



Piceance Energy, LLC

Mesa County, CO

Piceance 28-10 Pad

Piceance Federal 28-18E

Slot A-8

Survey: Survey #1

Survey Report - Geographic

23 December, 2015



Project: Mesa County, CO
Site: Piceance 28-10 Pad
Well: Piceance Federal 28-18E
Wellbore: Slot A-8
Design: Design #2
Latitude: 39.246469
Longitude: -107.774950
Ground Level: 7679.00
Well @ 7701.00usft

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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 28-18E, 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 28-18E

+N/-S	+E/-W	Northing	Ground Level: Easting	Latitude	Longitude	Slot
0.00	0.00	1522727.301	2355799.429	39.246469	-107.774950	

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance 28-18E tgt	7974.00	-1176.54	1905.40	1521503.423	2357674.772	39.243239	-107.768222	Circle (Radius: 50.00)

SECTION DETAILS

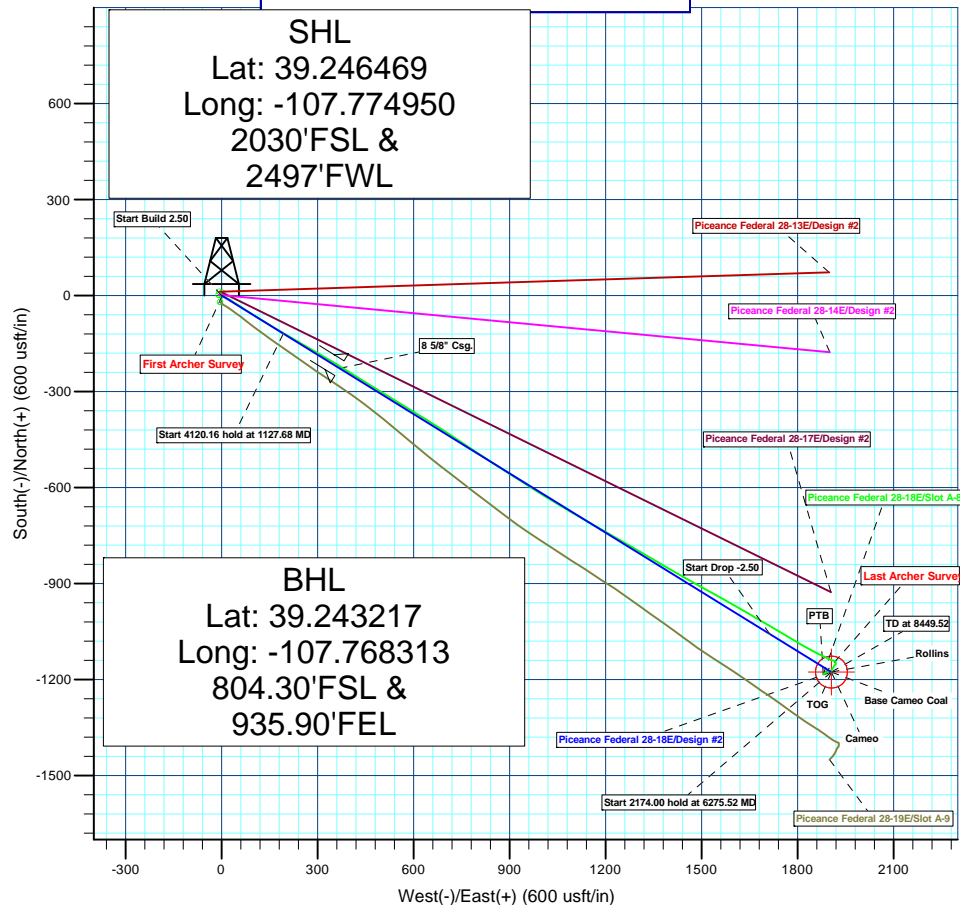
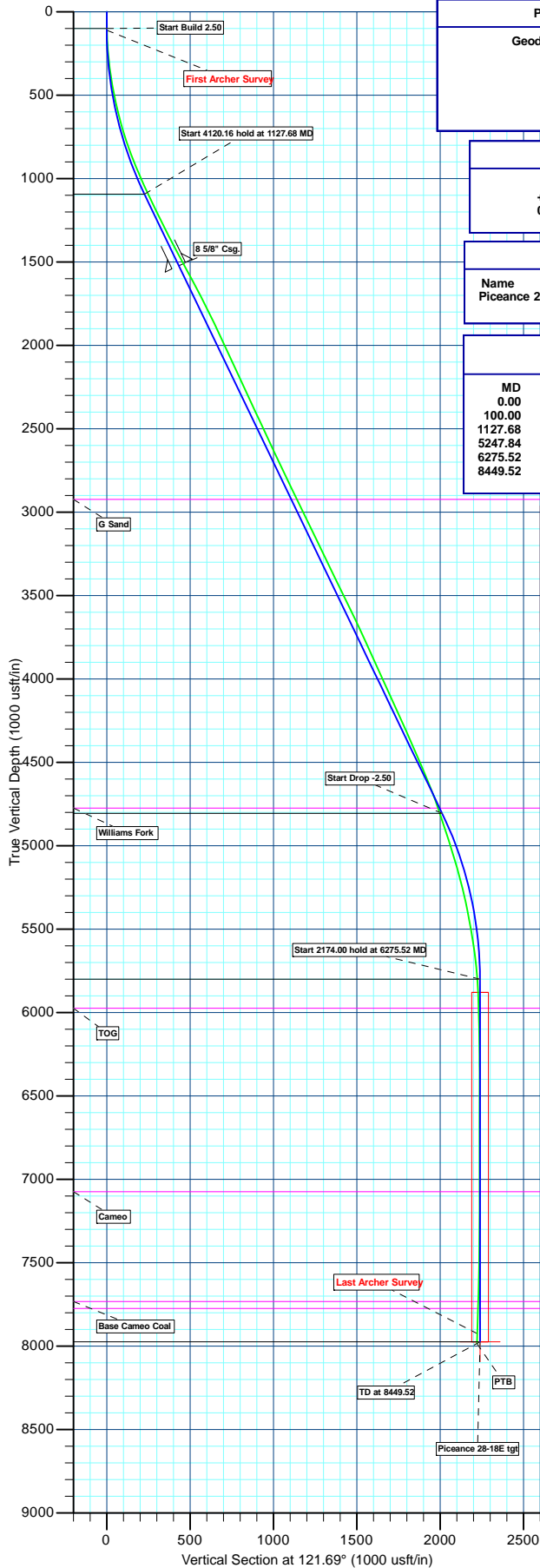
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.50
1127.68	25.69	121.69	1093.58	-119.04	192.78	2.50	121.69	226.58	Start 4120.16 hold at 1127.68 MD
5247.84	25.69	121.69	4806.42	-1057.50	1712.62	0.00	0.00	2012.80	Start Drop -2.50
6275.52	0.00	0.00	5800.00	-1176.54	1905.40	2.50	180.00	2239.37	Start 2174.00 hold at 6275.52 MD
8449.52	0.00	0.00	7974.00	-1176.54	1905.40	0.00	0.00	2239.37	TD at 8449.52



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

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2924.00	3158.91	G Sand
4774.00	5211.87	Williams Fork
5974.00	6449.52	TOG
7074.00	7549.52	Cameo
7732.00	8207.52	Base Cameo Coal
7774.00	8249.52	Rollins



Plan: Design #2 (Piceance Federal 28-18E/Slot A-8)

Created By: Ricky Osburn Date: 13:22, January 21 2016



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-18E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-18E	North Reference:	True
Wellbore:	Slot A-8	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-8	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 28-18E					
Well Position	+N/-S	0.00 usft	Northing:	1,522,727.301 usft	Latitude:	39.246469
	+E/-W	0.00 usft	Easting:	2,355,799.429 usft	Longitude:	-107.774950
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,679.00 usft

Wellbore	Slot A-8				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	03/31/15	9.73	65.47	51,746

Design	Slot A-8			
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	120.99

Survey Program	Date	10/29/15		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
112.00	8,447.00	Survey #1 (Slot A-8)	MWD	MWD - Standard



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-18E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-18E	North Reference:	True
Wellbore:	Slot A-8	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-8	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	1,522,727.301	2,355,799.429	39.246469	-107.774950	
First Archer Survey										
112.00	1.58	122.93	111.99	-0.84	1.30	1,522,726.429	2,355,800.703	39.246467	-107.774945	
204.00	3.60	113.00	203.89	-2.66	5.02	1,522,724.518	2,355,804.380	39.246462	-107.774932	
296.00	5.89	114.67	295.57	-5.76	11.97	1,522,721.246	2,355,811.250	39.246454	-107.774908	
389.00	8.61	119.77	387.81	-11.21	22.35	1,522,715.538	2,355,821.491	39.246439	-107.774871	
481.00	11.69	124.60	478.37	-19.92	36.00	1,522,706.485	2,355,834.922	39.246415	-107.774823	
573.00	12.57	123.37	568.31	-30.72	52.04	1,522,695.288	2,355,850.679	39.246385	-107.774766	
665.00	15.12	123.20	657.63	-42.80	70.44	1,522,682.752	2,355,868.775	39.246352	-107.774701	
757.00	17.45	121.44	745.93	-56.57	92.25	1,522,668.443	2,355,890.236	39.246314	-107.774624	
942.00	22.94	121.35	919.49	-89.82	146.75	1,522,633.838	2,355,943.883	39.246223	-107.774432	
1,033.00	23.42	120.65	1,003.15	-108.26	177.45	1,522,614.629	2,355,974.116	39.246172	-107.774323	
1,129.00	25.14	120.65	1,090.65	-128.39	211.41	1,522,593.661	2,356,007.560	39.246117	-107.774203	
1,223.00	25.84	120.03	1,175.50	-148.82	246.33	1,522,572.362	2,356,041.951	39.246061	-107.774080	
1,318.00	26.50	120.12	1,260.76	-169.81	282.58	1,522,550.464	2,356,077.671	39.246003	-107.773952	
1,413.00	27.11	119.86	1,345.56	-191.23	319.69	1,522,528.129	2,356,114.229	39.245944	-107.773821	
1,508.00	27.95	121.35	1,429.80	-213.59	357.47	1,522,504.829	2,356,151.443	39.245883	-107.773688	
1,589.00	28.48	121.97	1,501.17	-233.69	390.07	1,522,483.918	2,356,183.524	39.245828	-107.773573	
1,647.00	28.48	121.97	1,552.16	-248.33	413.53	1,522,468.691	2,356,206.613	39.245788	-107.773490	
1,694.00	28.08	121.88	1,593.55	-260.11	432.43	1,522,456.446	2,356,225.211	39.245755	-107.773423	
1,789.00	27.60	121.97	1,677.55	-283.57	470.09	1,522,432.050	2,356,262.267	39.245691	-107.773290	
1,884.00	27.03	122.14	1,761.96	-306.70	507.03	1,522,407.996	2,356,298.624	39.245627	-107.773160	
1,979.00	26.10	121.00	1,846.93	-328.95	543.23	1,522,384.850	2,356,334.247	39.245566	-107.773032	
2,073.00	25.27	120.91	1,931.64	-349.91	578.16	1,522,363.025	2,356,368.650	39.245509	-107.772908	
2,168.00	24.65	120.82	2,017.76	-370.48	612.57	1,522,341.603	2,356,402.535	39.245452	-107.772787	
2,263.00	25.22	123.28	2,103.91	-391.73	646.51	1,522,319.504	2,356,435.927	39.245394	-107.772667	
2,358.00	24.13	122.67	2,190.24	-413.32	679.78	1,522,297.088	2,356,468.643	39.245335	-107.772550	
2,452.00	25.18	123.37	2,275.67	-434.69	712.65	1,522,274.901	2,356,500.973	39.245276	-107.772434	
2,547.00	24.60	123.10	2,361.84	-456.61	746.09	1,522,252.156	2,356,533.856	39.245216	-107.772316	
2,642.00	25.70	123.40	2,447.83	-478.74	779.86	1,522,229.179	2,356,567.054	39.245155	-107.772196	
2,737.00	24.70	123.30	2,533.79	-500.98	813.64	1,522,206.103	2,356,600.274	39.245094	-107.772077	
2,832.00	26.10	123.20	2,619.61	-523.32	847.72	1,522,182.915	2,356,633.781	39.245033	-107.771957	
2,927.00	24.50	122.70	2,705.49	-545.41	881.79	1,522,159.984	2,356,667.282	39.244972	-107.771836	
3,022.00	25.40	124.40	2,791.63	-567.56	915.17	1,522,137.002	2,356,700.105	39.244911	-107.771719	
3,116.00	25.80	122.20	2,876.40	-589.85	949.12	1,522,113.868	2,356,733.481	39.244850	-107.771599	
3,211.00	26.40	120.90	2,961.71	-611.72	984.74	1,522,091.120	2,356,768.539	39.244790	-107.771473	
3,305.00	25.40	121.30	3,046.27	-632.92	1,019.89	1,522,069.040	2,356,803.156	39.244732	-107.771349	
3,400.00	26.60	120.80	3,131.65	-654.40	1,055.57	1,522,046.678	2,356,838.286	39.244673	-107.771223	
3,495.00	26.00	120.70	3,216.82	-675.92	1,091.75	1,522,024.257	2,356,873.909	39.244614	-107.771095	
3,590.00	25.30	120.70	3,302.46	-696.91	1,127.11	1,522,002.383	2,356,908.732	39.244556	-107.770970	
3,685.00	26.00	119.40	3,388.10	-717.50	1,162.70	1,521,980.913	2,356,943.802	39.244499	-107.770845	
3,780.00	26.30	119.50	3,473.37	-738.09	1,199.16	1,521,959.421	2,356,979.733	39.244443	-107.770716	
3,875.00	26.00	119.90	3,558.65	-758.83	1,235.53	1,521,937.773	2,357,015.571	39.244386	-107.770587	
3,970.00	25.80	120.10	3,644.11	-779.58	1,271.47	1,521,916.132	2,357,050.977	39.244329	-107.770461	
4,064.00	24.80	120.30	3,729.09	-799.78	1,306.19	1,521,895.063	2,357,085.180	39.244273	-107.770338	
4,159.00	23.60	120.60	3,815.74	-819.52	1,339.76	1,521,874.496	2,357,118.247	39.244219	-107.770219	
4,254.00	25.10	119.90	3,902.29	-839.24	1,373.60	1,521,853.929	2,357,151.580	39.244165	-107.770100	
4,349.00	24.80	120.20	3,988.42	-859.31	1,408.28	1,521,833.000	2,357,185.754	39.244110	-107.769977	
4,444.00	24.20	120.20	4,074.87	-879.12	1,442.33	1,521,812.337	2,357,219.296	39.244056	-107.769857	
4,539.00	24.92	119.15	4,161.27	-898.67	1,476.64	1,521,791.940	2,357,253.105	39.244002	-107.769736	
4,634.00	23.51	118.71	4,247.91	-917.52	1,510.74	1,521,772.240	2,357,286.722	39.243950	-107.769616	
4,729.00	24.39	119.68	4,334.73	-936.34	1,544.40	1,521,752.588	2,357,319.901	39.243898	-107.769497	
4,824.00	23.95	117.84	4,421.40	-955.05	1,578.49	1,521,733.023	2,357,353.514	39.243847	-107.769376	
4,919.00	23.12	119.94	4,508.50	-973.37	1,611.71	1,521,713.883	2,357,386.259	39.243797	-107.769259	
5,014.00	22.37	120.12	4,596.11	-991.75	1,643.51	1,521,694.712	2,357,417.588	39.243746	-107.769147	



Archer

Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-18E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-18E	North Reference:	True
Wellbore:	Slot A-8	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-8	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
5,108.00	21.22	120.74	4,683.39	-1,009.42	1,673.60	1,521,676.291	2,357,447.231	39.243698	-107.769041
5,203.00	19.42	120.47	4,772.48	-1,026.22	1,701.99	1,521,658.788	2,357,475.193	39.243652	-107.768940
5,299.00	17.62	121.18	4,863.50	-1,041.83	1,728.18	1,521,642.520	2,357,500.983	39.243609	-107.768848
5,394.00	18.11	119.94	4,953.92	-1,056.65	1,753.28	1,521,627.083	2,357,525.700	39.243568	-107.768759
5,489.00	17.14	120.21	5,044.46	-1,071.06	1,778.17	1,521,612.051	2,357,550.224	39.243528	-107.768671
5,583.00	15.73	120.91	5,134.62	-1,084.58	1,801.07	1,521,597.967	2,357,572.782	39.243491	-107.768591
5,678.00	14.41	121.70	5,226.35	-1,097.40	1,822.18	1,521,584.615	2,357,593.561	39.243456	-107.768516
5,773.00	12.92	115.46	5,318.66	-1,108.18	1,841.83	1,521,573.348	2,357,612.933	39.243427	-107.768447
5,868.00	10.85	115.55	5,411.62	-1,116.60	1,859.49	1,521,564.486	2,357,630.375	39.243403	-107.768384
5,962.00	9.98	117.75	5,504.07	-1,124.21	1,874.68	1,521,556.499	2,357,645.370	39.243383	-107.768331
6,057.00	8.04	117.40	5,597.89	-1,131.10	1,887.86	1,521,549.280	2,357,658.378	39.243364	-107.768284
6,152.00	7.03	114.06	5,692.07	-1,136.53	1,899.07	1,521,543.574	2,357,669.446	39.243349	-107.768245
6,247.00	4.97	105.62	5,786.55	-1,140.01	1,908.34	1,521,539.864	2,357,678.629	39.243339	-107.768212
6,342.00	2.55	110.01	5,881.34	-1,141.84	1,914.29	1,521,537.884	2,357,684.531	39.243334	-107.768191
6,437.00	1.14	132.86	5,976.29	-1,143.21	1,916.97	1,521,536.452	2,357,687.174	39.243330	-107.768181
6,532.00	0.97	150.44	6,071.27	-1,144.55	1,918.06	1,521,535.082	2,357,688.230	39.243327	-107.768178
6,626.00	1.23	173.47	6,165.25	-1,146.24	1,918.57	1,521,533.376	2,357,688.695	39.243322	-107.768176
6,721.00	1.67	174.70	6,260.22	-1,148.64	1,918.81	1,521,530.979	2,357,688.878	39.243315	-107.768175
6,816.00	0.57	160.90	6,355.20	-1,150.46	1,919.09	1,521,529.148	2,357,689.115	39.243310	-107.768174
6,911.00	0.18	133.48	6,450.20	-1,151.01	1,919.36	1,521,528.592	2,357,689.364	39.243309	-107.768173
7,006.00	0.40	223.48	6,545.20	-1,151.35	1,919.24	1,521,528.252	2,357,689.236	39.243308	-107.768173
7,101.00	0.70	228.58	6,640.20	-1,151.98	1,918.57	1,521,527.644	2,357,688.557	39.243306	-107.768176
7,196.00	1.23	229.90	6,735.18	-1,153.02	1,917.36	1,521,526.634	2,357,687.316	39.243303	-107.768180
7,291.00	1.67	218.82	6,830.15	-1,154.75	1,915.71	1,521,524.941	2,357,685.626	39.243299	-107.768186
7,385.00	1.93	213.11	6,924.11	-1,157.15	1,913.99	1,521,522.591	2,357,683.843	39.243292	-107.768192
7,480.00	2.11	204.94	7,019.05	-1,160.07	1,912.38	1,521,519.707	2,357,682.159	39.243284	-107.768198
7,575.00	1.63	211.70	7,114.00	-1,162.81	1,910.93	1,521,517.009	2,357,680.643	39.243277	-107.768203
7,670.00	1.85	213.55	7,208.95	-1,165.24	1,909.37	1,521,514.621	2,357,679.026	39.243270	-107.768208
7,765.00	2.07	211.44	7,303.90	-1,167.98	1,907.63	1,521,511.924	2,357,677.215	39.243262	-107.768214
7,860.00	1.76	222.25	7,398.84	-1,170.52	1,905.75	1,521,509.428	2,357,675.276	39.243255	-107.768221
7,954.00	1.76	248.70	7,492.80	-1,172.11	1,903.44	1,521,507.893	2,357,672.921	39.243251	-107.768229
8,049.00	2.33	257.67	7,587.74	-1,173.06	1,900.19	1,521,507.032	2,357,669.653	39.243248	-107.768241
8,144.00	2.99	243.17	7,682.64	-1,174.59	1,896.09	1,521,505.605	2,357,665.518	39.243244	-107.768255
8,239.00	3.69	241.23	7,777.48	-1,177.18	1,891.20	1,521,503.138	2,357,660.564	39.243237	-107.768272
8,334.00	3.87	237.72	7,872.27	-1,180.36	1,885.81	1,521,500.091	2,357,655.096	39.243228	-107.768291
Last Archer Survey									
8,387.00	3.82	235.35	7,925.15	-1,182.32	1,882.85	1,521,498.207	2,357,652.084	39.243223	-107.768302
Piceance 28-18E tgt									
8,434.29	3.82	235.35	7,972.33	-1,184.11	1,880.26	1,521,496.481	2,357,649.448	39.243218	-107.768311
PTB									
8,447.00	3.82	235.35	7,985.02	-1,184.59	1,879.56	1,521,496.017	2,357,648.739	39.243217	-107.768313



Archer

Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-18E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Well:	Piceance Federal 28-18E	North Reference:	True
Wellbore:	Slot A-8	Survey Calculation Method:	Minimum Curvature
Design:	Slot A-8	Database:	EDMDBBW

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
112.00	111.99	-0.84	1.30	First Archer Survey	
8,387.00	7,925.15	-1,182.32	1,882.85	Last Archer Survey	
8,447.00	7,985.02	-1,184.59	1,879.56	PTB	

Checked By:	_____	Approved By:	_____	Date:	_____
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