



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance 28-09M

Slot A-10

Survey: Survey #1

Survey Report - Geographic

20 October, 2015



Project: Mesa County, CO
Site: Piceance 28-05
Well: Piceance 28-09M
Wellbore: Slot A-10
Design: Design #1
Latitude: 39° 15' 3.280 N
Longitude: 107° 46' 45.670 W
Ground Level: 7556.0
Well @ 7578.0usft

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 28-09M, 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 28-09M

+N/-S	+E/-W	Northing	Ground Level:	Easting	Latitude	Longitude	Slot
0.0	0.0	1524375.79	7556.0	2354593.53	39° 15' 3.280 N	107° 46' 45.670 W	

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance Federal 28-09M tgt	7878.0	-526.1	1330.2	1523816.52	2355910.12	39° 14' 58.080 N	107° 46' 28.760 W	Circle (Radius: 50.0)

SECTION DETAILS

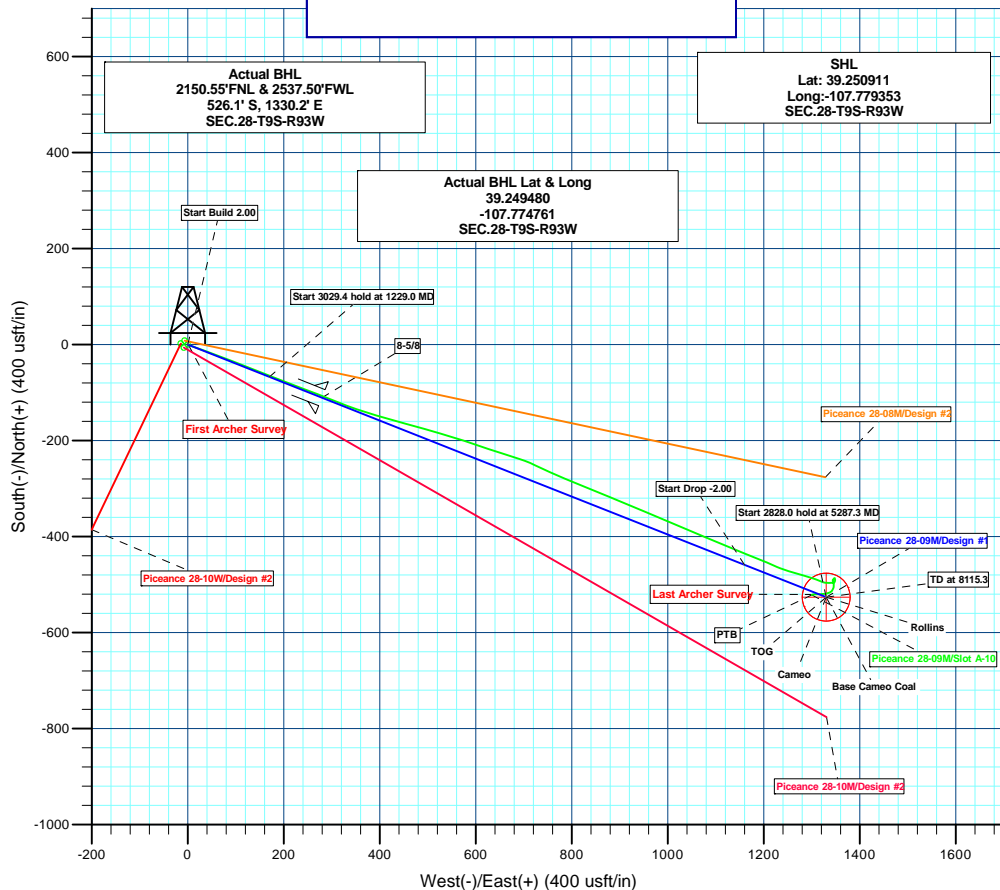
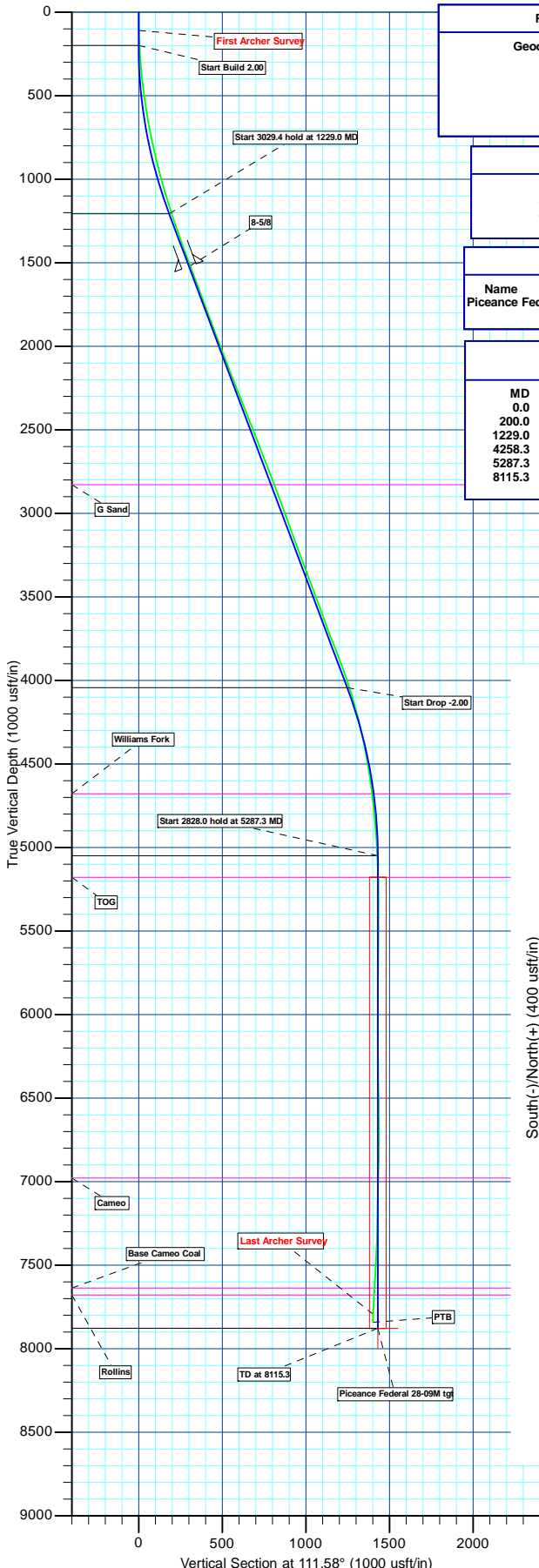
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	Start Build 2.00
1229.0	20.58	111.58	1207.0	-67.2	170.0	2.00	111.58	182.8	Start 3029.4 hold at 1229.0 MD
4258.3	20.58	111.58	4043.0	-458.8	1160.2	0.00	0.00	1247.6	Start Drop -2.00
5287.3	0.00	0.00	5050.0	-526.1	1330.2	2.00	180.00	1430.4	Start 2828.0 hold at 5287.3 MD
8115.3	0.00	0.00	7878.0	-526.1	1330.2	0.00	0.00	1430.4	TD at 8115.3



Azimuths to True North
Magnetic North: 9.72°
Magnetic Field
Strength: 51741.8snT
Dip Angle: 65.47°
Date: 2015/04/27
Model: IGRF2010

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2828.0	2960.5	G Sand
4678.0	4914.2	Williams Fork
5178.0	5415.3	TOG
6978.0	7215.3	Cameo
7636.0	7873.3	Base Cameo Coal
7678.0	7915.3	Rollins



Plan: Design #1 (Piceance 28-09M/Slot A-10)

Created By: Ricky Osburn Date: 11:06, October 21 2015



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance 28-09M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance 28-09M	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 28-05			
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 28-09M			
Well Position	+N/-S	0.00 usft	Northing:	1,524,375.785 usft
	+E/-W	0.00 usft	Easting:	2,354,593.535 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level: 7,556.00 usft

Wellbore	Slot A-10				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2015/04/27	9.73	65.47	51,742

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	110.91

Survey Program	Date	2015/07/13		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
110.00	8,075.00	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 28-09M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance 28-09M	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	1,524,375.785	2,354,593.535	39.250911	-107.779353
First Archer Survey									
110.00	1.63	107.81	109.99	-0.48	1.49	1,524,375.269	2,354,595.012	39.250910	-107.779348
202.00	2.77	119.32	201.92	-1.97	4.67	1,524,373.701	2,354,598.158	39.250906	-107.779336
293.00	4.61	106.14	292.73	-4.06	10.10	1,524,371.472	2,354,603.534	39.250900	-107.779317
386.00	6.41	108.25	385.29	-6.73	18.63	1,524,368.594	2,354,611.986	39.250893	-107.779287
478.00	6.86	110.53	476.68	-10.26	28.65	1,524,364.809	2,354,621.917	39.250883	-107.779252
570.00	8.48	111.67	567.85	-14.69	40.10	1,524,360.091	2,354,633.252	39.250871	-107.779211
663.00	10.24	110.00	659.61	-20.05	54.24	1,524,354.378	2,354,647.255	39.250856	-107.779161
755.00	12.45	109.56	749.80	-26.17	71.27	1,524,347.835	2,354,664.127	39.250839	-107.779101
847.00	12.47	110.84	839.64	-33.02	89.90	1,524,340.516	2,354,682.577	39.250820	-107.779035
939.00	14.45	111.36	929.11	-40.74	109.87	1,524,332.302	2,354,702.352	39.250799	-107.778965
1,031.00	14.67	112.10	1,018.15	-49.30	131.36	1,524,323.202	2,354,723.614	39.250776	-107.778889
1,126.00	17.43	112.11	1,109.44	-59.19	155.69	1,524,312.712	2,354,747.691	39.250749	-107.778803
1,221.00	18.16	110.64	1,199.89	-69.76	182.73	1,524,301.463	2,354,774.454	39.250720	-107.778708
1,316.00	18.93	111.78	1,289.96	-80.70	210.89	1,524,289.823	2,354,802.335	39.250690	-107.778608
1,411.00	19.65	109.67	1,379.63	-91.79	240.24	1,524,277.996	2,354,831.398	39.250659	-107.778504
1,506.00	20.47	110.98	1,468.86	-103.12	270.79	1,524,265.909	2,354,861.656	39.250628	-107.778397
1,562.00	20.73	112.83	1,521.28	-110.47	289.07	1,524,258.101	2,354,879.744	39.250608	-107.778332
1,696.00	20.63	110.12	1,646.65	-127.79	333.10	1,524,239.680	2,354,923.320	39.250560	-107.778177
1,791.00	19.77	108.33	1,735.81	-138.60	364.06	1,524,228.096	2,354,954.006	39.250531	-107.778067
1,886.00	21.47	105.99	1,824.72	-148.44	396.03	1,524,217.454	2,354,985.716	39.250504	-107.777954
1,980.00	20.96	105.25	1,912.35	-157.60	428.79	1,524,207.474	2,355,018.234	39.250478	-107.777839
2,075.00	20.13	106.17	2,001.31	-166.63	460.88	1,524,197.650	2,355,050.092	39.250454	-107.777725
2,170.00	21.07	104.85	2,090.23	-175.55	493.09	1,524,187.915	2,355,082.065	39.250429	-107.777612
2,265.00	21.58	107.16	2,178.73	-185.09	526.29	1,524,177.554	2,355,115.016	39.250403	-107.777494
2,360.00	20.86	106.54	2,267.29	-195.06	559.20	1,524,166.762	2,355,147.663	39.250376	-107.777378
2,455.00	21.93	109.22	2,355.74	-205.71	592.16	1,524,155.282	2,355,180.352	39.250346	-107.777262
2,550.00	21.45	107.83	2,444.02	-216.87	625.45	1,524,143.292	2,355,213.349	39.250316	-107.777144
2,645.00	21.96	108.05	2,532.28	-227.69	658.88	1,524,131.634	2,355,246.492	39.250286	-107.777026
2,739.00	21.27	108.06	2,619.67	-238.42	691.80	1,524,120.080	2,355,279.134	39.250256	-107.776910
2,834.00	21.33	115.96	2,708.20	-251.33	723.72	1,524,106.376	2,355,310.723	39.250221	-107.776797
2,929.00	21.01	113.74	2,796.79	-265.75	754.85	1,524,091.180	2,355,341.476	39.250181	-107.776687
3,024.00	20.05	112.89	2,885.76	-278.94	785.44	1,524,077.226	2,355,371.728	39.250145	-107.776579
3,119.00	19.98	112.16	2,975.02	-291.40	815.47	1,524,064.020	2,355,401.440	39.250111	-107.776473
3,213.00	19.47	112.32	3,063.50	-303.41	844.84	1,524,051.280	2,355,430.495	39.250078	-107.776369
3,309.00	21.33	111.94	3,153.48	-316.01	875.84	1,524,037.905	2,355,461.167	39.250043	-107.776260
3,403.00	20.36	112.44	3,241.32	-328.64	906.81	1,524,024.503	2,355,491.813	39.250009	-107.776151
3,499.00	19.34	113.68	3,331.62	-341.40	936.80	1,524,010.995	2,355,521.478	39.249974	-107.776045
3,593.00	21.32	112.60	3,419.76	-354.22	966.84	1,523,997.426	2,355,551.180	39.249939	-107.775939
3,688.00	20.66	113.29	3,508.46	-367.48	998.17	1,523,983.380	2,355,582.175	39.249902	-107.775828
3,783.00	20.13	112.69	3,597.50	-380.41	1,028.65	1,523,969.688	2,355,612.317	39.249867	-107.775720
3,878.00	19.59	112.93	3,686.85	-392.92	1,058.40	1,523,956.434	2,355,641.743	39.249832	-107.775615
3,973.00	21.72	111.97	3,775.74	-405.70	1,089.37	1,523,942.879	2,355,672.386	39.249797	-107.775506
4,068.00	21.44	113.20	3,864.08	-419.12	1,121.63	1,523,928.657	2,355,704.300	39.249760	-107.775392
4,163.00	19.41	111.37	3,953.10	-431.71	1,152.29	1,523,915.298	2,355,734.637	39.249726	-107.775284
4,257.00	18.63	112.18	4,041.97	-443.07	1,180.74	1,523,903.228	2,355,762.792	39.249695	-107.775183
4,352.00	14.49	113.55	4,133.01	-453.56	1,205.70	1,523,892.124	2,355,787.479	39.249666	-107.775095
4,447.00	14.16	113.39	4,225.06	-462.92	1,227.26	1,523,882.224	2,355,808.797	39.249640	-107.775019
4,542.00	12.40	107.36	4,317.52	-470.57	1,247.66	1,523,874.057	2,355,829.002	39.249619	-107.774947
4,637.00	12.32	106.19	4,410.32	-476.44	1,267.13	1,523,867.702	2,355,848.317	39.249603	-107.774878
4,732.00	9.93	106.17	4,503.52	-481.55	1,284.74	1,523,862.154	2,355,865.786	39.249589	-107.774816
4,826.00	7.67	107.23	4,596.41	-485.67	1,298.51	1,523,857.694	2,355,879.456	39.249578	-107.774767
4,921.00	6.65	111.58	4,690.67	-489.57	1,309.68	1,523,853.513	2,355,890.525	39.249567	-107.774728
5,016.00	6.27	112.00	4,785.07	-493.54	1,319.61	1,523,849.299	2,355,900.348	39.249556	-107.774693



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Survey Report - Geographic

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance 28-09M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.00usft
Site:	Piceance 28-05	MD Reference:	Well @ 7578.00usft
Well:	Piceance 28-09M	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
5,111.00	5.24	97.66	4,879.59	-496.06	1,328.72	1,523,846.550	2,355,909.391	39.249549	-107.774661
5,206.00	3.23	87.10	4,974.33	-496.50	1,335.69	1,523,845.932	2,355,916.351	39.249548	-107.774636
5,301.00	2.28	90.10	5,069.22	-496.37	1,340.26	1,523,845.950	2,355,920.916	39.249548	-107.774620
5,395.00	3.06	83.46	5,163.12	-496.09	1,344.62	1,523,846.123	2,355,925.284	39.249549	-107.774605
5,491.00	1.72	26.00	5,259.04	-494.50	1,347.80	1,523,847.629	2,355,928.501	39.249553	-107.774593
5,585.00	1.28	16.45	5,353.01	-492.22	1,348.71	1,523,849.881	2,355,929.473	39.249560	-107.774590
5,680.00	1.17	357.56	5,447.99	-490.24	1,348.97	1,523,851.860	2,355,929.782	39.249565	-107.774589
5,774.00	0.96	325.66	5,541.97	-488.63	1,348.49	1,523,853.481	2,355,929.338	39.249569	-107.774591
5,869.00	0.50	19.76	5,636.97	-487.58	1,348.18	1,523,854.535	2,355,929.055	39.249572	-107.774592
5,964.00	0.67	328.75	5,731.96	-486.72	1,348.03	1,523,855.404	2,355,928.929	39.249575	-107.774593
6,059.00	0.64	250.28	5,826.96	-486.42	1,347.24	1,523,855.719	2,355,928.149	39.249575	-107.774595
6,154.00	0.77	213.03	5,921.95	-487.13	1,346.39	1,523,855.027	2,355,927.284	39.249574	-107.774598
6,249.00	1.39	220.00	6,016.93	-488.55	1,345.31	1,523,853.637	2,355,926.160	39.249570	-107.774602
6,343.00	1.20	223.92	6,110.91	-490.13	1,343.89	1,523,852.090	2,355,924.705	39.249565	-107.774607
6,438.00	1.35	136.22	6,205.89	-491.66	1,343.97	1,523,850.564	2,355,924.751	39.249561	-107.774607
6,533.00	1.66	157.32	6,300.86	-493.74	1,345.28	1,523,848.454	2,355,926.003	39.249555	-107.774602
6,628.00	1.62	185.84	6,395.82	-496.34	1,345.67	1,523,845.840	2,355,926.332	39.249548	-107.774601
6,723.00	2.14	168.33	6,490.77	-499.41	1,345.89	1,523,842.762	2,355,926.477	39.249540	-107.774600
6,818.00	2.06	189.26	6,585.71	-502.84	1,345.98	1,523,839.339	2,355,926.475	39.249530	-107.774600
6,914.00	2.09	192.55	6,681.65	-506.25	1,345.32	1,523,835.945	2,355,925.732	39.249521	-107.774602
7,008.00	2.76	207.39	6,775.56	-509.93	1,343.91	1,523,832.299	2,355,924.226	39.249511	-107.774607
7,103.00	2.69	220.32	6,870.46	-513.66	1,341.41	1,523,828.632	2,355,921.639	39.249501	-107.774616
7,198.00	2.87	244.01	6,965.35	-516.40	1,337.83	1,523,825.981	2,355,917.990	39.249493	-107.774629
7,293.00	1.24	266.91	7,060.28	-517.50	1,334.67	1,523,824.963	2,355,914.799	39.249490	-107.774640
7,387.00	1.38	251.44	7,154.26	-517.92	1,332.58	1,523,824.600	2,355,912.701	39.249489	-107.774647
7,482.00	1.50	255.54	7,249.23	-518.59	1,330.29	1,523,823.983	2,355,910.396	39.249487	-107.774655
7,577.00	2.17	254.47	7,344.18	-519.38	1,327.35	1,523,823.265	2,355,907.440	39.249485	-107.774666
7,672.00	3.00	266.79	7,439.08	-520.00	1,323.14	1,523,822.750	2,355,903.211	39.249483	-107.774680
7,767.00	3.38	273.95	7,533.94	-519.95	1,317.86	1,523,822.936	2,355,897.938	39.249483	-107.774699
7,862.00	3.32	270.76	7,628.78	-519.72	1,312.32	1,523,823.305	2,355,892.401	39.249484	-107.774719
7,957.00	3.58	261.11	7,723.60	-520.14	1,306.64	1,523,823.025	2,355,886.711	39.249483	-107.774739
Last Archer Survey									
8,027.00	2.92	259.74	7,793.49	-520.80	1,302.72	1,523,822.468	2,355,882.782	39.249481	-107.774753
PTB - Piceance Federal 28-09M tgt									
8,075.00	2.92	259.74	7,841.43	-521.23	1,300.32	1,523,822.093	2,355,880.366	39.249480	-107.774761

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
110.00	109.99	-0.48	1.49	First Archer Survey
8,027.00	7,793.49	-520.80	1,302.72	Last Archer Survey
8,075.00	7,841.43	-521.23	1,300.32	PTB

Checked By: _____	Approved By: _____	Date: _____
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