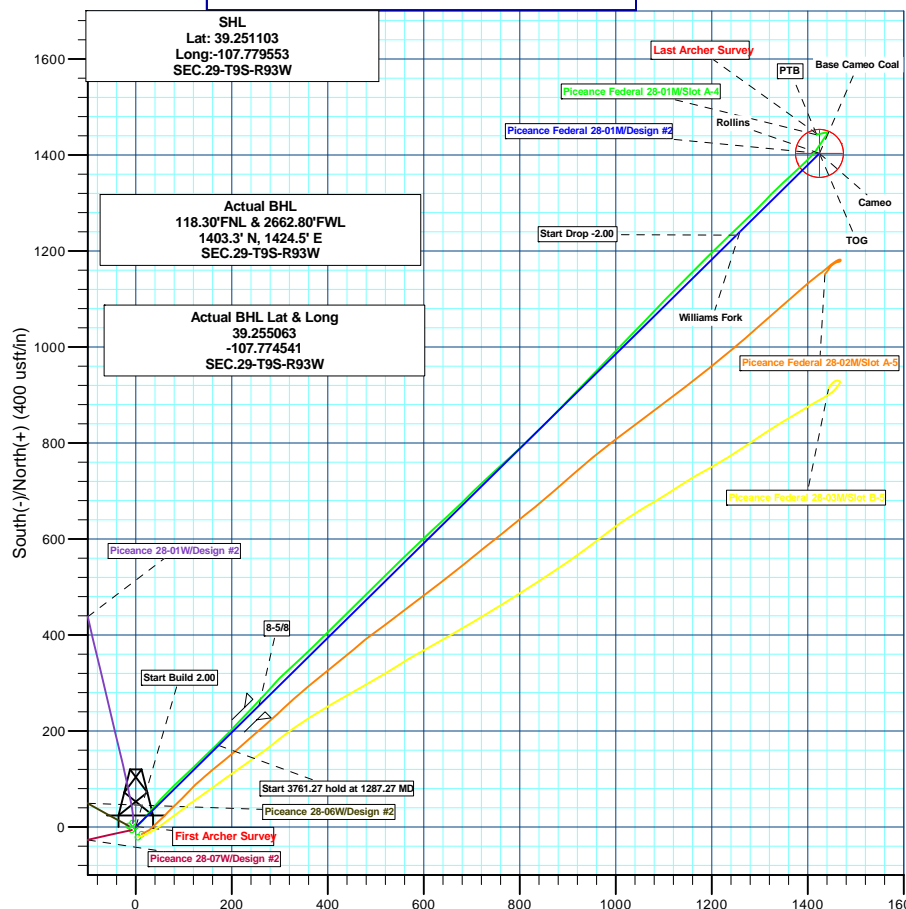
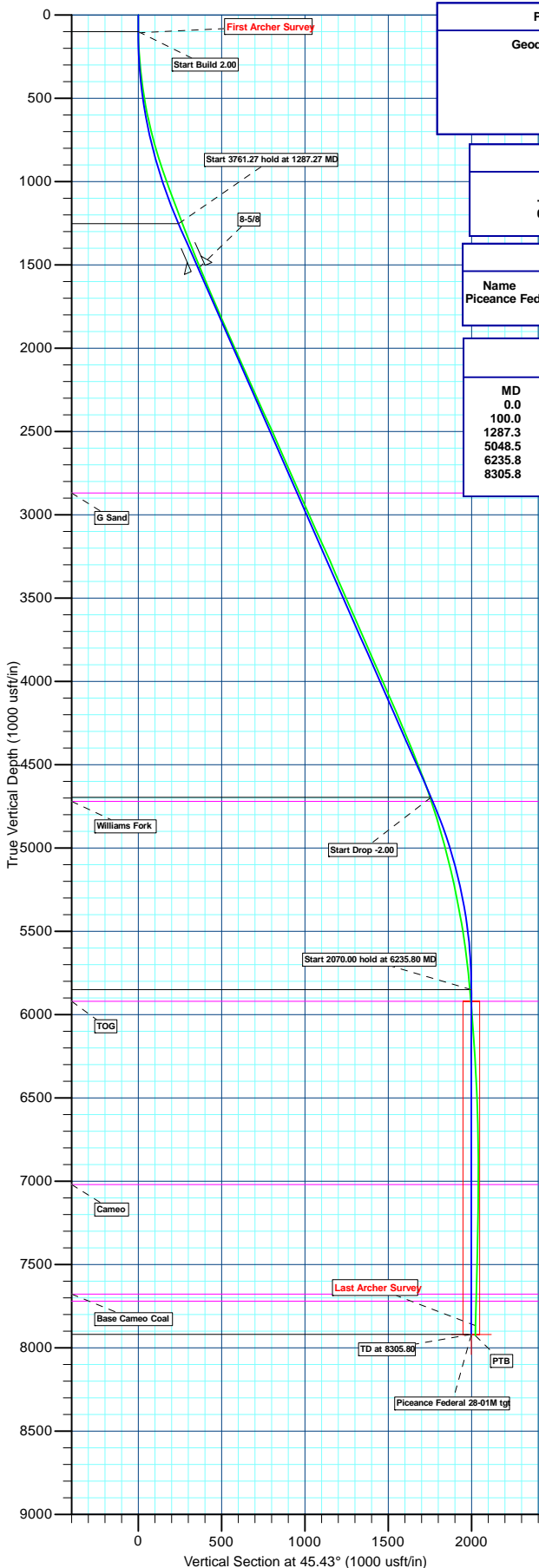
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
100.0	0.00	0.00	100.0	0.0	0.0	0.00	0.00	0.0	Start Build 2.00
1287.3	23.75	45.43	1253.6	170.2	172.8	2.00	45.43	242.5	Start 3761.27 hold at 1287.27 MD
5048.5	23.75	45.43	4696.4	1233.1	1251.7	0.00	0.00	1757.1	Start Drop -2.00
6235.8	0.00	0.00	5850.0	1403.3	1424.5	2.00	180.00	1999.6	Start 2070.00 hold at 6235.80 MD
8305.8	0.00	0.00	7920.0	1403.3	1424.5	0.00	0.00	1999.6	TD at 8305.80



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
2870.0	3053.2	G Sand
4720.0	5074.2	Williams Fork
5920.0	6305.8	TOG
7020.0	7405.8	Cameo
7678.0	8063.8	Base Cameo Coal
7720.0	8105.8	Rollins



Plan: Design #2 (Piceance Federal 28-01M/Slot A-4)

Created By: Ricky Osburn Date: 11:15, October 21 2015



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-01M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance Federal 28-01M	North Reference:	True
Wellbore:	Slot A-4	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-4	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 Federal 28-01M			
Well Position	+N/-S	0.00 usft	Northing:	1,524,446.983 usft
	+E/-W	0.00 usft	Easting:	2,354,538.667 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level: 7,556.00 usft

Wellbore	Slot A-4				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2015/04/27	9.73	65.47	51,742

Design	Slot A-4			
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	44.32

Survey Program	Date	2015/09/05		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
108.00	8,302.00	Survey #1 (Slot A-4)	MWD	MWD - Standard



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-01M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance Federal 28-01M	North Reference:	True
Wellbore:	Slot A-4	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-4	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	1,524,446.983	2,354,538.667	39.251103	-107.779553	
First Archer Survey										
108.00	1.10	27.21	107.99	0.92	0.47	1,524,447.893	2,354,539.164	39.251105	-107.779551	
200.00	3.08	57.72	199.93	3.03	2.97	1,524,449.936	2,354,541.710	39.251111	-107.779542	
292.00	4.88	52.09	291.70	6.75	8.15	1,524,453.529	2,354,546.979	39.251121	-107.779524	
384.00	7.25	40.58	383.19	13.57	15.01	1,524,460.169	2,354,554.013	39.251140	-107.779500	
477.00	8.70	37.06	475.28	23.64	23.07	1,524,470.034	2,354,562.320	39.251168	-107.779471	
569.00	11.25	39.17	565.89	36.15	32.93	1,524,482.295	2,354,572.494	39.251202	-107.779436	
661.00	13.32	43.92	655.78	50.74	45.95	1,524,496.557	2,354,585.877	39.251242	-107.779391	
754.00	14.77	41.90	746.00	67.28	61.30	1,524,512.708	2,354,601.637	39.251287	-107.779336	
846.00	16.39	45.77	834.61	85.07	78.43	1,524,530.057	2,354,619.212	39.251336	-107.779276	
938.00	19.20	47.44	922.20	104.36	98.88	1,524,548.828	2,354,640.137	39.251389	-107.779204	
1,030.00	19.78	46.20	1,008.93	125.36	121.26	1,524,569.266	2,354,663.035	39.251447	-107.779125	
1,125.00	20.39	45.68	1,098.16	148.05	144.70	1,524,591.360	2,354,687.040	39.251509	-107.779042	
1,220.00	20.39	45.85	1,187.20	171.14	168.42	1,524,613.847	2,354,711.326	39.251573	-107.778958	
1,315.00	21.62	43.92	1,275.89	195.28	192.43	1,524,637.372	2,354,735.940	39.251639	-107.778873	
1,410.00	21.62	44.01	1,364.21	220.47	216.73	1,524,661.948	2,354,760.864	39.251708	-107.778787	
1,505.00	22.02	42.78	1,452.40	246.13	240.99	1,524,686.990	2,354,785.756	39.251779	-107.778702	
1,575.00	22.06	43.83	1,517.29	265.25	259.00	1,524,705.647	2,354,804.246	39.251831	-107.778638	
1,634.00	22.72	41.28	1,571.84	281.80	274.19	1,524,721.816	2,354,819.846	39.251876	-107.778585	
1,697.00	22.94	42.34	1,629.90	300.02	290.49	1,524,739.620	2,354,836.594	39.251926	-107.778527	
1,791.00	23.73	47.70	1,716.22	326.29	316.82	1,524,765.224	2,354,863.576	39.251999	-107.778434	
1,886.00	22.94	47.26	1,803.45	351.72	344.56	1,524,789.950	2,354,891.942	39.252068	-107.778336	
1,981.00	24.35	45.50	1,890.48	378.02	372.13	1,524,815.544	2,354,920.161	39.252141	-107.778239	
2,076.00	24.17	45.59	1,977.09	405.35	399.99	1,524,842.174	2,354,948.700	39.252216	-107.778140	
2,171.00	23.38	45.24	2,064.02	432.24	427.27	1,524,868.364	2,354,976.644	39.252289	-107.778044	
2,266.00	24.79	45.77	2,150.75	459.40	454.92	1,524,894.828	2,355,004.973	39.252364	-107.777946	
2,361.00	24.13	44.80	2,237.22	487.07	482.88	1,524,921.789	2,355,033.613	39.252440	-107.777848	
2,456.00	23.69	44.62	2,324.07	514.44	509.97	1,524,948.464	2,355,061.379	39.252515	-107.777752	
2,551.00	25.09	46.03	2,410.59	542.01	537.87	1,524,975.325	2,355,089.965	39.252591	-107.777653	
2,646.00	24.35	46.73	2,496.89	569.42	566.63	1,525,002.004	2,355,119.401	39.252666	-107.777552	
2,740.00	23.33	46.64	2,582.86	595.48	594.27	1,525,027.365	2,355,147.690	39.252738	-107.777454	
2,835.00	23.99	46.73	2,669.88	621.63	622.01	1,525,052.814	2,355,176.076	39.252809	-107.777356	
2,930.00	23.12	46.73	2,756.96	647.65	649.65	1,525,078.135	2,355,204.364	39.252881	-107.777259	
3,025.00	24.21	46.20	2,843.97	673.92	677.29	1,525,103.700	2,355,232.655	39.252953	-107.777161	
3,120.00	23.33	45.50	2,930.91	700.59	704.77	1,525,129.670	2,355,260.792	39.253026	-107.777064	
3,214.00	25.36	47.61	3,016.55	727.21	732.92	1,525,155.576	2,355,289.598	39.253099	-107.776965	
3,309.00	24.79	47.17	3,102.60	754.47	762.55	1,525,182.080	2,355,319.905	39.253174	-107.776860	
3,404.00	24.17	46.64	3,189.06	781.36	791.29	1,525,208.243	2,355,349.317	39.253248	-107.776758	
3,499.00	23.64	46.73	3,275.91	807.77	819.30	1,525,233.941	2,355,377.980	39.253321	-107.776659	
3,594.00	22.46	46.47	3,363.32	833.32	846.33	1,525,258.810	2,355,405.639	39.253391	-107.776564	
3,689.00	24.08	44.27	3,450.59	859.70	873.02	1,525,284.510	2,355,432.980	39.253463	-107.776470	
3,784.00	23.95	43.92	3,537.37	887.47	899.92	1,525,311.593	2,355,460.572	39.253539	-107.776375	
3,879.00	23.60	43.04	3,624.31	915.26	926.28	1,525,338.711	2,355,487.615	39.253616	-107.776282	
3,973.00	22.85	43.57	3,710.69	942.23	951.70	1,525,365.041	2,355,513.706	39.253690	-107.776192	
4,068.00	24.47	44.45	3,797.70	969.64	978.19	1,525,391.779	2,355,540.879	39.253765	-107.776098	
4,163.00	24.26	44.53	3,884.24	997.60	1,005.66	1,525,419.040	2,355,569.036	39.253842	-107.776001	
4,258.00	23.99	44.10	3,970.94	1,025.38	1,032.78	1,525,446.132	2,355,596.852	39.253918	-107.775906	
4,353.00	23.60	43.66	4,057.87	1,053.01	1,059.35	1,525,473.084	2,355,624.105	39.253994	-107.775812	
4,448.00	23.33	42.78	4,145.01	1,080.57	1,085.26	1,525,499.989	2,355,650.693	39.254070	-107.775720	
4,543.00	23.25	45.59	4,232.27	1,107.50	1,111.43	1,525,526.253	2,355,677.532	39.254143	-107.775628	
4,638.00	22.41	45.15	4,319.83	1,133.40	1,137.66	1,525,551.480	2,355,704.406	39.254215	-107.775535	
4,733.00	22.06	44.18	4,407.77	1,158.96	1,162.93	1,525,576.403	2,355,730.311	39.254285	-107.775446	
4,827.00	21.93	44.18	4,494.92	1,184.21	1,187.47	1,525,601.027	2,355,755.472	39.254354	-107.775359	
4,922.00	20.04	46.56	4,583.62	1,208.13	1,211.65	1,525,624.330	2,355,780.249	39.254420	-107.775274	



Archer

Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-01M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance Federal 28-01M	North Reference:	True
Wellbore:	Slot A-4	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-4	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
5,017.00	19.25	46.20	4,673.09	1,230.16	1,234.77	1,525,645.774	2,355,803.917	39.254480	-107.775192
5,112.00	17.89	46.12	4,763.14	1,251.11	1,256.60	1,525,666.174	2,355,826.257	39.254538	-107.775115
5,207.00	16.52	45.94	4,853.89	1,270.62	1,276.82	1,525,685.169	2,355,846.965	39.254591	-107.775044
5,301.00	15.29	45.24	4,944.29	1,288.64	1,295.22	1,525,702.723	2,355,865.816	39.254641	-107.774979
5,396.00	14.81	44.18	5,036.03	1,306.17	1,312.58	1,525,719.809	2,355,883.607	39.254689	-107.774917
5,491.00	13.27	44.10	5,128.19	1,322.71	1,328.63	1,525,735.940	2,355,900.067	39.254734	-107.774861
5,586.00	11.95	46.91	5,220.90	1,337.26	1,343.40	1,525,750.114	2,355,915.198	39.254774	-107.774809
5,681.00	11.25	47.00	5,313.96	1,350.30	1,357.36	1,525,762.799	2,355,929.481	39.254810	-107.774759
5,775.00	10.11	47.35	5,406.33	1,362.14	1,370.14	1,525,774.318	2,355,942.549	39.254843	-107.774714
5,870.00	9.05	47.52	5,500.00	1,372.84	1,381.78	1,525,784.718	2,355,954.457	39.254872	-107.774673
5,965.00	8.00	47.17	5,593.95	1,382.38	1,392.14	1,525,793.995	2,355,965.052	39.254898	-107.774636
6,060.00	6.72	44.36	5,688.16	1,390.84	1,400.87	1,525,802.242	2,355,973.996	39.254921	-107.774606
6,155.00	5.93	42.43	5,782.59	1,398.44	1,408.07	1,525,809.655	2,355,981.382	39.254942	-107.774580
6,249.00	4.92	39.96	5,876.16	1,405.11	1,413.94	1,525,816.180	2,355,987.412	39.254961	-107.774559
6,344.00	4.22	34.95	5,970.86	1,411.10	1,418.55	1,525,822.050	2,355,992.180	39.254977	-107.774543
6,439.00	4.04	31.18	6,065.61	1,416.83	1,422.29	1,525,827.682	2,355,996.057	39.254993	-107.774530
6,534.00	3.96	35.75	6,160.38	1,422.36	1,425.94	1,525,833.114	2,355,999.844	39.255008	-107.774517
6,629.00	3.52	33.99	6,255.18	1,427.44	1,429.49	1,525,838.104	2,356,003.517	39.255022	-107.774505
6,724.00	2.94	31.18	6,350.03	1,431.94	1,432.38	1,525,842.533	2,356,006.521	39.255034	-107.774494
6,818.00	2.99	38.03	6,443.90	1,435.93	1,435.14	1,525,846.456	2,356,009.379	39.255045	-107.774485
6,914.00	2.42	37.77	6,539.80	1,439.51	1,437.92	1,525,849.959	2,356,012.252	39.255055	-107.774475
7,009.00	1.36	39.00	6,634.74	1,441.97	1,439.86	1,525,852.371	2,356,014.251	39.255062	-107.774468
7,104.00	0.83	16.94	6,729.73	1,443.50	1,440.77	1,525,853.882	2,356,015.199	39.255066	-107.774465
7,199.00	0.70	350.22	6,824.72	1,444.73	1,440.87	1,525,855.109	2,356,015.332	39.255069	-107.774464
7,293.00	0.40	340.64	6,918.71	1,445.61	1,440.66	1,525,855.990	2,356,015.147	39.255072	-107.774465
7,388.00	0.35	327.89	7,013.71	1,446.17	1,440.40	1,525,856.555	2,356,014.897	39.255073	-107.774466
7,483.00	0.57	279.73	7,108.71	1,446.49	1,439.78	1,525,856.896	2,356,014.286	39.255074	-107.774468
7,578.00	1.23	275.51	7,203.70	1,446.67	1,438.30	1,525,857.111	2,356,012.810	39.255075	-107.774473
7,673.00	1.58	262.94	7,298.67	1,446.61	1,435.98	1,525,857.106	2,356,010.494	39.255074	-107.774482
7,768.00	1.80	246.42	7,393.63	1,445.85	1,433.32	1,525,856.415	2,356,007.809	39.255072	-107.774491
7,862.00	1.63	255.12	7,487.59	1,444.91	1,430.67	1,525,855.548	2,356,005.141	39.255070	-107.774500
7,957.00	1.41	264.96	7,582.55	1,444.46	1,428.20	1,525,855.160	2,356,002.661	39.255069	-107.774509
8,052.00	1.71	261.01	7,677.52	1,444.14	1,425.64	1,525,854.901	2,356,000.089	39.255068	-107.774518
8,147.00	1.58	253.63	7,772.48	1,443.55	1,422.98	1,525,854.377	2,355,997.418	39.255066	-107.774528
Last Archer Survey									
8,242.00	1.49	252.13	7,867.44	1,442.80	1,420.55	1,525,853.690	2,355,994.968	39.255064	-107.774536
Piceance Federal 28-01M tgt									
8,294.76	1.49	252.13	7,920.18	1,442.38	1,419.24	1,525,853.302	2,355,993.652	39.255063	-107.774541
PTB									
8,302.00	1.49	252.13	7,927.42	1,442.32	1,419.06	1,525,853.249	2,355,993.472	39.255063	-107.774541



Archer

Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-01M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance Federal 28-01M	North Reference:	True
Wellbore:	Slot A-4	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-4	Database:	EDMDBBW

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
108.00	107.99	0.92	0.47	First Archer Survey	
8,242.00	7,867.44	1,442.80	1,420.55	Last Archer Survey	
8,302.00	7,927.42	1,442.32	1,419.06	PTB	

Checked By:	_____	Approved By:	_____	Date:	_____
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