



Piceance Energy, LLC

Mesa County, CO

Piceance 28-10 Pad

Piceance Federal 28-21E

Slot A-11

Plan: Design #2

Standard Planning Report

15 April, 2015

Archer



Project: Mesa County, CO
Site: Piceance 28-10 Pad
Well: Piceance Federal 28-21E
Wellbore: Slot A-11
Design: Design #2
Latitude: 39° 14' 46.810 N
Longitude: 107° 46' 29.980 W
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 28-21E, 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 28-21E

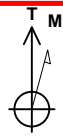
+N/-S	+E/-W	Northing	Ground Level: Easting	Latitude	Longitude	Slot
0.00	0.00	1522679.069	2355785.630	39° 14' 46.810 N	107° 46' 29.980 W	

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance 28-21E tgt	7921.00	-1877.65	1922.76	1520753.860	2357660.775	39° 14' 28.250 N	107° 46' 5.540 W	Circle (Radius: 50.00)

SECTION DETAILS

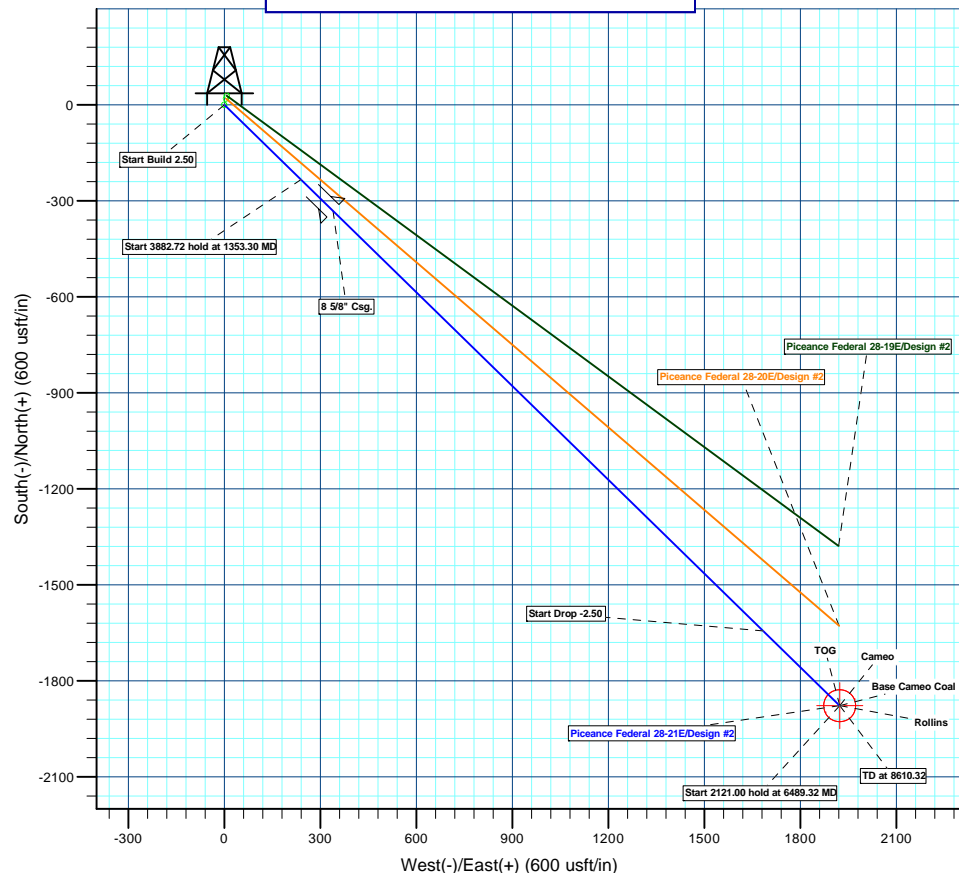
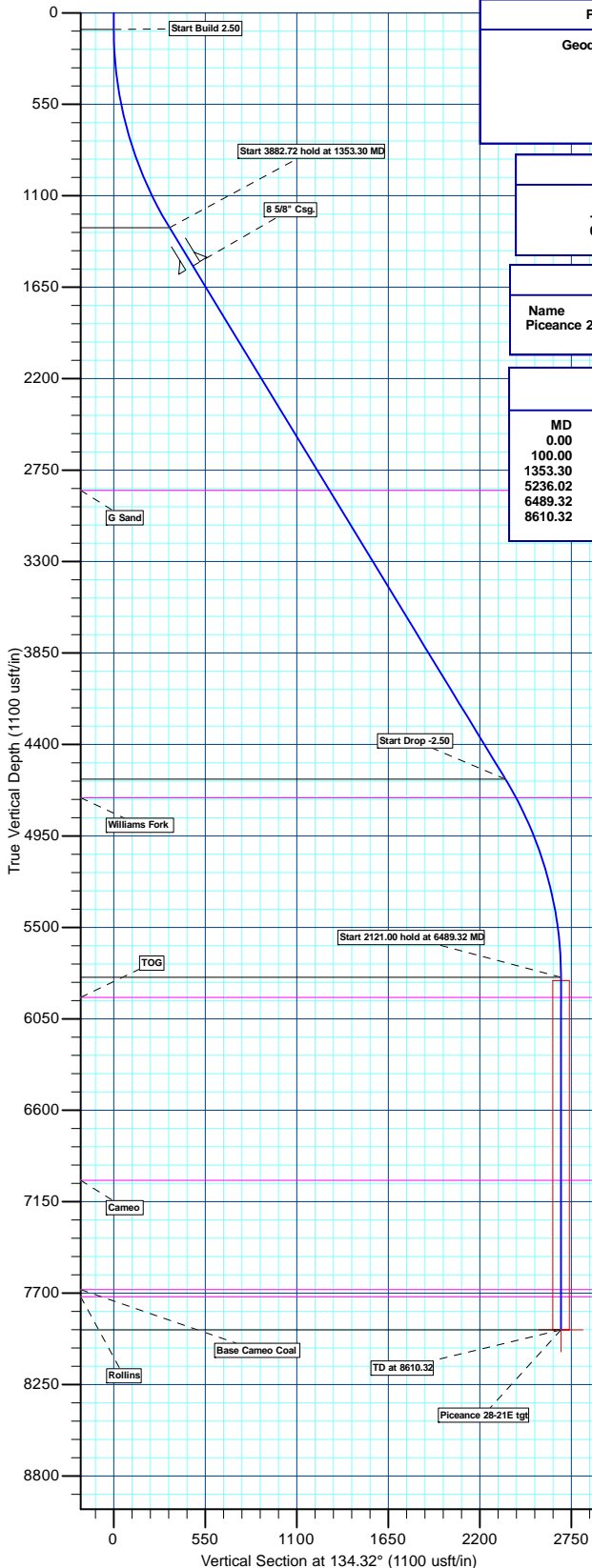
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.50
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	Start 3882.72 hold at 1353.30 MD
1353.30	31.33	134.32	1291.76	-233.52	239.13	2.50	134.32	334.23	Start Drop -2.50
5236.02	31.33	134.32	4608.24	-1644.14	1683.64	0.00	0.00	2353.26	Start 2121.00 hold at 6489.32 MD
6489.32	0.00	0.00	5800.00	-1877.66	1922.76	2.50	180.00	2687.49	TD at 8610.32
8610.32	0.00	0.00	7921.00	-1877.66	1922.76	0.00	0.00	2687.49	



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
2871.00	3202.17	G Sand
4721.00	5365.86	Williams Fork
5921.00	6610.32	TOG
7021.00	7710.32	Cameo
7679.00	8368.32	Base Cameo Coal
7721.00	8410.32	Rollins



Plan: Design #2 (Piceance Federal 28-21E/Slot A-11)

Created By: Ricky Osburn Date: 10:03, April 15 2015



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7701.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	North Reference:	True
Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-11		
Design:	Design #2		

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° 14' 48.240 N
From:	Lat/Long	Easting:	2,355,826.215 usft	Longitude:	107° 46' 29.510 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	-1.43 °

Well	Piceance Federal 28-21E					
Well Position	+N/-S	-144.69 usft	Northing:	1,522,679.069 usft	Latitude:	39° 14' 46.810 N
	+E/-W	-36.97 usft	Easting:	2,355,785.630 usft	Longitude:	107° 46' 29.980 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,679.00 usft

Wellbore	Slot A-11				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2015/03/31	9.73	65.47	51,746

Design	Design #2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	134.32

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	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	0.00	
1,353.30	31.33	134.32	1,291.76	-233.52	239.13	2.50	2.50	0.00	134.32	
5,236.02	31.33	134.32	4,608.24	-1,644.14	1,683.64	0.00	0.00	0.00	0.00	
6,489.32	0.00	0.00	5,800.00	-1,877.66	1,922.76	2.50	-2.50	0.00	180.00	
8,610.32	0.00	0.00	7,921.00	-1,877.66	1,922.76	0.00	0.00	0.00	0.00	Piceance 28-21E tgt



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7701.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	North Reference:	True
Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-11		
Design:	Design #2		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.50									
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	2.50	134.32	199.97	-1.52	1.56	2.18	2.50	2.50	0.00
300.00	5.00	134.32	299.75	-6.09	6.24	8.72	2.50	2.50	0.00
400.00	7.50	134.32	399.14	-13.70	14.03	19.61	2.50	2.50	0.00
500.00	10.00	134.32	497.97	-24.33	24.91	34.82	2.50	2.50	0.00
600.00	12.50	134.32	596.04	-37.96	38.87	54.33	2.50	2.50	0.00
700.00	15.00	134.32	693.17	-54.56	55.87	78.09	2.50	2.50	0.00
800.00	17.50	134.32	789.17	-74.11	75.89	106.07	2.50	2.50	0.00
900.00	20.00	134.32	883.85	-96.57	98.89	138.21	2.50	2.50	0.00
1,000.00	22.50	134.32	977.05	-121.89	124.81	174.46	2.50	2.50	0.00
1,100.00	25.00	134.32	1,068.57	-150.02	153.63	214.73	2.50	2.50	0.00
1,200.00	27.50	134.32	1,158.25	-180.92	185.27	258.95	2.50	2.50	0.00
1,300.00	30.00	134.32	1,245.92	-214.52	219.68	307.05	2.50	2.50	0.00
Start 3882.72 hold at 1353.30 MD									
1,353.30	31.33	134.32	1,291.76	-233.52	239.13	334.23	2.50	2.50	0.00
1,400.00	31.33	134.32	1,331.65	-250.48	256.50	358.52	0.00	0.00	0.00
1,500.00	31.33	134.32	1,417.07	-286.81	293.70	410.52	0.00	0.00	0.00
1,600.00	31.33	134.32	1,502.48	-323.14	330.91	462.52	0.00	0.00	0.00
8 5/8" Csg.									
1,622.85	31.33	134.32	1,522.00	-331.45	339.41	474.40	0.00	0.00	0.00
1,700.00	31.33	134.32	1,587.90	-359.47	368.11	514.52	0.00	0.00	0.00
1,800.00	31.33	134.32	1,673.32	-395.81	405.31	566.52	0.00	0.00	0.00
1,900.00	31.33	134.32	1,758.73	-432.14	442.52	618.52	0.00	0.00	0.00
2,000.00	31.33	134.32	1,844.15	-468.47	479.72	670.52	0.00	0.00	0.00
2,100.00	31.33	134.32	1,929.56	-504.80	516.92	722.52	0.00	0.00	0.00
2,200.00	31.33	134.32	2,014.98	-541.13	554.13	774.52	0.00	0.00	0.00
2,300.00	31.33	134.32	2,100.40	-577.46	591.33	826.52	0.00	0.00	0.00
2,400.00	31.33	134.32	2,185.81	-613.79	628.54	878.52	0.00	0.00	0.00
2,500.00	31.33	134.32	2,271.23	-650.12	665.74	930.52	0.00	0.00	0.00
2,600.00	31.33	134.32	2,356.65	-686.45	702.94	982.52	0.00	0.00	0.00
2,700.00	31.33	134.32	2,442.06	-722.78	740.15	1,034.52	0.00	0.00	0.00
2,800.00	31.33	134.32	2,527.48	-759.11	777.35	1,086.52	0.00	0.00	0.00
2,900.00	31.33	134.32	2,612.90	-795.45	814.55	1,138.52	0.00	0.00	0.00
3,000.00	31.33	134.32	2,698.31	-831.78	851.76	1,190.52	0.00	0.00	0.00
3,100.00	31.33	134.32	2,783.73	-868.11	888.96	1,242.52	0.00	0.00	0.00
3,200.00	31.33	134.32	2,869.15	-904.44	926.16	1,294.52	0.00	0.00	0.00
G Sand									
3,202.17	31.33	134.32	2,871.00	-905.23	926.97	1,295.65	0.00	0.00	0.00
3,300.00	31.33	134.32	2,954.56	-940.77	963.37	1,346.52	0.00	0.00	0.00
3,400.00	31.33	134.32	3,039.98	-977.10	1,000.57	1,398.52	0.00	0.00	0.00
3,500.00	31.33	134.32	3,125.39	-1,013.43	1,037.78	1,450.52	0.00	0.00	0.00
3,600.00	31.33	134.32	3,210.81	-1,049.76	1,074.98	1,502.52	0.00	0.00	0.00
3,700.00	31.33	134.32	3,296.23	-1,086.09	1,112.18	1,554.52	0.00	0.00	0.00
3,800.00	31.33	134.32	3,381.64	-1,122.42	1,149.39	1,606.52	0.00	0.00	0.00
3,900.00	31.33	134.32	3,467.06	-1,158.75	1,186.59	1,658.53	0.00	0.00	0.00
4,000.00	31.33	134.32	3,552.48	-1,195.08	1,223.79	1,710.53	0.00	0.00	0.00
4,100.00	31.33	134.32	3,637.89	-1,231.42	1,261.00	1,762.53	0.00	0.00	0.00
4,200.00	31.33	134.32	3,723.31	-1,267.75	1,298.20	1,814.53	0.00	0.00	0.00
4,300.00	31.33	134.32	3,808.73	-1,304.08	1,335.40	1,866.53	0.00	0.00	0.00
4,400.00	31.33	134.32	3,894.14	-1,340.41	1,372.61	1,918.53	0.00	0.00	0.00
4,500.00	31.33	134.32	3,979.56	-1,376.74	1,409.81	1,970.53	0.00	0.00	0.00
4,600.00	31.33	134.32	4,064.97	-1,413.07	1,447.02	2,022.53	0.00	0.00	0.00



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Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7701.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	North Reference:	True
Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-11		
Design:	Design #2		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,700.00	31.33	134.32	4,150.39	-1,449.40	1,484.22	2,074.53	0.00	0.00	0.00
4,800.00	31.33	134.32	4,235.81	-1,485.73	1,521.42	2,126.53	0.00	0.00	0.00
4,900.00	31.33	134.32	4,321.22	-1,522.06	1,558.63	2,178.53	0.00	0.00	0.00
5,000.00	31.33	134.32	4,406.64	-1,558.39	1,595.83	2,230.53	0.00	0.00	0.00
5,100.00	31.33	134.32	4,492.06	-1,594.72	1,633.03	2,282.53	0.00	0.00	0.00
5,200.00	31.33	134.32	4,577.47	-1,631.05	1,670.24	2,334.53	0.00	0.00	0.00
Start Drop -2.50									
5,236.02	31.33	134.32	4,608.24	-1,644.14	1,683.64	2,353.26	0.00	0.00	0.00
5,300.00	29.73	134.32	4,663.35	-1,666.85	1,706.89	2,385.76	2.50	-2.50	0.00
Williams Fork									
5,365.86	28.09	134.32	4,721.00	-1,689.09	1,729.67	2,417.60	2.50	-2.50	0.00
5,400.00	27.23	134.32	4,751.24	-1,700.17	1,741.01	2,433.45	2.50	-2.50	0.00
5,500.00	24.73	134.32	4,841.12	-1,730.77	1,772.35	2,477.26	2.50	-2.50	0.00
5,600.00	22.23	134.32	4,932.83	-1,758.61	1,800.86	2,517.10	2.50	-2.50	0.00
5,700.00	19.73	134.32	5,026.19	-1,783.63	1,826.47	2,552.91	2.50	-2.50	0.00
5,800.00	17.23	134.32	5,121.03	-1,805.77	1,849.15	2,584.61	2.50	-2.50	0.00
5,900.00	14.73	134.32	5,217.15	-1,825.01	1,868.85	2,612.14	2.50	-2.50	0.00
6,000.00	12.23	134.32	5,314.39	-1,841.30	1,885.53	2,635.45	2.50	-2.50	0.00
6,100.00	9.73	134.32	5,412.55	-1,854.61	1,899.16	2,654.50	2.50	-2.50	0.00
6,200.00	7.23	134.32	5,511.45	-1,864.91	1,909.72	2,669.25	2.50	-2.50	0.00
6,300.00	4.73	134.32	5,610.90	-1,872.20	1,917.17	2,679.68	2.50	-2.50	0.00
6,400.00	2.23	134.32	5,710.70	-1,876.44	1,921.52	2,685.75	2.50	-2.50	0.00
Start 2121.00 hold at 6489.32 MD									
6,489.32	0.00	0.00	5,800.00	-1,877.66	1,922.76	2,687.49	2.50	-2.50	0.00
6,500.00	0.00	0.00	5,810.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
6,600.00	0.00	0.00	5,910.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
TOG									
6,610.32	0.00	0.00	5,921.00	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
6,700.00	0.00	0.00	6,010.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
6,800.00	0.00	0.00	6,110.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
6,900.00	0.00	0.00	6,210.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,000.00	0.00	0.00	6,310.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,100.00	0.00	0.00	6,410.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,200.00	0.00	0.00	6,510.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,300.00	0.00	0.00	6,610.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,400.00	0.00	0.00	6,710.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,500.00	0.00	0.00	6,810.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,600.00	0.00	0.00	6,910.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,700.00	0.00	0.00	7,010.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
Cameo									
7,710.32	0.00	0.00	7,021.00	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,800.00	0.00	0.00	7,110.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
7,900.00	0.00	0.00	7,210.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
8,000.00	0.00	0.00	7,310.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
8,100.00	0.00	0.00	7,410.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
8,200.00	0.00	0.00	7,510.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
8,300.00	0.00	0.00	7,610.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
Base Cameo Coal									
8,368.32	0.00	0.00	7,679.00	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
8,400.00	0.00	0.00	7,710.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
Rollins									
8,410.32	0.00	0.00	7,721.00	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00
8,500.00	0.00	0.00	7,810.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7701.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7701.00usft
Site:	Piceance 28-10 Pad	North Reference:	True
Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-11		
Design:	Design #2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
8,600.00	0.00	0.00	7,910.68	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00	
TD at 8610.32										
8,610.32	0.00	0.00	7,921.00	-1,877.66	1,922.76	2,687.49	0.00	0.00	0.00	

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Piceance 28-21E tgt	0.00	0.00	7,921.00	-1,877.65	1,922.76	1,520,753.860	2,357,660.775	39° 14' 28.250 N	107° 46' 5.540 W
- plan hits target center									
- Circle (radius 50.00)									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
1,622.85	1,522.00	8 5/8" Csg.	8-5/8	12-1/4	

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,202.17	2,871.00	G Sand		0.00		
5,365.86	4,721.00	Williams Fork		0.00		
6,610.32	5,921.00	TOG		0.00		
7,710.32	7,021.00	Cameo		0.00		
8,368.32	7,679.00	Base Cameo Coal		0.00		
8,410.32	7,721.00	Rollins		0.00		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
100.00	100.00	0.00	0.00	Start Build 2.50	
1,353.30	1,291.76	-233.52	239.13	Start 3882.72 hold at 1353.30 MD	
5,236.02	4,608.24	-1,644.14	1,683.64	Start Drop -2.50	
6,489.32	5,800.00	-1,877.66	1,922.76	Start 2121.00 hold at 6489.32 MD	
8,610.32	7,921.00	-1,877.66	1,922.76	TD at 8610.32	



Piceance Energy, LLC

Mesa County, CO

Piceance 28-10 Pad

Piceance Federal 28-21E

Slot A-11

Design #2

Anticollision Report

15 April, 2015

Archer



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Reference Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-11	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Reference	Design #2		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.00 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	2015/04/15		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	8,610.32	Design #2 (Slot A-11)	MWD	MWD - Standard	

Summary						
Site Name	Reference	Offset	Distance		Separation	Warning
	Measured	Measured	Between	Between		
Offset Well - Wellbore - Design	Depth	Depth	Centres	Ellipses	Factor	
	(usft)	(usft)	(usft)	(usft)		
Piceance 28-10 Pad						
Piceance Federal 28-19E - Slot A-9 - Design #2	100.00	100.00	29.40	29.22	167.695	CC, ES
Piceance Federal 28-19E - Slot A-9 - Design #2	8,610.32	8,479.79	499.80	412.36	5.716	SF
Piceance Federal 28-20E - Slot A-10 - Design #2	100.00	100.00	20.00	19.82	114.055	CC, ES
Piceance Federal 28-20E - Slot A-10 - Design #2	5,200.00	5,212.52	202.91	120.76	2.470	SF

Offset Design		Piceance 28-10 Pad - Piceance Federal 28-19E - Slot A-9 - Design #2											Offset Site Error:	0.00 usft
Survey Program:		0-MWD											Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	15.52	28.33	7.87	29.40					
100.00	100.00	100.00	100.00	0.09	0.09	15.52	28.33	7.87	29.40	29.22	0.18	167.695	CC, ES	
200.00	199.97	199.97	199.97	0.30	0.31	-122.37	28.33	7.87	30.51	29.87	0.64	47.644		
300.00	299.75	299.75	299.75	0.54	0.54	-131.51	28.33	7.87	34.46	33.30	1.16	29.721		
400.00	399.14	400.39	400.36	0.82	0.75	-140.37	27.03	9.64	40.98	39.27	1.70	24.042		
500.00	497.97	501.41	501.15	1.16	0.96	-146.10	23.09	14.99	48.54	46.29	2.26	21.491		
600.00	596.04	602.81	601.93	1.57	1.22	-149.70	16.49	23.96	56.76	53.91	2.84	19.962		
700.00	693.17	704.57	702.48	2.06	1.53	-151.87	7.22	36.56	65.40	61.94	3.46	18.889		
800.00	789.17	806.71	802.59	2.62	1.92	-153.09	-4.73	52.80	74.34	70.22	4.13	18.021		
900.00	883.85	909.20	902.05	3.26	2.39	-153.63	-19.37	72.71	83.52	78.68	4.85	17.236		
1,000.00	977.05	1,012.04	1,000.64	3.99	2.95	-153.68	-36.69	96.25	92.90	87.27	5.64	16.475		
1,100.00	1,068.57	1,115.23	1,098.15	4.81	3.61	-153.38	-56.68	123.44	102.46	95.94	6.52	15.710		
1,200.00	1,158.25	1,218.77	1,194.35	5.72	4.36	-152.82	-79.34	154.24	112.18	104.67	7.51	14.930		
1,300.00	1,245.92	1,322.63	1,289.03	6.71	5.22	-152.05	-104.63	188.62	122.06	113.44	8.62	14.160		
1,400.00	1,331.65	1,426.85	1,381.99	7.79	6.18	-151.08	-132.54	226.56	131.69	121.82	9.87	13.342		
1,500.00	1,417.07	1,527.59	1,470.37	8.89	7.18	-149.66	-161.19	265.52	139.34	128.08	11.26	12.370		
1,600.00	1,502.48	1,627.25	1,557.74	9.99	8.18	-148.38	-189.60	304.13	146.98	134.25	12.73	11.543		
1,700.00	1,587.90	1,726.90	1,645.10	11.10	9.20	-147.22	-218.00	342.75	154.69	140.43	14.26	10.847		
1,800.00	1,673.32	1,826.56	1,732.47	12.21	10.22	-146.18	-246.41	381.37	162.46	146.62	15.84	10.259		
1,900.00	1,758.73	1,926.22	1,819.84	13.33	11.24	-145.23	-274.81	419.99	170.27	152.82	17.45	9.759		
2,000.00	1,844.15	2,025.87	1,907.21	14.44	12.27	-144.36	-303.22	458.60	178.13	159.03	19.09	9.330		
2,100.00	1,929.56	2,125.53	1,994.58	15.56	13.29	-143.57	-331.63	497.22	186.02	165.26	20.76	8.960		
2,200.00	2,014.98	2,225.18	2,081.95	16.68	14.32	-142.84	-360.03	535.84	193.95	171.49	22.45	8.638		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Reference Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-11	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.00 usft
Survey Program: 0-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
2,300.00	2,100.40	2,324.84	2,169.31	17.80	15.36	-142.17	-388.44	574.45	201.90	177.74	24.16	8.355		
2,400.00	2,185.81	2,424.50	2,256.68	18.92	16.39	-141.55	-416.84	613.07	209.88	183.99	25.89	8.107		
2,500.00	2,271.23	2,524.15	2,344.05	20.04	17.42	-140.97	-445.25	651.69	217.88	190.25	27.63	7.886		
2,600.00	2,356.65	2,623.81	2,431.42	21.16	18.46	-140.44	-473.65	690.31	225.91	196.53	29.38	7.689		
2,700.00	2,442.06	2,723.47	2,518.79	22.28	19.50	-139.94	-502.06	728.92	233.95	202.81	31.14	7.513		
2,800.00	2,527.48	2,823.12	2,606.16	23.40	20.53	-139.48	-530.47	767.54	242.00	209.09	32.91	7.354		
2,900.00	2,612.90	2,922.78	2,693.52	24.52	21.57	-139.04	-558.87	806.16	250.08	215.39	34.69	7.210		
3,000.00	2,698.31	3,022.44	2,780.89	25.65	22.61	-138.63	-587.28	844.78	258.16	221.69	36.47	7.079		
3,100.00	2,783.73	3,122.09	2,868.26	26.77	23.64	-138.25	-615.68	883.39	266.26	228.00	38.26	6.959		
3,200.00	2,869.15	3,221.75	2,955.63	27.89	24.68	-137.89	-644.09	922.01	274.37	234.31	40.06	6.850		
3,300.00	2,954.56	3,321.40	3,043.00	29.01	25.72	-137.55	-672.49	960.63	282.49	240.63	41.86	6.749		
3,400.00	3,039.98	3,421.06	3,130.36	30.14	26.76	-137.23	-700.90	999.24	290.62	246.95	43.66	6.656		
3,500.00	3,125.39	3,520.72	3,217.73	31.26	27.80	-136.93	-729.31	1,037.86	298.75	253.28	45.47	6.570		
3,600.00	3,210.81	3,620.37	3,305.10	32.39	28.84	-136.64	-757.71	1,076.48	306.90	259.62	47.28	6.491		
3,700.00	3,296.23	3,720.03	3,392.47	33.51	29.88	-136.37	-786.12	1,115.10	315.05	265.95	49.10	6.417		
3,800.00	3,381.64	3,819.69	3,479.84	34.63	30.92	-136.11	-814.52	1,153.71	323.21	272.29	50.91	6.348		
3,900.00	3,467.06	3,919.34	3,567.21	35.76	31.96	-135.87	-842.93	1,192.33	331.37	278.64	52.73	6.284		
4,000.00	3,552.48	4,019.00	3,654.57	36.88	33.00	-135.63	-871.33	1,230.95	339.54	284.99	54.56	6.224		
4,100.00	3,637.89	4,118.65	3,741.94	38.00	34.04	-135.41	-899.74	1,269.57	347.72	291.34	56.38	6.167		
4,200.00	3,723.31	4,218.31	3,829.31	39.13	35.08	-135.20	-928.15	1,308.18	355.90	297.69	58.21	6.114		
4,300.00	3,808.73	4,317.97	3,916.68	40.25	36.12	-135.00	-956.55	1,346.80	364.08	304.05	60.04	6.064		
4,400.00	3,894.14	4,417.62	4,004.05	41.38	37.16	-134.80	-984.96	1,385.42	372.27	310.41	61.87	6.017		
4,500.00	3,979.56	4,517.28	4,091.42	42.50	38.20	-134.62	-1,013.36	1,424.03	380.47	316.77	63.70	5.973		
4,600.00	4,064.97	4,616.94	4,178.78	43.63	39.24	-134.44	-1,041.77	1,462.65	388.67	323.13	65.53	5.931		
4,700.00	4,150.39	4,716.59	4,266.15	44.75	40.28	-134.27	-1,070.17	1,501.27	396.87	329.50	67.37	5.891		
4,800.00	4,235.81	4,816.25	4,353.52	45.88	41.32	-134.11	-1,098.58	1,539.89	405.07	335.87	69.20	5.853		
4,900.00	4,321.22	4,915.91	4,440.89	47.00	42.36	-133.95	-1,126.99	1,578.50	413.28	342.24	71.04	5.817		
5,000.00	4,406.64	5,015.56	4,528.26	48.12	43.40	-133.80	-1,155.39	1,617.12	421.49	348.61	72.88	5.783		
5,100.00	4,492.06	5,115.22	4,615.62	49.25	44.44	-133.65	-1,183.80	1,655.74	429.70	354.98	74.72	5.751		
5,200.00	4,577.47	5,214.24	4,702.44	50.37	45.47	-133.51	-1,212.02	1,694.10	437.92	361.38	76.55	5.721		
5,300.00	4,663.35	5,300.00	4,778.48	51.42	46.25	-133.62	-1,235.51	1,726.05	446.85	368.87	77.98	5.730		
5,400.00	4,751.24	5,392.75	4,862.31	52.25	46.94	-133.80	-1,259.01	1,757.98	455.24	376.08	79.16	5.751		
5,500.00	4,841.12	5,481.80	4,944.26	53.01	47.54	-133.96	-1,279.66	1,786.06	462.96	382.75	80.21	5.772		
5,600.00	4,932.83	5,570.75	5,027.40	53.69	48.08	-134.11	-1,298.38	1,811.51	469.97	388.83	81.14	5.792		
5,700.00	5,026.19	5,659.60	5,111.61	54.30	48.57	-134.23	-1,315.16	1,834.33	476.25	394.30	81.95	5.812		
5,800.00	5,121.03	5,748.37	5,196.77	54.84	48.99	-134.34	-1,329.99	1,854.48	481.81	399.16	82.64	5.830		
5,900.00	5,217.15	5,837.06	5,282.76	55.30	49.36	-134.43	-1,342.84	1,871.95	486.63	403.40	83.23	5.847		
6,000.00	5,314.39	5,925.68	5,369.47	55.69	49.67	-134.51	-1,353.69	1,886.71	490.71	407.01	83.70	5.863		
6,100.00	5,412.55	6,014.25	5,456.76	56.01	49.92	-134.58	-1,362.56	1,898.76	494.04	409.98	84.06	5.877		
6,200.00	5,511.45	6,100.00	5,541.76	56.26	50.12	-134.63	-1,369.22	1,907.82	496.62	412.31	84.31	5.890		
6,300.00	5,610.90	6,191.28	5,632.65	56.44	50.28	-134.66	-1,374.25	1,914.65	498.43	413.97	84.46	5.901		
6,400.00	5,710.70	6,279.76	5,720.99	56.56	50.38	-134.68	-1,377.06	1,918.48	499.49	414.98	84.51	5.911		
6,500.00	5,810.68	6,369.47	5,810.68	56.63	50.44	-0.37	-1,377.87	1,919.58	499.80	415.30	84.49	5.915		
6,600.00	5,910.68	6,469.47	5,910.68	56.67	50.49	-0.37	-1,377.87	1,919.58	499.80	415.19	84.61	5.907		
6,700.00	6,010.68	6,569.47	6,010.68	56.71	50.54	-0.37	-1,377.87	1,919.58	499.80	415.07	84.73	5.899		
6,800.00	6,110.68	6,669.47	6,110.68	56.76	50.60	-0.37	-1,377.87	1,919.58	499.80	414.95	84.85	5.890		
6,900.00	6,210.68	6,769.47	6,210.68	56.80	50.65	-0.37	-1,377.87	1,919.58	499.80	414.82	84.97	5.882		
7,000.00	6,310.68	6,869.47	6,310.68	56.85	50.70	-0.37	-1,377.87	1,919.58	499.80	414.69	85.10	5.873		
7,100.00	6,410.68	6,969.47	6,410.68	56.90	50.76	-0.37	-1,377.87	1,919.58	499.80	414.57	85.23	5.864		
7,200.00	6,510.68	7,069.47	6,510.68	56.94	50.81	-0.37	-1,377.87	1,919.58	499.80	414.43	85.36	5.855		
7,300.00	6,610.68	7,169.47	6,610.68	56.99	50.87	-0.37	-1,377.87	1,919.58	499.80	414.30	85.49	5.846		
7,400.00	6,710.68	7,269.47	6,710.68	57.04	50.93	-0.37	-1,377.87	1,919.58	499.80	414.17	85.63	5.837		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Reference Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-11	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design												Offset Site Error:	0.00 usft
Piceance 28-10 Pad - Piceance Federal 28-19E - Slot A-9 - Design #2												Offset Well Error:	0.00 usft
Survey Program: 0-MWD													
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
7,500.00	6,810.68	7,369.47	6,810.68	57.09	50.99	-0.37	-1,377.87	1,919.58	499.80	414.03	85.77	5.827	
7,600.00	6,910.68	7,469.47	6,910.68	57.14	51.05	-0.37	-1,377.87	1,919.58	499.80	413.89	85.91	5.818	
7,700.00	7,010.68	7,569.47	7,010.68	57.20	51.11	-0.37	-1,377.87	1,919.58	499.80	413.75	86.05	5.808	
7,800.00	7,110.68	7,669.47	7,110.68	57.25	51.17	-0.37	-1,377.87	1,919.58	499.80	413.60	86.19	5.799	
7,900.00	7,210.68	7,769.47	7,210.68	57.30	51.23	-0.37	-1,377.87	1,919.58	499.80	413.46	86.34	5.789	
8,000.00	7,310.68	7,869.47	7,310.68	57.36	51.29	-0.37	-1,377.87	1,919.58	499.80	413.31	86.49	5.779	
8,100.00	7,410.68	7,969.47	7,410.68	57.41	51.36	-0.37	-1,377.87	1,919.58	499.80	413.16	86.64	5.769	
8,200.00	7,510.68	8,069.47	7,510.68	57.47	51.42	-0.37	-1,377.87	1,919.58	499.80	413.01	86.79	5.759	
8,300.00	7,610.68	8,169.47	7,610.68	57.53	51.49	-0.37	-1,377.87	1,919.58	499.80	412.85	86.94	5.749	
8,400.00	7,710.68	8,269.47	7,710.68	57.58	51.55	-0.37	-1,377.87	1,919.58	499.80	412.70	87.10	5.738	
8,500.00	7,810.68	8,369.47	7,810.68	57.64	51.62	-0.37	-1,377.87	1,919.58	499.80	412.54	87.26	5.728	
8,600.00	7,910.68	8,469.47	7,910.68	57.70	51.69	-0.37	-1,377.87	1,919.58	499.80	412.38	87.42	5.717	
8,610.32	7,921.00	8,479.79	7,921.00	57.71	51.70	-0.37	-1,377.87	1,919.58	499.80	412.36	87.43	5.716 SF	



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Reference Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-11	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-10 Pad - Piceance Federal 28-20E - Slot A-10 - Design #2													Offset Site Error:	0.00 usft
Survey Program: 0-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	15.99	19.22	5.51	20.00					
100.00	100.00	100.00	100.00	0.09	0.09	15.99	19.22	5.51	20.00	19.82	0.18	114.055 CC, ES		
200.00	199.97	199.97	199.97	0.30	0.31	-123.53	19.22	5.51	21.12	20.48	0.64	32.885		
300.00	299.75	300.43	300.40	0.54	0.52	-132.07	17.79	7.17	23.91	22.77	1.14	20.952		
400.00	399.14	401.08	400.82	0.82	0.75	-138.25	13.48	12.19	27.29	25.61	1.68	16.254		
500.00	497.97	501.93	501.05	1.16	1.01	-142.58	6.28	20.57	31.06	28.80	2.26	13.736		
600.00	596.04	602.96	600.88	1.57	1.34	-145.55	-3.81	32.30	35.10	32.22	2.88	12.169		
700.00	693.17	704.17	700.11	2.06	1.74	-147.53	-16.78	47.39	39.33	35.78	3.55	11.070		
800.00	789.17	805.57	798.55	2.62	2.22	-148.76	-32.63	65.82	43.70	39.43	4.28	10.221		
900.00	883.85	907.15	895.98	3.26	2.79	-149.45	-51.34	87.58	48.17	43.11	5.06	9.513		
1,000.00	977.05	1,008.91	992.22	3.99	3.44	-149.73	-72.88	112.63	52.73	46.80	5.93	8.891		
1,100.00	1,068.57	1,110.84	1,087.05	4.81	4.18	-149.68	-97.23	140.96	57.35	50.46	6.89	8.322		
1,200.00	1,158.25	1,212.94	1,180.28	5.72	5.02	-149.39	-124.35	172.50	62.04	54.08	7.96	7.798		
1,300.00	1,245.92	1,315.21	1,271.72	6.71	5.96	-148.90	-154.20	207.22	66.78	57.63	9.14	7.303		
1,400.00	1,331.65	1,417.62	1,361.14	7.79	6.99	-148.07	-186.73	245.06	71.17	60.69	10.48	6.794		
1,500.00	1,417.07	1,517.55	1,447.32	8.89	8.05	-146.67	-219.71	283.42	74.33	62.36	11.97	6.211		
1,600.00	1,502.48	1,617.48	1,533.51	9.99	9.12	-145.37	-252.69	321.77	77.52	63.99	13.53	5.729		
1,700.00	1,587.90	1,717.42	1,619.69	11.10	10.20	-144.19	-285.67	360.13	80.76	65.60	15.16	5.327		
1,800.00	1,673.32	1,817.35	1,705.88	12.21	11.28	-143.09	-318.64	398.49	84.03	67.19	16.84	4.991		
1,900.00	1,758.73	1,917.29	1,792.06	13.33	12.37	-142.07	-351.62	436.85	87.32	68.77	18.56	4.706		
2,000.00	1,844.15	2,017.22	1,878.25	14.44	13.45	-141.13	-384.60	475.21	90.65	70.34	20.31	4.463		
2,100.00	1,929.56	2,117.15	1,964.43	15.56	14.54	-140.26	-417.58	513.57	93.99	71.90	22.09	4.255		
2,200.00	2,014.98	2,217.09	2,050.62	16.68	15.63	-139.45	-450.56	551.92	97.35	73.45	23.90	4.073		
2,300.00	2,100.40	2,317.02	2,136.80	17.80	16.72	-138.69	-483.54	590.28	100.74	75.01	25.73	3.915		
2,400.00	2,185.81	2,416.96	2,222.99	18.92	17.81	-137.98	-516.52	628.64	104.14	76.56	27.58	3.776		
2,500.00	2,271.23	2,516.89	2,309.17	20.04	18.91	-137.31	-549.49	667.00	107.55	78.11	29.45	3.653		
2,600.00	2,356.65	2,616.83	2,395.36	21.16	20.00	-136.69	-582.47	705.36	110.98	79.65	31.32	3.543		
2,700.00	2,442.06	2,716.76	2,481.54	22.28	21.10	-136.10	-615.45	743.72	114.42	81.20	33.22	3.445		
2,800.00	2,527.48	2,816.69	2,567.73	23.40	22.19	-135.55	-648.43	782.08	117.87	82.75	35.12	3.356		
2,900.00	2,612.90	2,916.63	2,653.92	24.52	23.28	-135.03	-681.41	820.43	121.33	84.30	37.03	3.276		
3,000.00	2,698.31	3,016.56	2,740.10	25.65	24.38	-134.54	-714.39	858.79	124.80	85.85	38.96	3.204		
3,100.00	2,783.73	3,116.50	2,826.29	26.77	25.48	-134.08	-747.37	897.15	128.28	87.40	40.89	3.138		
3,200.00	2,869.15	3,216.43	2,912.47	27.89	26.57	-133.64	-780.34	935.51	131.77	88.95	42.82	3.077		
3,300.00	2,954.56	3,316.36	2,998.66	29.01	27.67	-133.22	-813.32	973.87	135.27	90.50	44.77	3.022		
3,400.00	3,039.98	3,416.30	3,084.84	30.14	28.76	-132.82	-846.30	1,012.23	138.77	92.05	46.71	2.971		
3,500.00	3,125.39	3,516.23	3,171.03	31.26	29.86	-132.44	-879.28	1,050.58	142.28	93.61	48.67	2.923		
3,600.00	3,210.81	3,616.17	3,257.21	32.39	30.96	-132.09	-912.26	1,088.94	145.79	95.16	50.63	2.880		
3,700.00	3,296.23	3,716.10	3,343.40	33.51	32.06	-131.74	-945.24	1,127.30	149.31	96.72	52.59	2.839		
3,800.00	3,381.64	3,816.04	3,429.58	34.63	33.15	-131.42	-978.22	1,165.66	152.84	98.28	54.56	2.801		
3,900.00	3,467.06	3,915.97	3,515.77	35.76	34.25	-131.11	-1,011.19	1,204.02	156.37	99.84	56.53	2.766		
4,000.00	3,552.48	4,015.90	3,601.95	36.88	35.35	-130.81	-1,044.17	1,242.38	159.90	101.40	58.50	2.733		
4,100.00	3,637.89	4,115.84	3,688.14	38.00	36.44	-130.52	-1,077.15	1,280.73	163.44	102.96	60.48	2.703		
4,200.00	3,723.31	4,215.77	3,774.32	39.13	37.54	-130.25	-1,110.13	1,319.09	166.98	104.52	62.45	2.674		
4,300.00	3,808.73	4,315.71	3,860.51	40.25	38.64	-129.99	-1,143.11	1,357.45	170.52	106.09	64.44	2.646		
4,400.00	3,894.14	4,415.64	3,946.69	41.38	39.74	-129.74	-1,176.09	1,395.81	174.07	107.65	66.42	2.621		
4,500.00	3,979.56	4,515.57	4,032.88	42.50	40.83	-129.50	-1,209.06	1,434.17	177.63	109.22	68.40	2.597		
4,600.00	4,064.97	4,615.51	4,119.06	43.63	41.93	-129.27	-1,242.04	1,472.53	181.18	110.79	70.39	2.574		
4,700.00	4,150.39	4,715.44	4,205.25	44.75	43.03	-129.04	-1,275.02	1,510.89	184.74	112.36	72.38	2.552		
4,800.00	4,235.81	4,815.38	4,291.43	45.88	44.13	-128.83	-1,308.00	1,549.24	188.30	113.93	74.37	2.532		
4,900.00	4,321.22	4,915.31	4,377.62	47.00	45.23	-128.62	-1,340.98	1,587.60	191.86	115.50	76.36	2.512		
5,000.00	4,406.64	5,015.25	4,463.80	48.12	46.32	-128.42	-1,373.96	1,625.96	195.43	117.07	78.36	2.494		
5,100.00	4,492.06	5,115.18	4,549.99	49.25	47.42	-128.23	-1,406.94	1,664.32	199.00	118.64	80.35	2.477		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Reference Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-11	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.00 usft
Survey Program: 0-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,200.00	4,577.47	5,212.52	4,634.22	50.37	48.41	-128.19	-1,438.74	1,701.31	202.91	120.76	82.15	2.470 SF		
5,300.00	4,663.35	5,307.42	4,718.05	51.42	49.20	-128.82	-1,467.73	1,735.03	208.40	125.23	83.17	2.506		
5,400.00	4,751.24	5,400.00	4,801.53	52.25	49.90	-129.50	-1,493.81	1,765.37	213.79	129.87	83.91	2.548		
5,500.00	4,841.12	5,496.66	4,890.34	53.01	50.56	-130.15	-1,518.67	1,794.28	218.84	134.29	84.54	2.588		
5,600.00	4,932.83	5,591.03	4,978.53	53.69	51.14	-130.75	-1,540.57	1,819.75	223.58	138.52	85.06	2.629		
5,700.00	5,026.19	5,685.24	5,067.87	54.30	51.64	-131.31	-1,560.05	1,842.41	227.99	142.53	85.45	2.668		
5,800.00	5,121.03	5,779.31	5,158.22	54.84	52.08	-131.84	-1,577.10	1,862.24	232.05	146.32	85.74	2.707		
5,900.00	5,217.15	5,873.24	5,249.44	55.30	52.46	-132.34	-1,591.69	1,879.21	235.77	149.87	85.90	2.745		
6,000.00	5,314.39	5,967.05	5,341.37	55.69	52.77	-132.81	-1,603.82	1,893.33	239.13	153.17	85.96	2.782		
6,100.00	5,412.55	6,060.73	5,433.87	56.01	53.02	-133.25	-1,613.48	1,904.56	242.13	156.22	85.90	2.819		
6,200.00	5,511.45	6,154.31	5,526.79	56.26	53.22	-133.67	-1,620.66	1,912.91	244.76	159.01	85.74	2.855		
6,300.00	5,610.90	6,247.79	5,619.99	56.44	53.35	-134.07	-1,625.36	1,918.37	247.01	161.53	85.48	2.890		
6,400.00	5,710.70	6,341.18	5,713.31	56.56	53.44	-134.45	-1,627.57	1,920.95	248.88	163.77	85.12	2.924		
6,500.00	5,810.68	6,438.55	5,810.68	56.63	53.49	-0.37	-1,627.76	1,921.17	249.90	165.07	84.83	2.946		
6,600.00	5,910.68	6,538.55	5,910.68	56.67	53.54	-0.37	-1,627.76	1,921.17	249.90	164.96	84.94	2.942		
6,700.00	6,010.68	6,638.55	6,010.68	56.71	53.59	-0.37	-1,627.76	1,921.17	249.90	164.84	85.06	2.938		
6,800.00	6,110.68	6,738.55	6,110.68	56.76	53.64	-0.37	-1,627.76	1,921.17	249.90	164.72	85.18	2.934		
6,900.00	6,210.68	6,838.55	6,210.68	56.80	53.68	-0.37	-1,627.76	1,921.17	249.90	164.59	85.30	2.929		
7,000.00	6,310.68	6,938.55	6,310.68	56.85	53.73	-0.37	-1,627.76	1,921.17	249.90	164.47	85.43	2.925		
7,100.00	6,410.68	7,038.55	6,410.68	56.90	53.79	-0.37	-1,627.76	1,921.17	249.90	164.34	85.56	2.921		
7,200.00	6,510.68	7,138.55	6,510.68	56.94	53.84	-0.37	-1,627.76	1,921.17	249.90	164.21	85.69	2.916		
7,300.00	6,610.68	7,238.55	6,610.68	56.99	53.89	-0.37	-1,627.76	1,921.17	249.90	164.08	85.82	2.912		
7,400.00	6,710.68	7,338.55	6,710.68	57.04	53.94	-0.37	-1,627.76	1,921.17	249.90	163.95	85.95	2.907		
7,500.00	6,810.68	7,438.55	6,810.68	57.09	54.00	-0.37	-1,627.76	1,921.17	249.90	163.81	86.09	2.903		
7,600.00	6,910.68	7,538.55	6,910.68	57.14	54.05	-0.37	-1,627.76	1,921.17	249.90	163.67	86.22	2.898		
7,700.00	7,010.68	7,638.55	7,010.68	57.20	54.11	-0.37	-1,627.76	1,921.17	249.90	163.53	86.36	2.894		
7,800.00	7,110.68	7,738.55	7,110.68	57.25	54.17	-0.37	-1,627.76	1,921.17	249.90	163.39	86.51	2.889		
7,900.00	7,210.68	7,838.55	7,210.68	57.30	54.22	-0.37	-1,627.76	1,921.17	249.90	163.25	86.65	2.884		
8,000.00	7,310.68	7,938.55	7,310.68	57.36	54.28	-0.37	-1,627.76	1,921.17	249.90	163.10	86.80	2.879		
8,100.00	7,410.68	8,038.55	7,410.68	57.41	54.34	-0.37	-1,627.76	1,921.17	249.90	162.95	86.95	2.874		
8,200.00	7,510.68	8,138.55	7,510.68	57.47	54.40	-0.37	-1,627.76	1,921.17	249.90	162.80	87.10	2.869		
8,300.00	7,610.68	8,238.55	7,610.68	57.53	54.46	-0.37	-1,627.76	1,921.17	249.90	162.65	87.25	2.864		
8,400.00	7,710.68	8,338.55	7,710.68	57.58	54.53	-0.37	-1,627.76	1,921.17	249.90	162.49	87.40	2.859		
8,500.00	7,810.68	8,438.55	7,810.68	57.64	54.59	-0.37	-1,627.76	1,921.17	249.90	162.34	87.56	2.854		
8,600.00	7,910.68	8,538.55	7,910.68	57.70	54.65	-0.37	-1,627.76	1,921.17	249.90	162.18	87.72	2.849		
8,610.32	7,921.00	8,548.87	7,921.00	57.71	54.66	-0.37	-1,627.76	1,921.17	249.90	162.16	87.73	2.848		



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Reference Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-11	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Reference Depths are relative to Well @ 7701.00usft

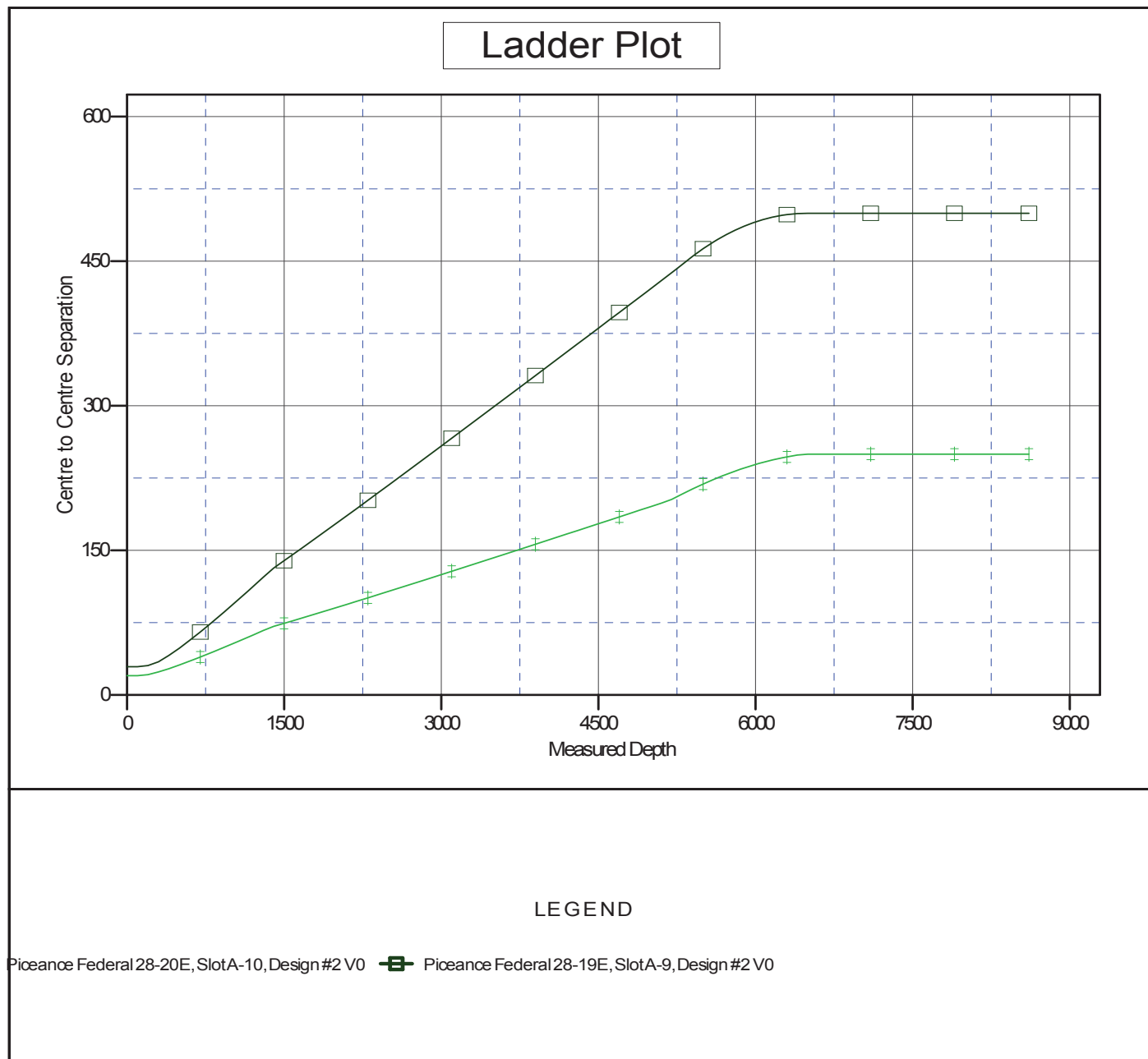
Offset Depths are relative to Offset Datum

Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Piceance Federal 28-21E

Coordinate System is US State Plane 1983, Colorado Central Zone

Grid Convergence at Surface is: -1.43°





Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7701.00usft
Reference Site:	Piceance 28-10 Pad	MD Reference:	Well @ 7701.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Piceance Federal 28-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-11	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Reference Depths are relative to Well @ 7701.00usft

Offset Depths are relative to Offset Datum

Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Piceance Federal 28-21E

Coordinate System is US State Plane 1983, Colorado Central Zone

Grid Convergence at Surface is: -1.43°

