



Piceance Energy, LLC

Mesa County, CO

Piceance 28-10 Pad

Piceance Federal 28-13E

Slot B-7

Plan: Design #2

Standard Planning Report

15 April, 2015

Archer



Project: Mesa County, CO
Site: Piceance 28-10 Pad
Well: Piceance Federal 28-13E
Wellbore: Slot B-7
Design: Design #2
Latitude: 39° 14' 47.410 N
Longitude: 107° 46' 29.910 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 28-13E, 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 28-13E

+N/-S	+E/-W	Northing	Ground Level: Easting	Latitude	Longitude	Slot
0.00	0.00	1522739.592	2355792.654	39° 14' 47.410 N	107° 46' 29.910 W	

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance 28-13E tgt	8024.00	60.81	1905.31	1522752.675	2357698.887	39° 14' 48.010 N	107° 46' 5.690 W	Circle (Radius: 50.00)

SECTION DETAILS

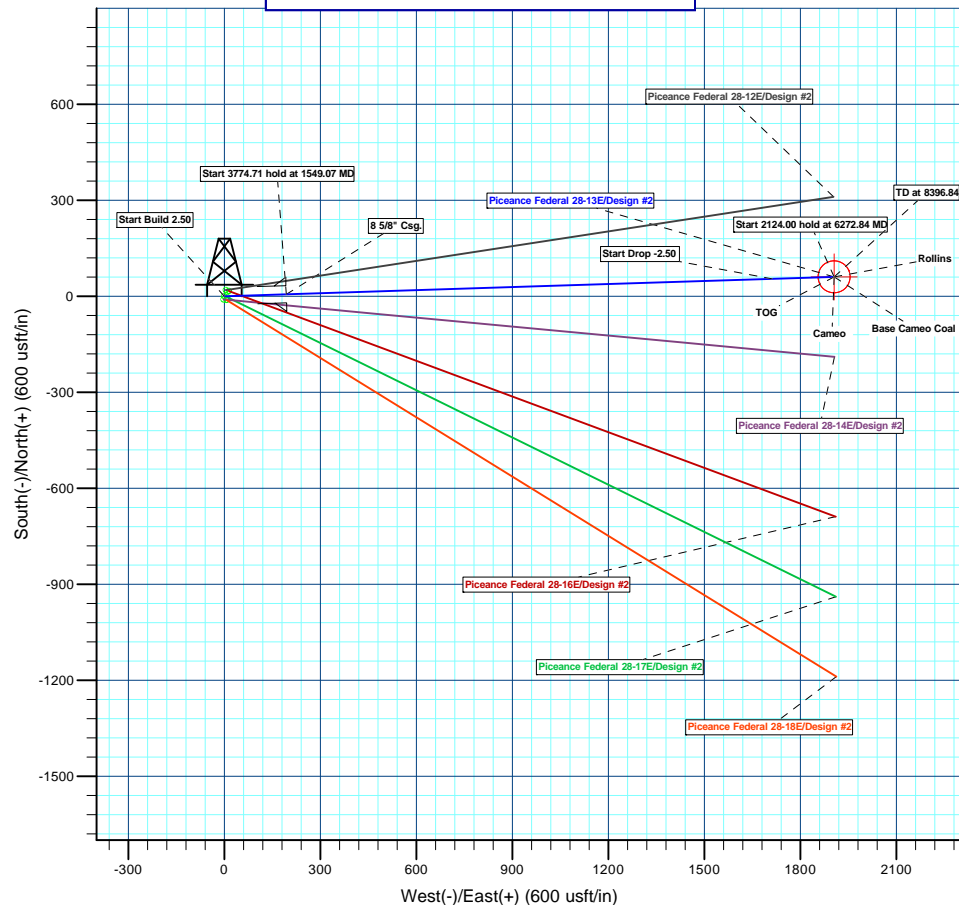
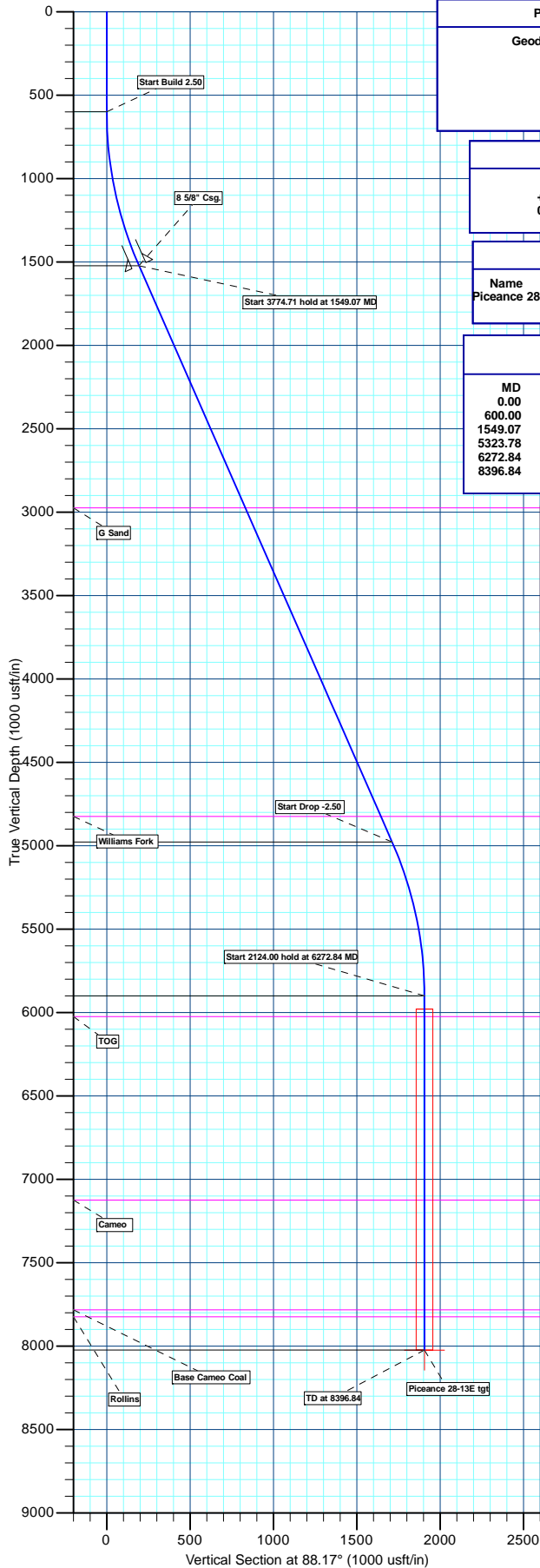
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.50
1549.07	23.73	88.17	1522.17	6.18	193.62	2.50	88.17	193.72	Start 3774.71 hold at 1549.07 MD
5323.78	23.73	88.17	4977.83	54.61	1711.69	0.00	0.00	1712.56	Start Drop -2.50
6272.84	0.00	0.00	5900.00	60.78	1905.31	2.50	180.00	1906.28	Start 2124.00 hold at 6272.84 MD
8396.84	0.00	0.00	8024.00	60.78	1905.31	0.00	0.00	1906.28	TD at 8396.84



Azimuths to True North
Magnetic North: 9.73°
Magnetic Field
Strength: 51746.5snT
Dip Angle: 65.47°
Date: 03/31/2015
Model: IGRF2010

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2974.00	3134.94	G Sand
4824.00	5155.75	Williams Fork
6024.00	6396.84	TOG
7124.00	7496.84	Cameo
7782.00	8154.84	Base Cameo Coal
7824.00	8196.84	Rollins



Plan: Design #2 (Piceance Federal 28-13E/Slot B-7)

Created By: Ricky Osburn Date: 9:33, April 15 2015



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Planning Report

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Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-7		
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 28-13E					
Well Position	+N/-S	-84.01 usft	Northing:	1,522,739.592 usft	Latitude:	39° 14' 47.410 N
	+E/-W	-31.47 usft	Easting:	2,355,792.654 usft	Longitude:	107° 46' 29.910 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,679.00 usft

Wellbore	Slot B-7				
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	88.17

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	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,549.07	23.73	88.17	1,522.17	6.18	193.62	2.50	2.50	0.00	88.17	
5,323.78	23.73	88.17	4,977.83	54.61	1,711.69	0.00	0.00	0.00	0.00	
6,272.84	0.00	0.00	5,900.00	60.78	1,905.31	2.50	-2.50	0.00	180.00	
8,396.84	0.00	0.00	8,024.00	60.78	1,905.31	0.00	0.00	0.00	0.00	Piceance 28-13E tgt



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-7		
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
100.00	0.00	0.00	100.00	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	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.50									
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	2.50	88.17	699.97	0.07	2.18	2.18	2.50	2.50	0.00
800.00	5.00	88.17	799.75	0.28	8.72	8.72	2.50	2.50	0.00
900.00	7.50	88.17	899.14	0.63	19.60	19.61	2.50	2.50	0.00
1,000.00	10.00	88.17	997.97	1.11	34.80	34.82	2.50	2.50	0.00
1,100.00	12.50	88.17	1,096.04	1.73	54.30	54.33	2.50	2.50	0.00
1,200.00	15.00	88.17	1,193.17	2.49	78.05	78.09	2.50	2.50	0.00
1,300.00	17.50	88.17	1,289.17	3.38	106.02	106.07	2.50	2.50	0.00
1,400.00	20.00	88.17	1,383.85	4.41	138.14	138.21	2.50	2.50	0.00
1,500.00	22.50	88.17	1,477.05	5.56	174.37	174.46	2.50	2.50	0.00
8 5/8" Csg.									
1,548.88	23.72	88.17	1,522.00	6.17	193.54	193.64	2.50	2.50	0.00
Start 3774.71 hold at 1549.07 MD									
1,549.07	23.73	88.17	1,522.17	6.18	193.62	193.72	2.50	2.50	0.00
1,600.00	23.73	88.17	1,568.80	6.83	214.10	214.21	0.00	0.00	0.00
1,700.00	23.73	88.17	1,660.35	8.11	254.32	254.45	0.00	0.00	0.00
1,800.00	23.73	88.17	1,751.90	9.40	294.54	294.69	0.00	0.00	0.00
1,900.00	23.73	88.17	1,843.44	10.68	334.75	334.92	0.00	0.00	0.00
2,000.00	23.73	88.17	1,934.99	11.96	374.97	375.16	0.00	0.00	0.00
2,100.00	23.73	88.17	2,026.54	13.25	415.19	415.40	0.00	0.00	0.00
2,200.00	23.73	88.17	2,118.09	14.53	455.40	455.63	0.00	0.00	0.00
2,300.00	23.73	88.17	2,209.63	15.81	495.62	495.87	0.00	0.00	0.00
2,400.00	23.73	88.17	2,301.18	17.09	535.84	536.11	0.00	0.00	0.00
2,500.00	23.73	88.17	2,392.73	18.38	576.05	576.35	0.00	0.00	0.00
2,600.00	23.73	88.17	2,484.28	19.66	616.27	616.58	0.00	0.00	0.00
2,700.00	23.73	88.17	2,575.82	20.94	656.49	656.82	0.00	0.00	0.00
2,800.00	23.73	88.17	2,667.37	22.23	696.70	697.06	0.00	0.00	0.00
2,900.00	23.73	88.17	2,758.92	23.51	736.92	737.30	0.00	0.00	0.00
3,000.00	23.73	88.17	2,850.47	24.79	777.14	777.53	0.00	0.00	0.00
3,100.00	23.73	88.17	2,942.01	26.07	817.36	817.77	0.00	0.00	0.00
G Sand									
3,134.94	23.73	88.17	2,974.00	26.52	831.41	831.83	0.00	0.00	0.00
3,200.00	23.73	88.17	3,033.56	27.36	857.57	858.01	0.00	0.00	0.00
3,300.00	23.73	88.17	3,125.11	28.64	897.79	898.25	0.00	0.00	0.00
3,400.00	23.73	88.17	3,216.66	29.92	938.01	938.48	0.00	0.00	0.00
3,500.00	23.73	88.17	3,308.20	31.21	978.22	978.72	0.00	0.00	0.00
3,600.00	23.73	88.17	3,399.75	32.49	1,018.44	1,018.96	0.00	0.00	0.00
3,700.00	23.73	88.17	3,491.30	33.77	1,058.66	1,059.20	0.00	0.00	0.00
3,800.00	23.73	88.17	3,582.85	35.06	1,098.87	1,099.43	0.00	0.00	0.00
3,900.00	23.73	88.17	3,674.39	36.34	1,139.09	1,139.67	0.00	0.00	0.00
4,000.00	23.73	88.17	3,765.94	37.62	1,179.31	1,179.91	0.00	0.00	0.00
4,100.00	23.73	88.17	3,857.49	38.90	1,219.52	1,220.15	0.00	0.00	0.00
4,200.00	23.73	88.17	3,949.04	40.19	1,259.74	1,260.38	0.00	0.00	0.00
4,300.00	23.73	88.17	4,040.58	41.47	1,299.96	1,300.62	0.00	0.00	0.00
4,400.00	23.73	88.17	4,132.13	42.75	1,340.18	1,340.86	0.00	0.00	0.00
4,500.00	23.73	88.17	4,223.68	44.04	1,380.39	1,381.09	0.00	0.00	0.00
4,600.00	23.73	88.17	4,315.23	45.32	1,420.61	1,421.33	0.00	0.00	0.00



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-7		
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	23.73	88.17	4,406.78	46.60	1,460.83	1,461.57	0.00	0.00	0.00
4,800.00	23.73	88.17	4,498.32	47.89	1,501.04	1,501.81	0.00	0.00	0.00
4,900.00	23.73	88.17	4,589.87	49.17	1,541.26	1,542.04	0.00	0.00	0.00
5,000.00	23.73	88.17	4,681.42	50.45	1,581.48	1,582.28	0.00	0.00	0.00
5,100.00	23.73	88.17	4,772.97	51.73	1,621.69	1,622.52	0.00	0.00	0.00
Williams Fork									
5,155.75	23.73	88.17	4,824.00	52.45	1,644.11	1,644.95	0.00	0.00	0.00
5,200.00	23.73	88.17	4,864.51	53.02	1,661.91	1,662.76	0.00	0.00	0.00
5,300.00	23.73	88.17	4,956.06	54.30	1,702.13	1,702.99	0.00	0.00	0.00
Start Drop -2.50									
5,323.78	23.73	88.17	4,977.83	54.61	1,711.69	1,712.56	0.00	0.00	0.00
5,400.00	21.82	88.17	5,048.10	55.55	1,741.18	1,742.07	2.50	-2.50	0.00
5,500.00	19.32	88.17	5,141.72	56.67	1,776.30	1,777.20	2.50	-2.50	0.00
5,600.00	16.82	88.17	5,236.78	57.66	1,807.30	1,808.22	2.50	-2.50	0.00
5,700.00	14.32	88.17	5,333.10	58.51	1,834.12	1,835.06	2.50	-2.50	0.00
5,800.00	11.82	88.17	5,430.50	59.23	1,856.73	1,857.67	2.50	-2.50	0.00
5,900.00	9.32	88.17	5,528.80	59.82	1,875.06	1,876.02	2.50	-2.50	0.00
6,000.00	6.82	88.17	5,627.80	60.26	1,889.09	1,890.05	2.50	-2.50	0.00
6,100.00	4.32	88.17	5,727.32	60.57	1,898.80	1,899.76	2.50	-2.50	0.00
6,200.00	1.82	88.17	5,827.17	60.75	1,904.15	1,905.12	2.50	-2.50	0.00
Start 2124.00 hold at 6272.84 MD									
6,272.84	0.00	0.00	5,900.00	60.78	1,905.31	1,906.28	2.50	-2.50	0.00
6,300.00	0.00	0.00	5,927.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
TOG									
6,396.84	0.00	0.00	6,024.00	60.78	1,905.31	1,906.28	0.00	0.00	0.00
6,400.00	0.00	0.00	6,027.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
6,500.00	0.00	0.00	6,127.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
6,600.00	0.00	0.00	6,227.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
6,700.00	0.00	0.00	6,327.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
6,800.00	0.00	0.00	6,427.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
6,900.00	0.00	0.00	6,527.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,000.00	0.00	0.00	6,627.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,100.00	0.00	0.00	6,727.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,200.00	0.00	0.00	6,827.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,300.00	0.00	0.00	6,927.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,400.00	0.00	0.00	7,027.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
Cameo									
7,496.84	0.00	0.00	7,124.00	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,500.00	0.00	0.00	7,127.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,600.00	0.00	0.00	7,227.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,700.00	0.00	0.00	7,327.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,800.00	0.00	0.00	7,427.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
7,900.00	0.00	0.00	7,527.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
8,000.00	0.00	0.00	7,627.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
8,100.00	0.00	0.00	7,727.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
Base Cameo Coal									
8,154.84	0.00	0.00	7,782.00	60.78	1,905.31	1,906.28	0.00	0.00	0.00
Rollins									
8,196.84	0.00	0.00	7,824.00	60.78	1,905.31	1,906.28	0.00	0.00	0.00
8,200.00	0.00	0.00	7,827.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
8,300.00	0.00	0.00	7,927.16	60.78	1,905.31	1,906.28	0.00	0.00	0.00
TD at 8396.84									
8,396.84	0.00	0.00	8,024.00	60.78	1,905.31	1,906.28	0.00	0.00	0.00



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-7		
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)

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 28-13E tgt	0.00	0.00	8,024.00	60.81	1,905.31	1,522,752.675	2,357,698.887	39° 14' 48.010 N	107° 46' 5.690 W
- plan misses target center by 0.03usft at 8396.84usft MD (8024.00 TVD, 60.78 N, 1905.31 E)									
- Circle (radius 50.00)									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
1,548.88	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 (°)	
3,134.94	2,974.00	G Sand		0.00		
5,155.75	4,824.00	Williams Fork		0.00		
6,396.84	6,024.00	TOG		0.00		
7,496.84	7,124.00	Cameo		0.00		
8,154.84	7,782.00	Base Cameo Coal		0.00		
8,196.84	7,824.00	Rollins		0.00		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
600.00	600.00	0.00	0.00	Start Build 2.50	
1,549.07	1,522.17	6.18	193.62	Start 3774.71 hold at 1549.07 MD	
5,323.78	4,977.83	54.61	1,711.69	Start Drop -2.50	
6,272.84	5,900.00	60.78	1,905.31	Start 2124.00 hold at 6272.84 MD	
8,396.84	8,024.00	60.78	1,905.31	TD at 8396.84	



Piceance Energy, LLC

Mesa County, CO

Piceance 28-10 Pad

Piceance Federal 28-13E

Slot B-7

Design #2

Anticollision Report

15 April, 2015

Archer



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	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	8,396.84	Design #2 (Slot B-7)	MWD	MWD - Standard	

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Piceance 28-10 Pad						
Piceance Federal 28-12E - Slot B-6 - Design #2	756.35	756.22	19.07	15.96	6.135	CC, ES
Piceance Federal 28-12E - Slot B-6 - Design #2	8,396.84	8,421.01	249.90	165.65	2.966	SF
Piceance Federal 28-14E - Slot B-8 - Design #2	580.26	580.27	10.29	7.96	4.427	CC
Piceance Federal 28-14E - Slot B-8 - Design #2	600.00	600.00	10.32	7.91	4.281	ES
Piceance Federal 28-14E - Slot B-8 - Design #2	8,396.84	8,389.20	250.02	165.62	2.962	SF
Piceance Federal 28-16E - Slot A-6 - Design #2	100.00	100.00	21.52	21.34	122.749	CC, ES
Piceance Federal 28-16E - Slot A-6 - Design #2	8,351.43	8,360.92	749.68	665.50	8.907	SF
Piceance Federal 28-17E - Slot A-7 - Design #2	200.00	200.00	9.91	9.28	15.858	CC, ES
Piceance Federal 28-17E - Slot A-7 - Design #2	300.00	299.51	12.06	11.00	11.392	SF
Piceance Federal 28-18E - Slot A-8 - Design #2	100.00	100.00	14.04	13.86	80.055	CC, ES
Piceance Federal 28-18E - Slot A-8 - Design #2	4,700.00	4,537.97	984.26	922.36	15.902	SF

Offset Design		Piceance 28-10 Pad - Piceance Federal 28-12E - Slot B-6 - 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	13.79	19.23	4.72	19.80					
100.00	100.00	100.00	100.00	0.09	0.09	13.79	19.23	4.72	19.80	19.62	0.18	112.926		
200.00	200.00	200.00	200.00	0.31	0.31	13.79	19.23	4.72	19.80	19.17	0.62	31.684		
300.00	300.00	300.00	300.00	0.54	0.54	13.79	19.23	4.72	19.80	18.72	1.07	18.427		
400.00	400.00	400.00	400.00	0.76	0.76	13.79	19.23	4.72	19.80	18.27	1.52	12.992		
500.00	500.00	500.00	500.00	0.99	0.99	13.79	19.23	4.72	19.80	17.82	1.97	10.032		
600.00	600.00	600.00	600.00	1.21	1.21	13.79	19.23	4.72	19.80	17.38	2.42	8.171		
700.00	699.97	699.97	699.97	1.42	1.44	-80.63	19.23	4.72	19.33	16.46	2.86	6.754		
756.35	756.22	756.22	756.22	1.55	1.56	-90.00	19.23	4.72	19.07	15.96	3.11	6.135	CC, ES	
800.00	799.75	799.75	799.75	1.64	1.66	-100.05	19.23	4.72	19.37	16.07	3.30	5.869		
900.00	899.14	899.60	899.57	1.88	1.87	-122.01	19.56	6.86	22.82	19.05	3.77	6.059		
1,000.00	997.97	999.82	999.57	2.16	2.09	-135.97	20.55	13.33	29.01	24.75	4.26	6.817		
1,100.00	1,096.04	1,100.42	1,099.56	2.49	2.32	-144.04	22.21	24.15	36.61	31.85	4.77	7.683		
1,200.00	1,193.17	1,201.39	1,199.34	2.90	2.60	-148.68	24.55	39.37	44.95	39.65	5.30	8.483		
1,300.00	1,289.17	1,302.73	1,298.71	3.38	2.92	-151.34	27.56	59.00	53.72	47.86	5.86	9.160		
1,400.00	1,383.85	1,404.44	1,397.46	3.96	3.31	-152.79	31.25	83.05	62.78	56.30	6.48	9.694		

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 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	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		
1,500.00	1,477.05	1,506.51	1,495.38	4.62	3.78	-153.47	35.62	111.51	72.04	64.90	7.15	10.080		
1,600.00	1,568.80	1,608.99	1,592.30	5.38	4.35	-153.49	40.66	144.39	80.97	73.08	7.89	10.259		
1,700.00	1,660.35	1,711.95	1,688.08	6.17	5.01	-152.05	46.39	181.71	86.64	77.87	8.77	9.879		
1,800.00	1,751.90	1,814.89	1,782.04	6.97	5.78	-149.07	52.76	223.22	88.74	78.86	9.88	8.979		
1,900.00	1,843.44	1,914.73	1,872.34	7.79	6.59	-145.47	59.22	265.32	89.51	78.31	11.20	7.991		
2,000.00	1,934.99	2,014.57	1,962.64	8.61	7.42	-141.96	65.68	307.42	90.63	77.96	12.67	7.151		
2,100.00	2,026.54	2,114.41	2,052.94	9.44	8.27	-138.54	72.15	349.51	92.08	77.81	14.28	6.450		
2,200.00	2,118.09	2,214.25	2,143.24	10.28	9.13	-135.23	78.61	391.61	93.85	77.86	15.99	5.869		
2,300.00	2,209.63	2,314.09	2,233.54	11.12	10.00	-132.06	85.07	433.71	95.92	78.13	17.79	5.392		
2,400.00	2,301.18	2,413.93	2,323.84	11.96	10.87	-129.03	91.53	475.81	98.27	78.61	19.66	4.999		
2,500.00	2,392.73	2,513.77	2,414.14	12.80	11.75	-126.15	97.99	517.91	100.88	79.31	21.57	4.677		
2,600.00	2,484.28	2,613.61	2,504.44	13.65	12.64	-123.43	104.45	560.01	103.74	80.22	23.52	4.411		
2,700.00	2,575.82	2,713.45	2,594.74	14.50	13.53	-120.85	110.91	602.11	106.82	81.33	25.49	4.191		
2,800.00	2,667.37	2,813.29	2,685.04	15.35	14.42	-118.42	117.37	644.21	110.10	82.63	27.46	4.009		
2,900.00	2,758.92	2,913.13	2,775.34	16.20	15.31	-116.14	123.83	686.30	113.56	84.12	29.44	3.857		
3,000.00	2,850.47	3,012.97	2,865.64	17.05	16.20	-113.99	130.30	728.40	117.20	85.78	31.42	3.730		
3,100.00	2,942.01	3,112.81	2,955.94	17.90	17.10	-111.98	136.76	770.50	120.99	87.61	33.38	3.624		
3,200.00	3,033.56	3,212.65	3,046.24	18.75	18.00	-110.09	143.22	812.60	124.93	89.59	35.34	3.535		
3,300.00	3,125.11	3,312.49	3,136.54	19.60	18.89	-108.31	149.68	854.70	128.99	91.70	37.28	3.460		
3,400.00	3,216.66	3,412.33	3,226.84	20.46	19.79	-106.65	156.14	896.80	133.16	93.95	39.21	3.396		
3,500.00	3,308.20	3,512.17	3,317.14	21.31	20.69	-105.09	162.60	938.90	137.44	96.32	41.12	3.342		
3,600.00	3,399.75	3,612.01	3,407.44	22.17	21.60	-103.62	169.06	981.00	141.82	98.80	43.02	3.297		
3,700.00	3,491.30	3,711.85	3,497.74	23.02	22.50	-102.24	175.52	1,023.09	146.29	101.38	44.90	3.258		
3,800.00	3,582.85	3,811.69	3,588.04	23.88	23.40	-100.95	181.99	1,065.19	150.83	104.06	46.77	3.225		
3,900.00	3,674.39	3,911.53	3,678.34	24.73	24.30	-99.73	188.45	1,107.29	155.45	106.82	48.62	3.197		
4,000.00	3,765.94	4,011.37	3,768.64	25.59	25.21	-98.58	194.91	1,149.39	160.13	109.67	50.46	3.173		
4,100.00	3,857.49	4,111.21	3,858.94	26.44	26.11	-97.50	201.37	1,191.49	164.87	112.58	52.29	3.153		
4,200.00	3,949.04	4,211.05	3,949.24	27.30	27.01	-96.48	207.83	1,233.59	169.67	115.57	54.10	3.136		
4,300.00	4,040.59	4,310.89	4,039.53	28.15	27.92	-95.51	214.29	1,275.69	174.52	118.62	55.90	3.122		
4,400.00	4,132.13	4,410.73	4,129.83	29.01	28.82	-94.60	220.75	1,317.79	179.42	121.72	57.69	3.110		
4,500.00	4,223.68	4,510.57	4,220.13	29.87	29.73	-93.73	227.21	1,359.88	184.36	124.88	59.47	3.100		
4,600.00	4,315.23	4,610.41	4,310.43	30.72	30.63	-92.92	233.68	1,401.98	189.34	128.09	61.25	3.091		
4,700.00	4,406.78	4,710.25	4,400.73	31.58	31.54	-92.14	240.14	1,444.08	194.35	131.34	63.01	3.085		
4,800.00	4,498.32	4,810.09	4,491.03	32.44	32.44	-91.40	246.60	1,486.18	199.40	134.64	64.76	3.079		
4,900.00	4,589.87	4,909.94	4,581.33	33.29	33.35	-90.70	253.06	1,528.28	204.48	137.98	66.50	3.075		
5,000.00	4,681.42	5,009.78	4,671.63	34.15	34.26	-90.03	259.52	1,570.38	209.59	141.35	68.24	3.071		
5,100.00	4,772.97	5,109.62	4,761.93	35.01	35.16	-89.40	265.98	1,612.48	214.73	144.76	69.97	3.069		
5,200.00	4,864.51	5,209.46	4,852.23	35.87	36.07	-88.79	272.44	1,654.58	219.89	148.20	71.70	3.067		
5,300.00	4,956.06	5,309.61	4,942.86	36.72	36.95	-88.24	278.91	1,696.71	225.06	151.67	73.39	3.067		
5,400.00	5,048.11	5,410.92	5,035.82	37.50	37.65	-88.25	285.02	1,736.50	229.85	154.99	74.86	3.071		
5,500.00	5,141.72	5,512.28	5,130.51	38.10	38.28	-88.31	290.50	1,772.22	234.14	158.05	76.08	3.077		
5,600.00	5,236.78	5,613.70	5,226.77	38.64	38.83	-88.37	295.34	1,803.77	237.92	160.76	77.16	3.083		
5,700.00	5,333.10	5,715.17	5,324.39	39.10	39.30	-88.41	299.54	1,831.10	241.20	163.11	78.09	3.089		
5,800.00	5,430.50	5,816.68	5,423.18	39.48	39.70	-88.45	303.07	1,854.15	243.96	165.08	78.88	3.093		
5,900.00	5,528.80	5,918.23	5,522.94	39.80	40.03	-88.48	305.94	1,872.85	246.20	166.67	79.53	3.096		
6,000.00	5,627.80	6,019.80	5,623.46	40.06	40.30	-88.51	308.14	1,887.16	247.92	167.88	80.04	3.097		
6,100.00	5,727.32	6,121.39	5,724.55	40.24	40.49	-88.53	309.66	1,897.07	249.11	168.68	80.43	3.097		
6,200.00	5,827.17	6,223.00	5,826.00	40.37	40.63	-88.54	310.50	1,902.53	249.76	169.07	80.69	3.095		
6,300.00	5,927.16	6,324.17	5,927.16	40.45	40.71	-0.36	310.68	1,903.72	249.90	169.06	80.84	3.091		
6,400.00	6,027.16	6,424.17	6,027.16	40.52	40.78	-0.36	310.68	1,903.72	249.90	168.92	80.98	3.086		
6,500.00	6,127.16	6,524.17	6,127.16	40.59	40.85	-0.36	310.68	1,903.72	249.90	168.78	81.13	3.080		
6,600.00	6,227.16	6,624.17	6,227.16	40.66	40.92	-0.36	310.68	1,903.72	249.90	168.63	81.27	3.075		

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 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	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		
6,700.00	6,327.16	6,724.17	6,327.16	40.74	41.00	-0.36	310.68	1,903.72	249.90	168.48	81.42	3.069		
6,800.00	6,427.16	6,824.17	6,427.16	40.81	41.07	-0.36	310.68	1,903.72	249.90	168.33	81.57	3.064		
6,900.00	6,527.16	6,924.17	6,527.16	40.89	41.15	-0.36	310.68	1,903.72	249.90	168.18	81.72	3.058		
7,000.00	6,627.16	7,024.17	6,627.16	40.96	41.22	-0.36	310.68	1,903.72	249.90	168.03	81.88	3.052		
7,100.00	6,727.16	7,124.17	6,727.16	41.04	41.30	-0.36	310.68	1,903.72	249.90	167.87	82.03	3.046		
7,200.00	6,827.16	7,224.17	6,827.16	41.12	41.38	-0.36	310.68	1,903.72	249.90	167.71	82.19	3.040		
7,300.00	6,927.16	7,324.17	6,927.16	41.20	41.46	-0.36	310.68	1,903.72	249.90	167.55	82.35	3.035		
7,400.00	7,027.16	7,424.17	7,027.16	41.28	41.54	-0.36	310.68	1,903.72	249.90	167.39	82.52	3.029		
7,500.00	7,127.16	7,524.17	7,127.16	41.36	41.62	-0.36	310.68	1,903.72	249.90	167.22	82.68	3.023		
7,600.00	7,227.16	7,624.17	7,227.16	41.45	41.70	-0.36	310.68	1,903.72	249.90	167.06	82.85	3.016		
7,700.00	7,327.16	7,724.17	7,327.16	41.53	41.79	-0.36	310.68	1,903.72	249.90	166.89	83.02	3.010		
7,800.00	7,427.16	7,824.17	7,427.16	41.62	41.87	-0.36	310.68	1,903.72	249.90	166.71	83.19	3.004		
7,900.00	7,527.16	7,924.17	7,527.16	41.70	41.96	-0.36	310.68	1,903.72	249.90	166.54	83.36	2.998		
8,000.00	7,627.16	8,024.17	7,627.16	41.79	42.05	-0.36	310.68	1,903.72	249.90	166.37	83.54	2.992		
8,100.00	7,727.16	8,124.17	7,727.16	41.88	42.14	-0.36	310.68	1,903.72	249.90	166.19	83.71	2.985		
8,200.00	7,827.16	8,224.17	7,827.16	41.97	42.22	-0.36	310.68	1,903.72	249.90	166.01	83.89	2.979		
8,300.00	7,927.16	8,324.17	7,927.16	42.06	42.32	-0.36	310.68	1,903.72	249.90	165.83	84.08	2.972		
8,396.84	8,024.00	8,421.01	8,024.00	42.15	42.40	-0.36	310.68	1,903.72	249.90	165.65	84.25	2.966 SF		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	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		
0.00	0.00	0.00	0.00	0.00	0.00	-166.86	-10.11	-2.36	10.38					
100.00	100.00	100.00	100.00	0.09	0.09	-166.86	-10.11	-2.36	10.38	10.21	0.18	59.232		
200.00	200.00	200.00	200.00	0.31	0.31	-166.86	-10.11	-2.36	10.38	9.76	0.62	16.619		
300.00	300.00	300.00	300.00	0.54	0.54	-166.86	-10.11	-2.36	10.38	9.31	1.07	9.665		
400.00	400.00	400.00	400.00	0.76	0.76	-166.86	-10.11	-2.36	10.38	8.86	1.52	6.814		
500.00	500.00	500.00	500.00	0.99	0.99	-166.86	-10.11	-2.36	10.38	8.41	1.97	5.262		
580.26	580.26	580.27	580.26	1.17	1.16	-174.64	-10.24	-0.96	10.29	7.96	2.32	4.427 CC		
600.00	600.00	600.00	599.97	1.21	1.20	-178.96	-10.32	-0.19	10.32	7.91	2.41	4.281 ES		
700.00	699.97	699.77	699.52	1.42	1.41	71.20	-10.92	6.30	11.75	8.91	2.84	4.144		
800.00	799.75	799.35	798.50	1.64	1.65	57.18	-11.93	17.08	14.85	11.57	3.29	4.521		
900.00	899.14	898.74	896.73	1.88	1.94	49.53	-13.34	32.09	18.89	15.12	3.78	5.001		
1,000.00	997.97	997.92	994.02	2.16	2.28	45.64	-15.14	51.28	23.48	19.17	4.32	5.441		
1,100.00	1,096.04	1,096.91	1,090.18	2.49	2.69	43.88	-17.33	74.60	28.45	23.54	4.91	5.794		
1,200.00	1,193.17	1,195.69	1,185.06	2.90	3.19	43.36	-19.89	101.96	33.74	28.16	5.58	6.044		
1,300.00	1,289.17	1,294.28	1,278.47	3.38	3.76	43.59	-22.83	133.31	39.32	32.97	6.35	6.191		
1,400.00	1,383.85	1,392.66	1,370.26	3.96	4.43	44.29	-26.14	168.55	45.19	37.95	7.24	6.240		
1,500.00	1,477.05	1,491.67	1,461.22	4.62	5.19	45.64	-29.78	207.47	50.95	42.66	8.29	6.146		
1,600.00	1,568.80	1,591.54	1,552.75	5.38	5.98	49.28	-33.51	247.25	54.63	45.01	9.61	5.682		
1,700.00	1,660.35	1,691.41	1,644.28	6.17	6.79	52.90	-37.24	287.03	58.18	47.10	11.08	5.249		
1,800.00	1,751.90	1,791.29	1,735.82	6.97	7.61	56.09	-40.97	326.81	61.95	49.30	12.65	4.898		
1,900.00	1,843.44	1,891.16	1,827.35	7.79	8.44	58.91	-44.70	366.59	65.88	51.60	14.28	4.614		
2,000.00	1,934.99	1,991.03	1,918.88	8.61	9.27	61.40	-48.43	406.37	69.95	54.00	15.95	4.386		
2,100.00	2,026.54	2,090.91	2,010.42	9.44	10.11	63.62	-52.16	446.15	74.14	56.49	17.65	4.200		
2,200.00	2,118.09	2,190.78	2,101.95	10.28	10.95	65.60	-55.89	485.93	78.43	59.06	19.37	4.048		
2,300.00	2,209.63	2,290.65	2,193.48	11.12	11.79	67.37	-59.62	525.71	82.80	61.69	21.11	3.923		
2,400.00	2,301.18	2,390.53	2,285.02	11.96	12.64	68.96	-63.35	565.49	87.24	64.39	22.85	3.818		
2,500.00	2,392.73	2,490.40	2,376.55	12.80	13.48	70.40	-67.08	605.27	91.75	67.15	24.60	3.729		
2,600.00	2,484.28	2,590.27	2,468.08	13.65	14.33	71.70	-70.81	645.05	96.31	69.95	26.35	3.654		
2,700.00	2,575.82	2,690.15	2,559.62	14.50	15.18	72.88	-74.54	684.83	100.91	72.80	28.11	3.590		
2,800.00	2,667.37	2,790.02	2,651.15	15.35	16.03	73.96	-78.27	724.61	105.55	75.69	29.86	3.534		
2,900.00	2,758.92	2,889.89	2,742.68	16.20	16.88	74.95	-82.00	764.39	110.22	78.61	31.62	3.486		
3,000.00	2,850.47	2,989.77	2,834.22	17.05	17.73	75.86	-85.72	804.17	114.93	81.56	33.37	3.444		
3,100.00	2,942.01	3,089.64	2,925.75	17.90	18.58	76.70	-89.45	843.95	119.66	84.54	35.12	3.407		
3,200.00	3,033.56	3,189.51	3,017.28	18.75	19.43	77.47	-93.18	883.73	124.42	87.54	36.87	3.374		
3,300.00	3,125.11	3,289.39	3,108.82	19.60	20.28	78.18	-96.91	923.51	129.19	90.57	38.62	3.345		
3,400.00	3,216.66	3,389.26	3,200.35	20.46	21.13	78.85	-100.64	963.29	133.99	93.62	40.37	3.319		
3,500.00	3,308.20	3,489.13	3,291.88	21.31	21.99	79.47	-104.37	1,003.07	138.80	96.68	42.12	3.295		
3,600.00	3,399.75	3,589.01	3,383.42	22.17	22.84	80.04	-108.10	1,042.85	143.63	99.76	43.86	3.274		
3,700.00	3,491.30	3,688.88	3,474.95	23.02	23.69	80.58	-111.83	1,082.63	148.47	102.86	45.61	3.255		
3,800.00	3,582.85	3,788.75	3,566.48	23.88	24.55	81.09	-115.56	1,122.41	153.32	105.97	47.35	3.238		
3,900.00	3,674.39	3,888.63	3,658.02	24.73	25.40	81.56	-119.29	1,162.19	158.18	109.09	49.09	3.222		
4,000.00	3,765.94	3,988.50	3,749.55	25.59	26.25	82.01	-123.02	1,201.97	163.06	112.22	50.83	3.208		
4,100.00	3,857.49	4,088.37	3,841.08	26.44	27.11	82.43	-126.75	1,241.75	167.94	115.37	52.57	3.195		
4,200.00	3,949.04	4,188.25	3,932.62	27.30	27.96	82.83	-130.48	1,281.53	172.83	118.52	54.31	3.182		
4,300.00	4,040.59	4,288.12	4,024.15	28.15	28.82	83.20	-134.21	1,321.30	177.73	121.69	56.05	3.171		
4,400.00	4,132.13	4,387.99	4,115.68	29.01	29.67	83.55	-137.94	1,361.08	182.64	124.86	57.78	3.161		
4,500.00	4,223.68	4,487.87	4,207.22	29.87	30.53	83.89	-141.67	1,400.86	187.55	128.04	59.52	3.151		
4,600.00	4,315.23	4,587.74	4,298.75	30.72	31.38	84.21	-145.39	1,440.64	192.47	131.22	61.25	3.142		
4,700.00	4,406.78	4,687.61	4,390.28	31.58	32.23	84.51	-149.12	1,480.42	197.40	134.41	62.98	3.134		
4,800.00	4,498.32	4,787.49	4,481.82	32.44	33.09	84.80	-152.85	1,520.20	202.33	137.61	64.71	3.127		
4,900.00	4,589.87	4,887.36	4,573.35	33.29	33.94	85.07	-156.58	1,559.98	207.26	140.82	66.44	3.119		
5,000.00	4,681.42	4,987.23	4,664.88	34.15	34.80	85.34	-160.31	1,599.76	212.20	144.03	68.17	3.113		

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 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	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	
5,100.00	4,772.97	5,087.11	4,756.42	35.01	35.65	85.59	-164.04	1,639.54	217.14	147.24	69.90	3.106	
5,200.00	4,864.51	5,186.98	4,847.95	35.87	36.51	85.82	-167.77	1,679.32	222.09	150.46	71.63	3.100	
5,300.00	4,956.06	5,286.98	4,939.60	36.72	37.36	86.06	-171.50	1,719.14	227.04	153.69	73.36	3.095	
5,400.00	5,048.11	5,388.67	5,033.79	37.50	38.03	86.67	-175.08	1,757.29	231.63	156.75	74.88	3.093	
5,500.00	5,141.72	5,490.31	5,129.54	38.10	38.62	87.31	-178.26	1,791.22	235.72	159.57	76.15	3.095	
5,600.00	5,236.78	5,591.91	5,226.66	38.64	39.14	87.93	-181.04	1,820.88	239.30	162.03	77.26	3.097	
5,700.00	5,333.10	5,693.45	5,324.96	39.10	39.57	88.52	-183.42	1,846.21	242.37	164.14	78.22	3.098	
5,800.00	5,430.50	5,794.93	5,424.22	39.48	39.94	89.09	-185.38	1,867.18	244.92	165.88	79.03	3.099	
5,900.00	5,528.80	5,896.34	5,524.25	39.80	40.23	89.65	-186.93	1,883.73	246.95	167.25	79.70	3.099	
6,000.00	5,627.80	5,997.68	5,624.85	40.06	40.45	90.18	-188.07	1,895.86	248.45	168.22	80.22	3.097	
6,100.00	5,727.32	6,098.94	5,725.80	40.24	40.62	90.71	-188.79	1,903.55	249.42	168.81	80.61	3.094	
6,200.00	5,827.17	6,200.11	5,826.91	40.37	40.72	91.22	-189.10	1,906.78	249.85	168.98	80.87	3.089	
6,300.00	5,927.16	6,300.35	5,927.16	40.45	40.78	179.64	-189.11	1,906.90	249.89	168.87	81.02	3.084	
6,400.00	6,027.16	6,400.35	6,027.16	40.52	40.85	179.64	-189.11	1,906.90	249.89	168.73	81.16	3.079	
6,500.00	6,127.16	6,500.35	6,127.16	40.59	40.92	179.64	-189.11	1,906.90	249.89	168.59	81.31	3.074	
6,600.00	6,227.16	6,600.35	6,227.16	40.66	40.99	179.64	-189.11	1,906.90	249.89	168.44	81.45	3.068	
6,700.00	6,327.16	6,700.35	6,327.16	40.74	41.06	179.64	-189.11	1,906.90	249.89	168.30	81.60	3.063	
6,800.00	6,427.16	6,800.35	6,427.16	40.81	41.13	179.64	-189.11	1,906.90	249.89	168.15	81.74	3.057	
6,900.00	6,527.16	6,900.35	6,527.16	40.89	41.21	179.64	-189.11	1,906.90	249.89	168.00	81.90	3.051	
7,000.00	6,627.16	7,000.35	6,627.16	40.96	41.28	179.64	-189.11	1,906.90	249.89	167.85	82.05	3.046	
7,100.00	6,727.16	7,100.35	6,727.16	41.04	41.36	179.64	-189.11	1,906.90	249.89	167.69	82.20	3.040	
7,200.00	6,827.16	7,200.35	6,827.16	41.12	41.44	179.64	-189.11	1,906.90	249.89	167.53	82.36	3.034	
7,300.00	6,927.16	7,300.35	6,927.16	41.20	41.52	179.64	-189.11	1,906.90	249.89	167.37	82.52	3.028	
7,400.00	7,027.16	7,400.35	7,027.16	41.28	41.60	179.64	-189.11	1,906.90	249.89	167.21	82.68	3.022	
7,500.00	7,127.16	7,500.35	7,127.16	41.36	41.68	179.64	-189.11	1,906.90	249.89	167.05	82.84	3.016	
7,600.00	7,227.16	7,600.35	7,227.16	41.45	41.76	179.64	-189.11	1,906.90	249.89	166.88	83.01	3.010	
7,700.00	7,327.16	7,700.35	7,327.16	41.53	41.84	179.64	-189.11	1,906.90	249.89	166.72	83.18	3.004	
7,800.00	7,427.16	7,800.35	7,427.16	41.62	41.93	179.64	-189.11	1,906.90	249.89	166.55	83.35	2.998	
7,900.00	7,527.16	7,900.35	7,527.16	41.70	42.01	179.64	-189.11	1,906.90	249.89	166.37	83.52	2.992	
8,000.00	7,627.16	8,000.35	7,627.16	41.79	42.10	179.64	-189.11	1,906.90	249.89	166.20	83.69	2.986	
8,100.00	7,727.16	8,100.35	7,727.16	41.88	42.19	179.64	-189.11	1,906.90	249.89	166.02	83.87	2.980	
8,200.00	7,827.16	8,200.35	7,827.16	41.97	42.27	179.64	-189.11	1,906.90	249.89	165.85	84.05	2.973	
8,300.00	7,927.16	8,300.35	7,927.16	42.06	42.36	179.64	-189.11	1,906.90	249.89	165.67	84.23	2.967	
8,361.66	7,988.81	8,362.01	7,988.81	42.12	42.42	179.64	-189.11	1,906.90	249.89	165.55	84.34	2.963	
8,396.84	8,024.00	8,389.20	8,016.00	42.15	42.44	179.64	-189.11	1,906.90	250.02	165.62	84.40	2.962 SF	



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-10 Pad - Piceance Federal 28-16E - Slot A-6 - 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	41.15	16.21	14.16	21.52					
100.00	100.00	100.00	100.00	0.09	0.09	41.15	16.21	14.16	21.52	21.34	0.18	122.749	CC, ES	
200.00	200.00	199.61	199.57	0.31	0.31	46.34	15.45	16.19	22.38	21.76	0.62	36.196		
300.00	300.00	298.84	298.59	0.54	0.55	59.31	13.20	22.24	25.90	24.82	1.08	23.985		
400.00	400.00	397.33	396.49	0.76	0.82	73.58	9.49	32.21	33.76	32.19	1.57	21.519		
500.00	500.00	494.72	492.78	0.99	1.15	84.55	4.39	45.94	46.71	44.60	2.11	22.106		
600.00	600.00	590.70	586.96	1.21	1.53	91.85	-2.04	63.21	64.57	61.85	2.72	23.721		
700.00	699.97	685.43	679.08	1.42	1.98	8.57	-9.72	83.86	84.88	81.86	3.02	28.143		
800.00	799.75	779.27	769.37	1.64	2.50	12.35	-18.63	107.82	105.37	101.86	3.51	30.059		
900.00	899.14	872.22	857.69	1.88	3.08	15.53	-28.72	134.95	126.04	122.02	4.02	31.365		
1,000.00	997.97	964.28	943.94	2.16	3.74	18.33	-39.93	165.10	146.91	142.35	4.56	32.249		
1,100.00	1,096.04	1,058.84	1,031.32	2.49	4.47	20.97	-52.52	198.97	167.52	162.38	5.13	32.646		
1,200.00	1,193.17	1,156.92	1,121.79	2.90	5.25	23.61	-65.73	234.49	184.99	179.26	5.73	32.289		
1,300.00	1,289.17	1,255.47	1,212.68	3.38	6.05	26.33	-79.01	270.17	198.96	192.55	6.41	31.060		
1,400.00	1,383.85	1,354.30	1,303.84	3.96	6.85	29.26	-92.32	305.96	209.57	202.41	7.17	29.235		
1,500.00	1,477.05	1,453.22	1,395.07	4.62	7.66	32.52	-105.64	341.79	217.06	208.99	8.06	26.915		
1,600.00	1,568.80	1,552.07	1,486.25	5.38	8.47	36.16	-118.95	377.58	222.18	213.05	9.12	24.350		
1,700.00	1,660.35	1,650.89	1,577.40	6.17	9.28	39.75	-132.26	413.38	227.78	217.45	10.33	22.054		
1,800.00	1,751.90	1,749.72	1,668.55	6.97	10.09	43.15	-145.57	449.17	234.25	222.58	11.67	20.073		
1,900.00	1,843.44	1,848.55	1,759.71	7.79	10.91	46.36	-158.88	484.96	241.50	228.38	13.13	18.399		
2,000.00	1,934.99	1,947.38	1,850.86	8.61	11.72	49.38	-172.19	520.75	249.48	234.81	14.68	16.999		
2,100.00	2,026.54	2,046.21	1,942.02	9.44	12.53	52.21	-185.50	556.54	258.12	241.82	16.30	15.835		
2,200.00	2,118.09	2,145.04	2,033.17	10.28	13.35	54.85	-198.81	592.33	267.34	249.36	17.98	14.868		
2,300.00	2,209.63	2,243.87	2,124.33	11.12	14.16	57.31	-212.12	628.12	277.10	257.40	19.71	14.062		
2,400.00	2,301.18	2,342.70	2,215.48	11.96	14.98	59.60	-225.43	663.91	287.34	265.88	21.46	13.389		
2,500.00	2,392.73	2,441.53	2,306.64	12.80	15.80	61.74	-238.74	699.70	298.01	274.77	23.24	12.825		
2,600.00	2,484.28	2,540.36	2,397.79	13.65	16.61	63.72	-252.05	735.49	309.06	284.04	25.03	12.349		
2,700.00	2,575.82	2,639.19	2,488.95	14.50	17.43	65.57	-265.36	771.28	320.46	293.63	26.83	11.945		
2,800.00	2,667.37	2,738.02	2,580.10	15.35	18.24	67.29	-278.67	807.07	332.17	303.54	28.63	11.601		
2,900.00	2,758.92	2,836.85	2,671.26	16.20	19.06	68.90	-291.98	842.86	344.16	313.72	30.44	11.306		
3,000.00	2,850.47	2,935.68	2,762.41	17.05	19.88	70.39	-305.29	878.65	356.39	324.15	32.25	11.052		
3,100.00	2,942.01	3,034.51	2,853.57	17.90	20.69	71.79	-318.60	914.44	368.85	334.80	34.05	10.833		
3,200.00	3,033.56	3,133.34	2,944.72	18.75	21.51	73.09	-331.92	950.23	381.52	345.67	35.85	10.642		
3,300.00	3,125.11	3,232.17	3,035.87	19.60	22.33	74.31	-345.23	986.02	394.37	356.72	37.64	10.476		
3,400.00	3,216.66	3,331.00	3,127.03	20.46	23.15	75.46	-358.54	1,021.81	407.38	367.94	39.44	10.330		
3,500.00	3,308.20	3,429.83	3,218.18	21.31	23.96	76.53	-371.85	1,057.60	420.54	379.32	41.22	10.202		
3,600.00	3,399.75	3,528.66	3,309.34	22.17	24.78	77.54	-385.16	1,093.39	433.84	390.84	43.00	10.089		
3,700.00	3,491.30	3,627.49	3,400.49	23.02	25.60	78.49	-398.47	1,129.18	447.27	402.50	44.77	9.990		
3,800.00	3,582.85	3,726.32	3,491.65	23.88	26.42	79.38	-411.78	1,164.98	460.81	414.27	46.54	9.901		
3,900.00	3,674.39	3,825.15	3,582.80	24.73	27.23	80.22	-425.09	1,200.77	474.45	426.15	48.31	9.822		
4,000.00	3,765.94	3,923.98	3,673.96	25.59	28.05	81.02	-438.40	1,236.56	488.19	438.13	50.06	9.752		
4,100.00	3,857.49	4,022.81	3,765.11	26.44	28.87	81.77	-451.71	1,272.35	502.02	450.20	51.82	9.689		
4,200.00	3,949.04	4,121.63	3,856.27	27.30	29.69	82.48	-465.02	1,308.14	515.93	462.36	53.56	9.632		
4,300.00	4,040.59	4,220.46	3,947.42	28.15	30.50	83.15	-478.33	1,343.93	529.91	474.60	55.31	9.581		
4,400.00	4,132.13	4,319.29	4,038.58	29.01	31.32	83.79	-491.64	1,379.72	543.96	486.91	57.05	9.536		
4,500.00	4,223.68	4,418.12	4,129.73	29.87	32.14	84.40	-504.95	1,415.51	558.07	499.29	58.78	9.494		
4,600.00	4,315.23	4,516.95	4,220.88	30.72	32.96	84.98	-518.26	1,451.30	572.24	511.73	60.51	9.457		
4,700.00	4,406.78	4,615.78	4,312.04	31.58	33.77	85.53	-531.57	1,487.09	586.47	524.23	62.24	9.423		
4,800.00	4,498.32	4,714.61	4,403.19	32.44	34.59	86.05	-544.88	1,522.88	600.75	536.79	63.96	9.393		
4,900.00	4,589.87	4,813.44	4,494.35	33.29	35.41	86.55	-558.19	1,558.67	615.07	549.39	65.68	9.365		
5,000.00	4,681.42	4,912.27	4,585.50	34.15	36.23	87.03	-571.50	1,594.46	629.44	562.04	67.39	9.340		
5,100.00	4,772.97	5,011.10	4,676.66	35.01	37.05	87.48	-584.81	1,630.25	643.85	574.74	69.11	9.317		

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 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-10 Pad - Piceance Federal 28-16E - Slot A-6 - 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		
5,200.00	4,864.51	5,109.93	4,767.81	35.87	37.86	87.92	-598.12	1,666.04	658.29	587.48	70.82	9.296		
5,300.00	4,956.06	5,208.76	4,858.97	36.72	38.68	88.33	-611.43	1,701.83	672.77	600.25	72.52	9.276		
5,400.00	5,048.11	5,307.63	4,950.16	37.50	39.50	88.91	-624.75	1,737.64	687.32	613.13	74.18	9.265		
5,500.00	5,141.72	5,417.14	5,051.89	38.10	40.28	89.33	-638.87	1,775.62	701.32	625.71	75.61	9.276		
5,600.00	5,236.78	5,529.07	5,157.72	38.64	40.90	89.71	-651.56	1,809.74	713.61	636.80	76.81	9.291		
5,700.00	5,333.10	5,641.42	5,265.61	39.10	41.42	90.06	-662.47	1,839.08	724.15	646.30	77.85	9.302		
5,800.00	5,430.50	5,754.10	5,375.22	39.48	41.87	90.38	-671.55	1,863.48	732.90	654.16	78.74	9.308		
5,900.00	5,528.80	5,867.03	5,486.24	39.80	42.22	90.67	-678.75	1,882.85	739.84	660.37	79.46	9.310		
6,000.00	5,627.80	5,980.14	5,598.31	40.06	42.49	90.93	-684.05	1,897.09	744.94	664.90	80.04	9.307		
6,100.00	5,727.32	6,093.32	5,711.07	40.24	42.68	91.17	-687.41	1,906.13	748.20	667.72	80.47	9.298		
6,200.00	5,827.17	6,206.50	5,824.16	40.37	42.80	91.38	-688.83	1,909.95	749.60	668.84	80.76	9.282		
6,300.00	5,927.16	6,309.49	5,927.16	40.45	42.86	179.64	-688.88	1,910.08	749.68	668.75	80.92	9.264		
6,400.00	6,027.16	6,409.49	6,027.16	40.52	42.92	179.64	-688.88	1,910.08	749.68	668.62	81.06	9.249		
6,500.00	6,127.16	6,509.49	6,127.16	40.59	42.99	179.64	-688.88	1,910.08	749.68	668.48	81.20	9.233		
6,600.00	6,227.16	6,609.49	6,227.16	40.66	43.05	179.64	-688.88	1,910.08	749.68	668.34	81.34	9.217		
6,700.00	6,327.16	6,709.49	6,327.16	40.74	43.12	179.64	-688.88	1,910.08	749.68	668.19	81.48	9.200		
6,800.00	6,427.16	6,809.49	6,427.16	40.81	43.18	179.64	-688.88	1,910.08	749.68	668.05	81.63	9.184		
6,900.00	6,527.16	6,909.49	6,527.16	40.89	43.25	179.64	-688.88	1,910.08	749.68	667.90	81.78	9.167		
7,000.00	6,627.16	7,009.49	6,627.16	40.96	43.32	179.64	-688.88	1,910.08	749.68	667.75	81.93	9.150		
7,100.00	6,727.16	7,109.49	6,727.16	41.04	43.39	179.64	-688.88	1,910.08	749.68	667.60	82.08	9.133		
7,200.00	6,827.16	7,209.49	6,827.16	41.12	43.46	179.64	-688.88	1,910.08	749.68	667.44	82.24	9.116		
7,300.00	6,927.16	7,309.49	6,927.16	41.20	43.54	179.64	-688.88	1,910.08	749.68	667.28	82.39	9.099		
7,400.00	7,027.16	7,409.49	7,027.16	41.28	43.61	179.64	-688.88	1,910.08	749.68	667.12	82.55	9.081		
7,500.00	7,127.16	7,509.49	7,127.16	41.36	43.69	179.64	-688.88	1,910.08	749.68	666.96	82.71	9.064		
7,600.00	7,227.16	7,609.49	7,227.16	41.45	43.76	179.64	-688.88	1,910.08	749.68	666.80	82.88	9.046		
7,700.00	7,327.16	7,709.49	7,327.16	41.53	43.84	179.64	-688.88	1,910.08	749.68	666.63	83.04	9.028		
7,800.00	7,427.16	7,809.49	7,427.16	41.62	43.92	179.64	-688.88	1,910.08	749.68	666.47	83.21	9.010		
7,900.00	7,527.16	7,909.49	7,527.16	41.70	43.99	179.64	-688.88	1,910.08	749.68	666.30	83.38	8.991		
8,000.00	7,627.16	8,009.49	7,627.16	41.79	44.07	179.64	-688.88	1,910.08	749.68	666.13	83.55	8.973		
8,100.00	7,727.16	8,109.49	7,727.16	41.88	44.16	179.64	-688.88	1,910.08	749.68	665.95	83.72	8.954		
8,200.00	7,827.16	8,209.49	7,827.16	41.97	44.24	179.64	-688.88	1,910.08	749.68	665.78	83.90	8.935		
8,300.00	7,927.16	8,309.49	7,927.16	42.06	44.32	179.64	-688.88	1,910.08	749.68	665.60	84.08	8.916		
8,351.43	7,978.59	8,360.92	7,978.59	42.11	44.36	179.64	-688.88	1,910.08	749.68	665.50	84.17	8.907 SF		
8,396.84	8,024.00	8,378.34	7,996.00	42.15	44.38	179.64	-688.88	1,910.08	750.20	665.97	84.23	8.907		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-10 Pad - Piceance Federal 28-17E - Slot A-7 - 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	107.70	-3.01	9.44	9.91					
100.00	100.00	100.00	100.00	0.09	0.09	107.70	-3.01	9.44	9.91	9.73	0.18	56.521		
200.00	200.00	200.00	200.00	0.31	0.31	107.70	-3.01	9.44	9.91	9.28	0.62	15.858 CC, ES		
300.00	300.00	299.51	299.48	0.54	0.52	109.22	-3.97	11.38	12.06	11.00	1.06	11.392 SF		
400.00	400.00	398.65	398.40	0.76	0.75	111.65	-6.81	17.16	18.53	17.03	1.51	12.312		
500.00	500.00	497.05	496.22	0.99	1.01	113.31	-11.50	26.69	29.31	27.31	1.99	14.708		
600.00	600.00	594.36	592.41	1.21	1.32	114.28	-17.96	39.81	44.32	41.79	2.53	17.512		
700.00	699.97	690.62	686.88	1.42	1.69	27.38	-26.11	56.38	61.60	58.70	2.90	21.269		
800.00	799.75	786.08	779.71	1.64	2.13	29.45	-35.92	76.31	79.25	75.88	3.37	23.498		
900.00	899.14	880.69	870.73	1.88	2.64	31.82	-47.32	99.47	97.40	93.52	3.88	25.105		
1,000.00	997.97	974.44	959.79	2.16	3.22	34.28	-60.24	125.73	116.15	111.72	4.42	26.252		
1,100.00	1,096.04	1,067.29	1,046.74	2.49	3.87	36.75	-74.61	154.93	135.60	130.57	5.02	27.000		
1,200.00	1,193.17	1,159.24	1,131.47	2.90	4.59	39.16	-90.36	186.94	155.84	150.14	5.70	27.353		
1,300.00	1,289.17	1,254.67	1,218.22	3.38	5.40	41.69	-107.93	222.63	176.13	169.66	6.47	27.227		
1,400.00	1,383.85	1,352.53	1,307.08	3.96	6.25	44.57	-126.03	259.42	193.95	186.54	7.40	26.204		
1,500.00	1,477.05	1,450.56	1,396.09	4.62	7.11	47.82	-144.16	296.26	209.36	200.84	8.51	24.598		
1,600.00	1,568.80	1,548.57	1,485.09	5.38	7.98	51.47	-162.29	333.10	223.09	213.27	9.82	22.715		
1,700.00	1,660.35	1,646.58	1,574.09	6.17	8.85	54.91	-180.42	369.94	237.39	226.13	11.26	21.087		
1,800.00	1,751.90	1,744.59	1,663.08	6.97	9.72	57.95	-198.55	406.77	252.44	239.66	12.78	19.748		
1,900.00	1,843.44	1,842.59	1,752.07	7.79	10.60	60.65	-216.68	443.61	268.12	253.75	14.37	18.655		
2,000.00	1,934.99	1,940.60	1,841.06	8.61	11.48	63.05	-234.81	480.45	284.33	268.32	16.01	17.764		
2,100.00	2,026.54	2,038.61	1,930.06	9.44	12.35	65.19	-252.94	517.28	300.97	283.30	17.67	17.033		
2,200.00	2,118.09	2,136.61	2,019.05	10.28	13.23	67.11	-271.06	554.12	317.99	298.63	19.36	16.429		
2,300.00	2,209.63	2,234.62	2,108.04	11.12	14.11	68.83	-289.19	590.96	335.32	314.26	21.06	15.926		
2,400.00	2,301.18	2,332.62	2,197.03	11.96	14.99	70.39	-307.32	627.79	352.91	330.15	22.76	15.503		
2,500.00	2,392.73	2,430.63	2,286.03	12.80	15.87	71.80	-325.45	664.63	370.74	346.26	24.48	15.144		
2,600.00	2,484.28	2,528.64	2,375.02	13.65	16.75	73.07	-343.58	701.47	388.76	362.56	26.20	14.837		
2,700.00	2,575.82	2,626.64	2,464.01	14.50	17.64	74.24	-361.71	738.30	406.96	379.04	27.92	14.574		
2,800.00	2,667.37	2,724.65	2,553.00	15.35	18.52	75.30	-379.83	775.14	425.31	395.66	29.65	14.345		
2,900.00	2,758.92	2,822.66	2,642.00	16.20	19.40	76.28	-397.96	811.98	443.78	412.41	31.37	14.146		
3,000.00	2,850.47	2,920.66	2,730.99	17.05	20.28	77.18	-416.09	848.81	462.37	429.28	33.10	13.970		
3,100.00	2,942.01	3,018.67	2,819.98	17.90	21.17	78.01	-434.22	885.65	481.07	446.25	34.82	13.816		
3,200.00	3,033.56	3,116.68	2,908.97	18.75	22.05	78.78	-452.35	922.49	499.85	463.31	36.54	13.679		
3,300.00	3,125.11	3,214.68	2,997.97	19.60	22.93	79.49	-470.48	959.32	518.72	480.45	38.26	13.556		
3,400.00	3,216.66	3,312.69	3,086.96	20.46	23.82	80.15	-488.60	996.16	537.66	497.67	39.98	13.447		
3,500.00	3,308.20	3,410.69	3,175.95	21.31	24.70	80.77	-506.73	1,033.00	556.66	514.96	41.70	13.348		
3,600.00	3,399.75	3,508.70	3,264.94	22.17	25.58	81.35	-524.86	1,069.83	575.72	532.30	43.42	13.259		
3,700.00	3,491.30	3,606.71	3,353.94	23.02	26.47	81.89	-542.99	1,106.67	594.83	549.70	45.14	13.178		
3,800.00	3,582.85	3,704.71	3,442.93	23.88	27.35	82.40	-561.12	1,143.51	614.00	567.14	46.85	13.105		
3,900.00	3,674.39	3,802.72	3,531.92	24.73	28.24	82.87	-579.25	1,180.34	633.20	584.63	48.57	13.038		
4,000.00	3,765.94	3,900.73	3,620.91	25.59	29.12	83.32	-597.37	1,217.18	652.45	602.17	50.28	12.976		
4,100.00	3,857.49	3,998.73	3,709.91	26.44	30.00	83.74	-615.50	1,254.02	671.73	619.74	51.99	12.920		
4,200.00	3,949.04	4,096.74	3,798.90	27.30	30.89	84.14	-633.63	1,290.85	691.04	637.34	53.70	12.868		
4,300.00	4,040.59	4,194.75	3,887.89	28.15	31.77	84.52	-651.76	1,327.69	710.39	654.98	55.41	12.820		
4,400.00	4,132.13	4,292.75	3,976.88	29.01	32.66	84.88	-669.89	1,364.53	729.76	672.64	57.12	12.776		
4,500.00	4,223.68	4,390.76	4,065.88	29.87	33.54	85.21	-688.02	1,401.36	749.16	690.33	58.83	12.735		
4,600.00	4,315.23	4,488.77	4,154.87	30.72	34.43	85.54	-706.14	1,438.20	768.58	708.05	60.54	12.696		
4,700.00	4,406.78	4,586.77	4,243.86	31.58	35.31	85.84	-724.27	1,475.04	788.03	725.79	62.24	12.661		
4,800.00	4,498.32	4,684.78	4,332.85	32.44	36.19	86.13	-742.40	1,511.87	807.49	743.55	63.95	12.628		
4,900.00	4,589.87	4,782.78	4,421.85	33.29	37.08	86.41	-760.53	1,548.71	826.98	761.33	65.65	12.597		
5,000.00	4,681.42	4,880.79	4,510.84	34.15	37.96	86.67	-778.66	1,585.55	846.48	779.13	67.35	12.568		
5,100.00	4,772.97	4,978.80	4,599.83	35.01	38.85	86.93	-796.79	1,622.38	866.00	796.95	69.06	12.541		

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 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	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	4,864.51	5,076.80	4,688.82	35.87	39.73	87.17	-814.91	1,659.22	885.54	814.78	70.76	12.515		
5,300.00	4,956.06	5,174.81	4,777.82	36.72	40.62	87.40	-833.04	1,696.05	905.09	832.63	72.46	12.491		
5,400.00	5,048.11	5,279.73	4,873.21	37.50	41.53	87.94	-852.33	1,735.25	924.59	850.40	74.19	12.463		
5,500.00	5,141.72	5,401.23	4,985.58	38.10	42.34	88.52	-872.72	1,776.67	942.41	866.71	75.70	12.450		
5,600.00	5,236.78	5,523.62	5,101.09	38.64	43.03	89.05	-890.56	1,812.94	957.89	880.89	77.01	12.439		
5,700.00	5,333.10	5,646.76	5,219.31	39.10	43.61	89.54	-905.75	1,843.79	971.00	892.85	78.15	12.425		
5,800.00	5,430.50	5,770.48	5,339.78	39.48	44.09	89.99	-918.15	1,869.00	981.66	902.55	79.12	12.408		
5,900.00	5,528.80	5,894.60	5,462.00	39.80	44.47	90.41	-927.70	1,888.40	989.86	909.95	79.91	12.387		
6,000.00	5,627.80	6,018.96	5,585.43	40.06	44.73	90.79	-934.32	1,901.86	995.57	915.04	80.53	12.362		
6,100.00	5,727.32	6,143.35	5,709.53	40.24	44.90	91.14	-937.98	1,909.29	998.77	917.77	80.99	12.331		
6,200.00	5,827.17	6,261.01	5,827.17	40.37	44.99	91.44	-938.77	1,910.89	999.53	918.23	81.30	12.294		
6,300.00	5,927.16	6,361.00	5,927.16	40.45	45.05	179.68	-938.77	1,910.89	999.56	918.10	81.46	12.270		
6,400.00	6,027.16	6,461.00	6,027.16	40.52	45.11	179.68	-938.77	1,910.89	999.56	917.97	81.60	12.250		
6,500.00	6,127.16	6,561.00	6,127.16	40.59	45.17	179.68	-938.77	1,910.89	999.56	917.83	81.73	12.229		
6,600.00	6,227.16	6,661.00	6,227.16	40.66	45.23	179.68	-938.77	1,910.89	999.56	917.69	81.87	12.208		
6,700.00	6,327.16	6,761.00	6,327.16	40.74	45.29	179.68	-938.77	1,910.89	999.56	917.55	82.02	12.187		
6,800.00	6,427.16	6,861.00	6,427.16	40.81	45.36	179.68	-938.77	1,910.89	999.56	917.40	82.16	12.166		
6,900.00	6,527.16	6,961.00	6,527.16	40.89	45.42	179.68	-938.77	1,910.89	999.56	917.26	82.31	12.144		
7,000.00	6,627.16	7,061.00	6,627.16	40.96	45.49	179.68	-938.77	1,910.89	999.56	917.11	82.46	12.122		
7,100.00	6,727.16	7,161.00	6,727.16	41.04	45.55	179.68	-938.77	1,910.89	999.56	916.96	82.61	12.100		
7,200.00	6,827.16	7,261.00	6,827.16	41.12	45.62	179.68	-938.77	1,910.89	999.56	916.80	82.76	12.078		
7,300.00	6,927.16	7,361.00	6,927.16	41.20	45.69	179.68	-938.77	1,910.89	999.56	916.65	82.92	12.055		
7,400.00	7,027.16	7,461.00	7,027.16	41.28	45.76	179.68	-938.77	1,910.89	999.56	916.49	83.07	12.032		
7,500.00	7,127.16	7,561.00	7,127.16	41.36	45.83	179.68	-938.77	1,910.89	999.56	916.33	83.23	12.009		
7,600.00	7,227.16	7,661.00	7,227.16	41.45	45.90	179.68	-938.77	1,910.89	999.56	916.17	83.39	11.986		
7,700.00	7,327.16	7,761.00	7,327.16	41.53	45.97	179.68	-938.77	1,910.89	999.56	916.01	83.56	11.962		
7,800.00	7,427.16	7,861.00	7,427.16	41.62	46.05	179.68	-938.77	1,910.89	999.56	915.84	83.72	11.939		
7,900.00	7,527.16	7,961.00	7,527.16	41.70	46.12	179.68	-938.77	1,910.89	999.56	915.67	83.89	11.915		
8,000.00	7,627.16	8,061.00	7,627.16	41.79	46.20	179.68	-938.77	1,910.89	999.56	915.50	84.06	11.891		
8,100.00	7,727.16	8,161.00	7,727.16	41.88	46.27	179.68	-938.77	1,910.89	999.56	915.33	84.23	11.866		
8,200.00	7,827.16	8,261.00	7,827.16	41.97	46.35	179.68	-938.77	1,910.89	999.56	915.16	84.41	11.842		
8,300.00	7,927.16	8,361.00	7,927.16	42.06	46.43	179.68	-938.77	1,910.89	999.56	914.98	84.58	11.817		
8,343.71	7,970.87	8,404.71	7,970.87	42.10	46.46	179.68	-938.77	1,910.89	999.56	914.90	84.66	11.807		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-10 Pad - Piceance Federal 28-18E - Slot A-8 - 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	149.70	-12.12	7.08	14.04					
100.00	100.00	100.00	100.00	0.09	0.09	149.70	-12.12	7.08	14.04	13.86	0.18	80.055 CC, ES		
200.00	200.00	199.40	199.37	0.31	0.30	146.07	-13.25	8.91	15.98	15.37	0.61	26.067		
300.00	300.00	298.43	298.18	0.54	0.54	139.14	-16.63	14.38	22.06	20.99	1.07	20.543		
400.00	400.00	396.72	395.89	0.76	0.81	133.49	-22.20	23.40	32.51	30.94	1.58	20.635		
500.00	500.00	493.92	491.99	0.99	1.14	129.82	-29.86	35.81	47.31	45.18	2.13	22.217		
600.00	600.00	589.72	586.00	1.21	1.53	127.53	-39.50	51.43	66.34	63.60	2.74	24.205		
700.00	699.97	684.22	677.91	1.42	1.98	38.41	-51.03	70.10	87.81	84.83	2.97	29.521		
800.00	799.75	777.72	767.88	1.64	2.49	38.90	-64.38	91.72	109.94	106.47	3.46	31.757		
900.00	899.14	870.16	855.75	1.88	3.07	40.07	-79.47	116.15	132.75	128.76	3.98	33.317		
1,000.00	997.97	961.52	941.38	2.16	3.72	41.58	-96.20	143.24	156.31	151.76	4.55	34.348		
1,100.00	1,096.04	1,051.78	1,024.65	2.49	4.43	43.24	-114.47	172.83	180.69	175.52	5.18	34.898		
1,200.00	1,193.17	1,142.04	1,106.53	2.90	5.20	45.00	-134.43	205.16	205.94	200.06	5.88	35.021		
1,300.00	1,289.17	1,238.66	1,193.60	3.38	6.08	47.11	-156.44	240.80	229.88	223.17	6.71	34.279		
1,400.00	1,383.85	1,335.61	1,280.95	3.96	6.96	49.54	-178.52	276.56	251.42	243.74	7.67	32.768		
1,500.00	1,477.05	1,432.68	1,368.44	4.62	7.85	52.26	-200.63	312.37	270.85	262.03	8.81	30.734		
1,600.00	1,568.80	1,529.74	1,455.89	5.38	8.75	55.37	-222.74	348.17	288.83	278.70	10.14	28.491		
1,700.00	1,660.35	1,626.78	1,543.34	6.17	9.64	58.36	-244.84	383.97	307.39	295.81	11.57	26.558		
1,800.00	1,751.90	1,723.82	1,630.79	6.97	10.54	61.01	-266.94	419.77	326.67	313.58	13.09	24.963		
1,900.00	1,843.44	1,820.86	1,718.23	7.79	11.44	63.37	-289.05	455.56	346.57	331.91	14.65	23.651		
2,000.00	1,934.99	1,917.90	1,805.68	8.61	12.34	65.47	-311.15	491.36	366.97	350.71	16.26	22.569		
2,100.00	2,026.54	2,014.94	1,893.12	9.44	13.24	67.35	-333.25	527.15	387.81	369.91	17.89	21.672		
2,200.00	2,118.09	2,111.98	1,980.57	10.28	14.15	69.04	-355.35	562.95	409.01	389.46	19.55	20.922		
2,300.00	2,209.63	2,209.02	2,068.02	11.12	15.05	70.56	-377.46	598.74	430.52	409.31	21.22	20.290		
2,400.00	2,301.18	2,306.06	2,155.46	11.96	15.95	71.94	-399.56	634.54	452.30	429.40	22.90	19.753		
2,500.00	2,392.73	2,403.10	2,242.91	12.80	16.86	73.20	-421.66	670.34	474.31	449.73	24.58	19.293		
2,600.00	2,484.28	2,500.13	2,330.36	13.65	17.76	74.34	-443.77	706.13	496.52	470.24	26.28	18.897		
2,700.00	2,575.82	2,597.17	2,417.80	14.50	18.66	75.39	-465.87	741.93	518.90	490.93	27.97	18.552		
2,800.00	2,667.37	2,694.21	2,505.25	15.35	19.57	76.35	-487.97	777.72	541.43	511.77	29.67	18.250		
2,900.00	2,758.92	2,791.25	2,592.69	16.20	20.47	77.23	-510.08	813.52	564.10	532.73	31.37	17.984		
3,000.00	2,850.47	2,888.29	2,680.14	17.05	21.38	78.05	-532.18	849.31	586.89	553.82	33.07	17.749		
3,100.00	2,942.01	2,985.33	2,767.59	17.90	22.28	78.80	-554.28	885.11	609.78	575.01	34.77	17.539		
3,200.00	3,033.56	3,082.37	2,855.03	18.75	23.19	79.50	-576.39	920.91	632.76	596.30	36.47	17.352		
3,300.00	3,125.11	3,179.41	2,942.48	19.60	24.09	80.16	-598.49	956.70	655.83	617.66	38.17	17.183		
3,400.00	3,216.66	3,276.45	3,029.93	20.46	25.00	80.76	-620.59	992.50	678.98	639.11	39.87	17.031		
3,500.00	3,308.20	3,373.49	3,117.37	21.31	25.91	81.33	-642.69	1,028.29	702.19	660.62	41.56	16.894		
3,600.00	3,399.75	3,470.53	3,204.82	22.17	26.81	81.86	-664.80	1,064.09	725.46	682.20	43.26	16.769		
3,700.00	3,491.30	3,567.57	3,292.26	23.02	27.72	82.36	-686.90	1,099.88	748.79	703.83	44.96	16.654		
3,800.00	3,582.85	3,664.61	3,379.71	23.88	28.62	82.83	-709.00	1,135.68	772.17	725.51	46.66	16.550		
3,900.00	3,674.39	3,761.65	3,467.16	24.73	29.53	83.27	-731.11	1,171.48	795.59	747.24	48.35	16.454		
4,000.00	3,765.94	3,858.69	3,554.60	25.59	30.44	83.69	-753.21	1,207.27	819.06	769.01	50.05	16.365		
4,100.00	3,857.49	3,955.73	3,642.05	26.44	31.34	84.08	-775.31	1,243.07	842.57	790.82	51.74	16.284		
4,200.00	3,949.04	4,052.77	3,729.50	27.30	32.25	84.45	-797.42	1,278.86	866.11	812.67	53.44	16.208		
4,300.00	4,040.59	4,149.81	3,816.94	28.15	33.15	84.80	-819.52	1,314.66	889.68	834.55	55.13	16.138		
4,400.00	4,132.13	4,246.85	3,904.39	29.01	34.06	85.14	-841.62	1,350.45	913.29	856.46	56.82	16.072		
4,500.00	4,223.68	4,343.89	3,991.83	29.87	34.97	85.45	-863.72	1,386.25	936.92	878.40	58.51	16.012		
4,600.00	4,315.23	4,440.93	4,079.28	30.72	35.87	85.76	-885.83	1,422.05	960.58	900.37	60.21	15.955		
4,700.00	4,406.78	4,537.97	4,166.73	31.58	36.78	86.04	-907.93	1,457.84	984.26	922.36	61.90	15.902 SF		

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



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Reference Depths are relative to Well @ 7701.00usft

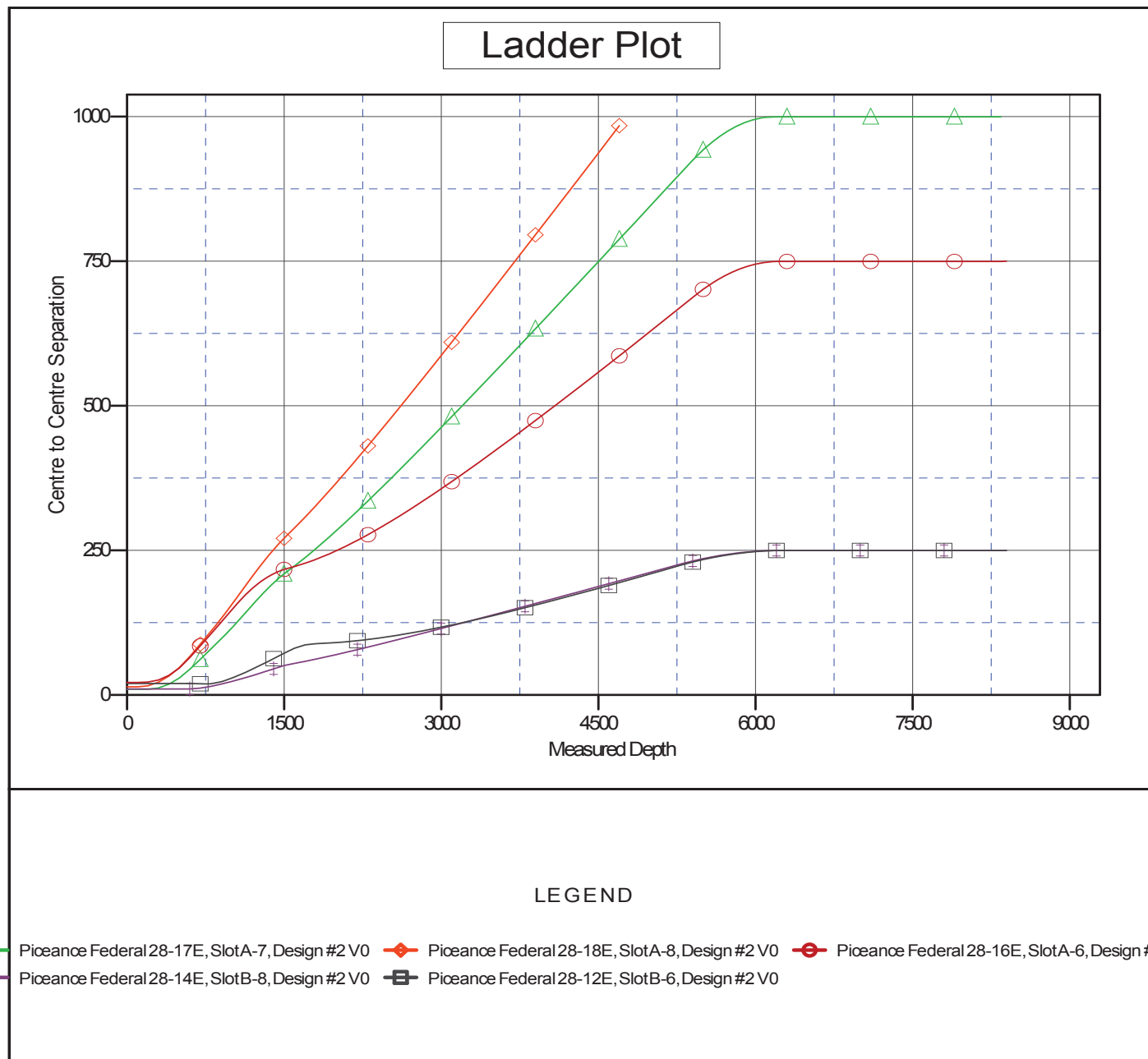
Offset Depths are relative to Offset Datum

Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Piceance Federal 28-13E

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 28-13E
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 28-13E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-7	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 28-13E

Coordinate System is US State Plane 1983, Colorado Central Zone

Grid Convergence at Surface is: -1.43°

