



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance Federal 28-02M

Slot A-5

Plan: Design #1

Standard Planning Report

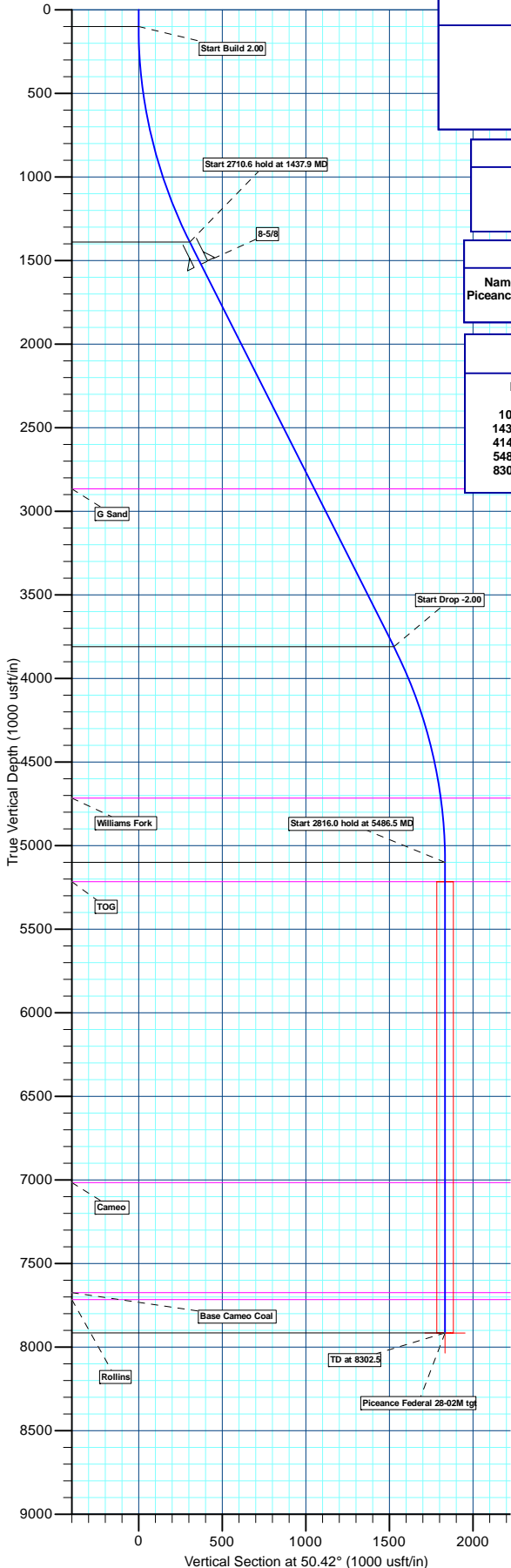
28 April, 2015

Archer



Project: Mesa County, CO
 Site: Piceance 28-05
 Well: Piceance Federal 28-02M
 Wellbore: Slot A-5
 Design: Design #1
 Latitude: 39° 15' 3.820 N
 Longitude: 107° 46' 46.230 W
 Ground Level: 7556.0
 Well @ 7578.0usft

Archer



PROJECT DETAILS: Mesa County, CO

Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Central Zone
 System Datum: Mean Sea Level

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Piceance Federal 28-02M, True North
 Vertical (TVD) Reference: Well @ 7578.0usft
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: Well @ 7578.0usft
 Calculation Method: Minimum Curvature

WELL DETAILS: Piceance Federal 28-02M

+N-S	+E-W	Northing	Ground Level:	7556.0	Latitude	Longitude	Slot
0.0	0.0	1524431.50	Easting	2354550.87	39° 15' 3.820 N	107° 46' 46.230 W	

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

Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude	Shape
Piceance Federal 28-02M tgt	7916.0	1168.6	1413.5	1525564.24	2355993.23	39° 15' 15.370 N	107° 46' 28.260 W	Circle (Radius: 50.0)

SECTION DETAILS

MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
100.0	0.00	0.00	100.0	0.0	0.0	0.00	0.00	0.0	Start Build 2.00
1437.9	26.76	50.42	1389.8	195.5	236.4	2.00	50.42	306.8	Start 2710.6 hold at 1437.9 MD
4148.6	26.76	50.42	3810.2	973.1	1177.0	0.00	0.00	1527.2	Start Drop -2.00
5486.5	0.00	0.00	5100.0	1168.6	1413.5	2.00	180.00	1834.0	Start 2816.0 hold at 5486.5 MD
8302.5	0.00	0.00	7916.0	1168.6	1413.5	0.00	0.00	1834.0	TD at 8302.5

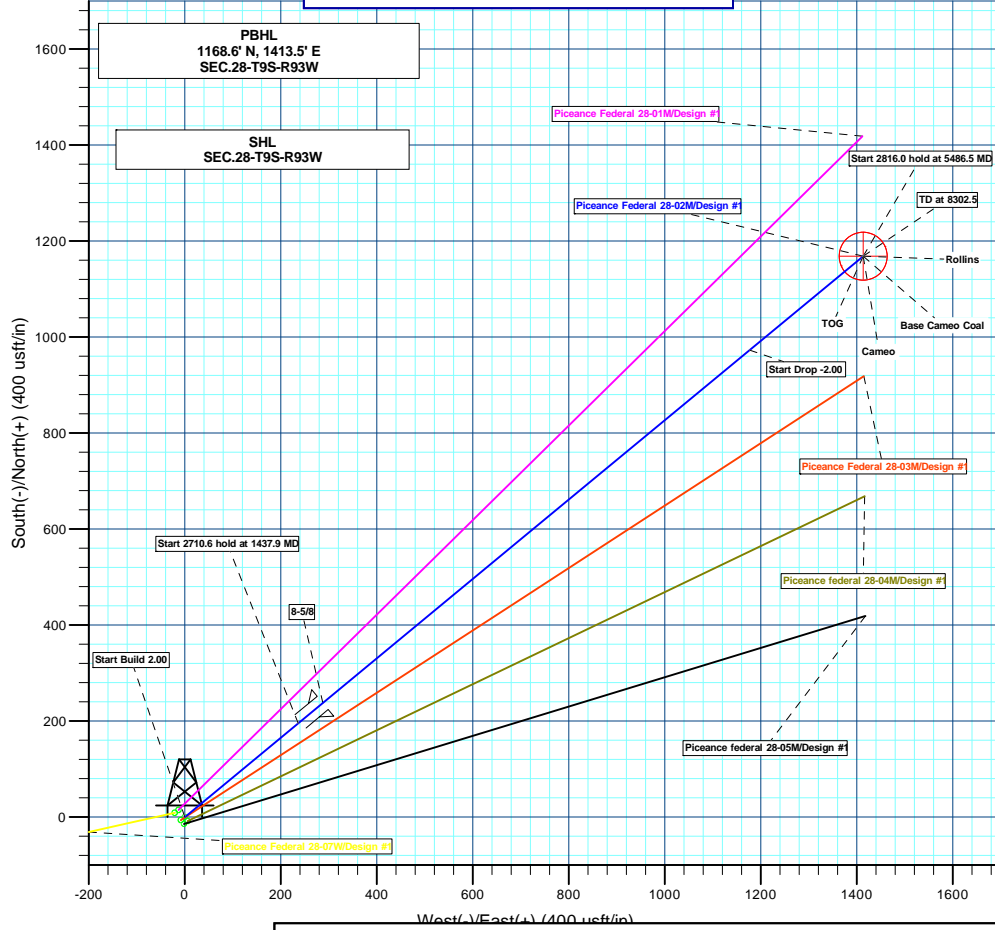
T M

Azimuths to True North
 Magnetic North: 9.72°

Magnetic Field
 Strength: 51741.9snT
 Dip Angle: 65.47°
 Date: 04/27/2015
 Model: IGRF2010

FORMATION TOP DETAILS

TVDPPath	MDPath	Formation
2866.0	3091.2	G Sand
4716.0	5101.3	Williams Fork
5216.0	5602.5	TOG
7016.0	7402.5	Cameo
7674.0	8060.5	Base Cameo Coal
7716.0	8102.5	Rollins





Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7578.0usft
Project:	Mesa County, CO	MD Reference:	Well @ 7578.0usft
Site:	Piceance 28-05	North Reference:	True
Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-5		
Design:	Design #1		

Project	Mesa County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site	Piceance 28-05				
Site Position:		Northing:	1,524,375.79 usft	Latitude:	39° 15' 3.280 N
From:	Lat/Long	Easting:	2,354,593.53 usft	Longitude:	107° 46' 45.670 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	-1.44 °

Well	Piceance Federal 28-02M					
Well Position	+N/-S	54.6 usft	Northing:	1,524,431.50 usft	Latitude:	39° 15' 3.820 N
	+E/-W	-44.1 usft	Easting:	2,354,550.87 usft	Longitude:	107° 46' 46.230 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,556.0 usft

Wellbore	Slot A-5				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2015/04/27	9.73	65.47	51,742

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	50.42

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
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
100.0	0.00	0.00	100.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,437.9	26.76	50.42	1,389.8	195.5	236.4	2.00	2.00	0.00	50.42	
4,148.6	26.76	50.42	3,810.2	973.1	1,177.0	0.00	0.00	0.00	0.00	
5,486.5	0.00	0.00	5,100.0	1,168.6	1,413.5	2.00	-2.00	0.00	180.00	
8,302.5	0.00	0.00	7,916.0	1,168.6	1,413.5	0.00	0.00	0.00	0.00	Piceance Federal 28-



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7578.0usft
Project:	Mesa County, CO	MD Reference:	Well @ 7578.0usft
Site:	Piceance 28-05	North Reference:	True
Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-5		
Design:	Design #1		

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
Start Build 2.00									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	2.00	50.42	200.0	1.1	1.3	1.7	2.00	2.00	0.00
300.0	4.00	50.42	299.8	4.4	5.4	7.0	2.00	2.00	0.00
400.0	6.00	50.42	399.5	10.0	12.1	15.7	2.00	2.00	0.00
500.0	8.00	50.42	498.7	17.8	21.5	27.9	2.00	2.00	0.00
600.0	10.00	50.42	597.5	27.7	33.5	43.5	2.00	2.00	0.00
700.0	12.00	50.42	695.6	39.9	48.2	62.6	2.00	2.00	0.00
800.0	14.00	50.42	793.1	54.2	65.6	85.1	2.00	2.00	0.00
900.0	16.00	50.42	889.6	70.7	85.5	111.0	2.00	2.00	0.00
1,000.0	18.00	50.42	985.3	89.3	108.1	140.2	2.00	2.00	0.00
1,100.0	20.00	50.42	1,079.8	110.1	133.2	172.8	2.00	2.00	0.00
1,200.0	22.00	50.42	1,173.2	132.9	160.8	208.6	2.00	2.00	0.00
1,300.0	24.00	50.42	1,265.2	157.8	190.9	247.7	2.00	2.00	0.00
1,400.0	26.00	50.42	1,355.8	184.7	223.5	289.9	2.00	2.00	0.00
Start 2710.6 hold at 1437.9 MD									
1,437.9	26.76	50.42	1,389.8	195.5	236.4	306.8	2.00	2.00	0.00
1,500.0	26.76	50.42	1,445.2	213.3	258.0	334.7	0.00	0.00	0.00
8-5/8									
1,586.0	26.76	50.42	1,522.0	237.9	287.8	373.4	0.00	0.00	0.00
1,600.0	26.76	50.42	1,534.5	242.0	292.7	379.8	0.00	0.00	0.00
1,700.0	26.76	50.42	1,623.8	270.7	327.4	424.8	0.00	0.00	0.00
1,800.0	26.76	50.42	1,713.1	299.3	362.1	469.8	0.00	0.00	0.00
1,900.0	26.76	50.42	1,802.4	328.0	396.8	514.8	0.00	0.00	0.00
2,000.0	26.76	50.42	1,891.7	356.7	431.5	559.8	0.00	0.00	0.00
2,100.0	26.76	50.42	1,981.0	385.4	466.2	604.9	0.00	0.00	0.00
2,200.0	26.76	50.42	2,070.3	414.1	500.9	649.9	0.00	0.00	0.00
2,300.0	26.76	50.42	2,159.6	442.8	535.6	694.9	0.00	0.00	0.00
2,400.0	26.76	50.42	2,248.9	471.5	570.3	739.9	0.00	0.00	0.00
2,500.0	26.76	50.42	2,338.2	500.2	605.0	785.0	0.00	0.00	0.00
2,600.0	26.76	50.42	2,427.4	528.8	639.7	830.0	0.00	0.00	0.00
2,700.0	26.76	50.42	2,516.7	557.5	674.4	875.0	0.00	0.00	0.00
2,800.0	26.76	50.42	2,606.0	586.2	709.1	920.0	0.00	0.00	0.00
2,900.0	26.76	50.42	2,695.3	614.9	743.8	965.1	0.00	0.00	0.00
3,000.0	26.76	50.42	2,784.6	643.6	778.5	1,010.1	0.00	0.00	0.00
G Sand									
3,091.2	26.76	50.42	2,866.0	669.8	810.1	1,051.1	0.00	0.00	0.00
3,100.0	26.76	50.42	2,873.9	672.3	813.2	1,055.1	0.00	0.00	0.00
3,200.0	26.76	50.42	2,963.2	701.0	847.9	1,100.1	0.00	0.00	0.00
3,300.0	26.76	50.42	3,052.5	729.7	882.6	1,145.2	0.00	0.00	0.00
3,400.0	26.76	50.42	3,141.8	758.4	917.3	1,190.2	0.00	0.00	0.00
3,500.0	26.76	50.42	3,231.1	787.0	952.0	1,235.2	0.00	0.00	0.00
3,600.0	26.76	50.42	3,320.4	815.7	986.7	1,280.2	0.00	0.00	0.00
3,700.0	26.76	50.42	3,409.6	844.4	1,021.4	1,325.2	0.00	0.00	0.00
3,800.0	26.76	50.42	3,498.9	873.1	1,056.1	1,370.3	0.00	0.00	0.00
3,900.0	26.76	50.42	3,588.2	901.8	1,090.8	1,415.3	0.00	0.00	0.00
4,000.0	26.76	50.42	3,677.5	930.5	1,125.5	1,460.3	0.00	0.00	0.00
4,100.0	26.76	50.42	3,766.8	959.2	1,160.2	1,505.3	0.00	0.00	0.00
Start Drop -2.00									
4,148.6	26.76	50.42	3,810.2	973.1	1,177.0	1,527.2	0.00	0.00	0.00
4,200.0	25.73	50.42	3,856.3	987.6	1,194.6	1,549.9	2.00	-2.00	0.00
4,300.0	23.73	50.42	3,947.1	1,014.2	1,226.8	1,591.8	2.00	-2.00	0.00
4,400.0	21.73	50.42	4,039.4	1,038.9	1,256.6	1,630.4	2.00	-2.00	0.00



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Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7578.0usft
Project:	Mesa County, CO	MD Reference:	Well @ 7578.0usft
Site:	Piceance 28-05	North Reference:	True
Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-5		
Design:	Design #1		

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)	
4,500.0	19.73	50.42	4,132.9	1,061.4	1,283.9	1,665.8	2.00	-2.00	0.00	
4,600.0	17.73	50.42	4,227.6	1,081.9	1,308.6	1,697.9	2.00	-2.00	0.00	
4,700.0	15.73	50.42	4,323.3	1,100.2	1,330.8	1,726.7	2.00	-2.00	0.00	
4,800.0	13.73	50.42	4,420.1	1,116.4	1,350.4	1,752.1	2.00	-2.00	0.00	
4,900.0	11.73	50.42	4,517.6	1,130.5	1,367.4	1,774.2	2.00	-2.00	0.00	
5,000.0	9.73	50.42	4,615.8	1,142.3	1,381.7	1,792.8	2.00	-2.00	0.00	
5,100.0	7.73	50.42	4,714.7	1,152.0	1,393.4	1,808.0	2.00	-2.00	0.00	
Williams Fork										
5,101.3	7.70	50.42	4,716.0	1,152.1	1,393.6	1,808.1	2.00	-2.00	0.00	
5,200.0	5.73	50.42	4,814.0	1,159.5	1,402.5	1,819.7	2.00	-2.00	0.00	
5,300.0	3.73	50.42	4,913.6	1,164.7	1,408.8	1,827.9	2.00	-2.00	0.00	
5,400.0	1.73	50.42	5,013.5	1,167.7	1,412.5	1,832.7	2.00	-2.00	0.00	
Start 2816.0 hold at 5486.5 MD										
5,486.5	0.00	0.00	5,100.0	1,168.6	1,413.5	1,834.0	2.00	-2.00	-58.29	
5,500.0	0.00	0.00	5,113.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
5,600.0	0.00	0.00	5,213.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
TOG										
5,602.5	0.00	0.00	5,216.0	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
5,700.0	0.00	0.00	5,313.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
5,800.0	0.00	0.00	5,413.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
5,900.0	0.00	0.00	5,513.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,000.0	0.00	0.00	5,613.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,100.0	0.00	0.00	5,713.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,200.0	0.00	0.00	5,813.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,300.0	0.00	0.00	5,913.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,400.0	0.00	0.00	6,013.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,500.0	0.00	0.00	6,113.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,600.0	0.00	0.00	6,213.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,700.0	0.00	0.00	6,313.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,800.0	0.00	0.00	6,413.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
6,900.0	0.00	0.00	6,513.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,000.0	0.00	0.00	6,613.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,100.0	0.00	0.00	6,713.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,200.0	0.00	0.00	6,813.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,300.0	0.00	0.00	6,913.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,400.0	0.00	0.00	7,013.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
Cameo										
7,402.5	0.00	0.00	7,016.0	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,500.0	0.00	0.00	7,113.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,600.0	0.00	0.00	7,213.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,700.0	0.00	0.00	7,313.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,800.0	0.00	0.00	7,413.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
7,900.0	0.00	0.00	7,513.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
8,000.0	0.00	0.00	7,613.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
Base Cameo Coal										
8,060.5	0.00	0.00	7,674.0	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
8,100.0	0.00	0.00	7,713.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
Rollins										
8,102.5	0.00	0.00	7,716.0	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
8,200.0	0.00	0.00	7,813.5	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	
TD at 8302.5										
8,302.5	0.00	0.00	7,916.0	1,168.6	1,413.5	1,834.0	0.00	0.00	0.00	



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Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7578.0usft
Project:	Mesa County, CO	MD Reference:	Well @ 7578.0usft
Site:	Piceance 28-05	North Reference:	True
Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-5		
Design:	Design #1		

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Piceance Federal 28-02I - hit/miss target - Shape - plan hits target center - Circle (radius 50.0)	0.00	0.00	7,916.0	1,168.6	1,413.5	1,525,564.24	2,355,993.23	39° 15' 15.370 N	107° 46' 28.260 W

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,586.0	1,522.0	8-5/8	8-5/8	12-1/4

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,091.2	2,866.0	G Sand		0.00	
5,101.3	4,716.0	Williams Fork		0.00	
5,602.5	5,216.0	TOG		0.00	
7,402.5	7,016.0	Cameo		0.00	
8,060.5	7,674.0	Base Cameo Coal		0.00	
8,102.5	7,716.0	Rollins		0.00	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
100.0	100.0	0.0	0.0	Start Build 2.00	
1,437.9	1,389.8	195.5	236.4	Start 2710.6 hold at 1437.9 MD	
4,148.6	3,810.2	973.1	1,177.0	Start Drop -2.00	
5,486.5	5,100.0	1,168.6	1,413.5	Start 2816.0 hold at 5486.5 MD	
8,302.5	7,916.0	1,168.6	1,413.5	TD at 8302.5	



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance Federal 28-02M

Slot A-5

Design #1

Anticollision Report

28 April, 2015

Archer



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Reference	Design #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date	2015/04/28		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	8,302.5	Design #1 (Slot A-5)	MWD	MWD - Standard

Site Name	Reference	Offset	Distance		Separation Factor	Warning
	Measured Depth (usft)	Measured Depth (usft)	Between Centres (usft)	Between Ellipses (usft)		
Offset Well - Wellbore - Design						
Piceance 28-05						
Piceance Federal 28-01M - Slot A-4 - Design #1	100.0	100.0	19.7	19.5	112.458	CC
Piceance Federal 28-01M - Slot A-4 - Design #1	300.0	299.9	20.3	19.2	18.643	ES
Piceance Federal 28-01M - Slot A-4 - Design #1	1,900.0	1,897.8	67.9	46.9	3.235	SF
Piceance Federal 28-03M - Slot B-5 - Design #1	100.0	100.0	9.9	9.8	56.675	CC, ES
Piceance Federal 28-03M - Slot B-5 - Design #1	8,300.0	8,249.7	249.9	184.2	3.804	SF
Piceance federal 28-04M - Slot A-6 - Design #1	100.0	100.0	10.3	10.1	58.478	CC
Piceance federal 28-04M - Slot A-6 - Design #1	200.0	200.0	10.5	9.8	16.712	ES
Piceance federal 28-04M - Slot A-6 - Design #1	8,300.0	8,216.8	499.8	434.4	7.638	SF
Piceance federal 28-05M - Slot B-6 - Design #1	100.0	100.0	14.3	14.1	81.288	CC, ES
Piceance federal 28-05M - Slot B-6 - Design #1	8,300.0	8,196.8	749.8	684.1	11.416	SF
Piceance Federal 28-07W - Slot B-4 - Design #1	100.0	100.0	22.4	22.2	127.697	CC, ES
Piceance Federal 28-07W - Slot B-4 - Design #1	500.0	498.7	42.8	40.6	19.393	SF

Offset Design													Offset Site Error:	0.0 usft
Piceance 28-05 - Piceance Federal 28-01M - Slot A-4 - Design #1													Offset Well Error:	0.0 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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.0	0.0	0.0	0.0	0.0	0.0	-39.67	15.2	-12.6	19.7					
100.0	100.0	100.0	100.0	0.1	0.1	-39.67	15.2	-12.6	19.7	19.5	0.18	112.458	CC	
200.0	200.0	199.9	199.9	0.3	0.3	-90.11	16.4	-11.3	19.9	19.2	0.62	31.986		
300.0	299.8	299.9	299.7	0.6	0.6	-90.16	20.1	-7.6	20.3	19.2	1.09	18.643	ES	
400.0	399.5	399.8	399.3	0.8	0.8	-90.24	26.2	-1.4	21.1	19.5	1.61	13.103		
500.0	498.7	499.8	498.5	1.1	1.1	-90.35	34.7	7.3	22.1	19.9	2.20	10.075		
600.0	597.5	599.7	597.1	1.4	1.4	-90.47	45.7	18.4	23.5	20.6	2.87	8.178		
700.0	695.6	699.6	695.2	1.8	1.8	-90.60	59.1	32.0	25.2	21.5	3.65	6.893		
800.0	793.1	799.5	792.6	2.3	2.3	-90.72	74.8	48.0	27.1	22.6	4.54	5.978		
900.0	889.6	899.4	889.1	2.8	2.8	-90.84	92.9	66.4	29.4	23.8	5.54	5.303		
1,000.0	985.3	999.3	984.6	3.3	3.3	-90.96	113.4	87.1	31.9	25.2	6.66	4.791		
1,100.0	1,079.8	1,099.2	1,079.1	4.0	3.9	-91.06	136.2	110.3	34.7	26.8	7.91	4.393		
1,200.0	1,173.2	1,199.1	1,172.3	4.7	4.6	-91.15	161.3	135.8	37.9	28.6	9.28	4.079		
1,300.0	1,265.2	1,298.9	1,264.2	5.4	5.4	-91.23	188.7	163.5	41.3	30.5	10.78	3.825		
1,400.0	1,355.8	1,398.8	1,354.7	6.2	6.2	-91.29	218.3	193.6	44.9	32.5	12.42	3.619		
1,500.0	1,445.2	1,498.6	1,443.7	7.1	7.1	-90.61	250.0	225.8	48.9	34.7	14.17	3.449		

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 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
1,600.0	1,534.5	1,598.3	1,531.0	8.0	8.0	-86.72	283.9	260.2	53.2	37.2	15.95	3.332		
1,700.0	1,623.8	1,698.1	1,618.0	8.9	9.0	-82.53	318.3	295.1	57.8	40.1	17.69	3.269		
1,800.0	1,713.1	1,798.0	1,704.9	9.8	9.9	-78.99	352.7	330.0	62.8	43.4	19.37	3.241		
1,900.0	1,802.4	1,897.8	1,791.8	10.7	10.9	-75.97	387.1	364.9	67.9	46.9	21.00	3.235 SF		
2,000.0	1,891.7	1,997.6	1,878.8	11.6	11.9	-73.38	421.5	399.9	73.2	50.6	22.58	3.242		
2,100.0	1,981.0	2,097.4	1,965.7	12.5	12.8	-71.15	455.9	434.8	78.7	54.5	24.14	3.259		
2,200.0	2,070.3	2,197.2	2,052.6	13.4	13.8	-69.20	490.3	469.7	84.2	58.5	25.67	3.281		
2,300.0	2,159.6	2,297.0	2,139.6	14.3	14.8	-67.50	524.7	504.6	89.8	62.7	27.17	3.306		
2,400.0	2,248.9	2,398.8	2,226.5	15.2	15.8	-66.00	559.1	539.6	95.5	66.9	28.67	3.332		
2,500.0	2,338.2	2,496.6	2,313.5	16.1	16.8	-64.67	593.5	574.5	101.3	71.1	30.14	3.360		
2,600.0	2,427.4	2,596.4	2,400.4	17.0	17.7	-63.48	627.9	609.4	107.1	75.5	31.61	3.388		
2,700.0	2,516.7	2,696.2	2,487.3	17.9	18.7	-62.42	662.3	644.3	112.9	79.9	33.06	3.415		
2,800.0	2,606.0	2,796.0	2,574.3	18.8	19.7	-61.46	696.7	679.3	118.8	84.3	34.51	3.442		
2,900.0	2,695.3	2,895.8	2,661.2	19.8	20.7	-60.59	731.2	714.2	124.7	88.7	35.96	3.468		
3,000.0	2,784.6	2,995.7	2,748.1	20.7	21.7	-59.80	765.6	749.1	130.6	93.2	37.39	3.494		
3,100.0	2,873.9	3,095.5	2,835.1	21.6	22.7	-59.08	800.0	784.1	136.6	97.8	38.83	3.518		
3,200.0	2,963.2	3,195.3	2,922.0	22.5	23.6	-58.41	834.4	819.0	142.6	102.3	40.26	3.542		
3,300.0	3,052.5	3,295.1	3,009.0	23.4	24.6	-57.81	868.8	853.9	148.6	106.9	41.68	3.564		
3,400.0	3,141.8	3,394.9	3,095.9	24.3	25.6	-57.24	903.2	888.8	154.6	111.5	43.10	3.586		
3,500.0	3,231.1	3,494.7	3,182.8	25.2	26.6	-56.73	937.6	923.8	160.6	116.1	44.52	3.607		
3,600.0	3,320.4	3,594.5	3,269.8	26.1	27.6	-56.24	972.0	958.7	166.6	120.7	45.94	3.627		
3,700.0	3,409.6	3,694.3	3,356.7	27.0	28.6	-55.80	1,006.4	993.6	172.7	125.3	47.36	3.646		
3,800.0	3,498.9	3,794.1	3,443.6	28.0	29.6	-55.38	1,040.8	1,028.5	178.7	130.0	48.77	3.664		
3,900.0	3,588.2	3,893.9	3,530.6	28.9	30.5	-54.99	1,075.2	1,063.5	184.8	134.6	50.19	3.682		
4,000.0	3,677.5	3,993.7	3,617.5	29.8	31.5	-54.62	1,109.6	1,098.4	190.9	139.3	51.60	3.699		
4,100.0	3,766.8	4,093.5	3,704.4	30.7	32.5	-54.28	1,144.0	1,133.3	196.9	143.9	53.01	3.715		
4,200.0	3,856.3	4,196.0	3,794.0	31.5	33.5	-54.02	1,179.0	1,168.8	202.9	148.6	54.37	3.733		
4,300.0	3,947.1	4,300.8	3,887.1	32.2	34.2	-53.81	1,212.6	1,202.9	208.6	153.1	55.45	3.762		
4,400.0	4,039.4	4,405.7	3,982.1	32.9	35.0	-53.60	1,243.8	1,234.6	213.9	157.5	56.44	3.790		
4,500.0	4,132.9	4,510.8	4,078.9	33.5	35.6	-53.39	1,272.7	1,263.9	218.9	161.6	57.34	3.818		
4,600.0	4,227.6	4,616.0	4,177.2	34.0	36.3	-53.17	1,299.0	1,290.6	223.6	165.5	58.14	3.847		
4,700.0	4,323.3	4,721.5	4,277.0	34.5	36.8	-52.94	1,322.8	1,314.8	228.0	169.1	58.83	3.875		
4,800.0	4,420.1	4,827.0	4,378.1	34.9	37.3	-52.71	1,344.1	1,336.4	232.0	172.5	59.43	3.903		
4,900.0	4,517.6	4,932.8	4,480.5	35.3	37.8	-52.47	1,362.8	1,355.4	235.6	175.7	59.92	3.932		
5,000.0	4,615.8	5,038.6	4,583.8	35.6	38.2	-52.22	1,378.8	1,371.6	238.9	178.6	60.31	3.961		
5,100.0	4,714.7	5,144.6	4,688.1	35.9	38.5	-51.96	1,392.2	1,385.2	241.8	181.2	60.60	3.990		
5,200.0	4,814.0	5,250.8	4,793.1	36.1	38.8	-51.69	1,402.8	1,396.0	244.3	183.6	60.78	4.020		
5,300.0	4,913.6	5,357.0	4,898.7	36.3	39.0	-51.41	1,410.7	1,404.0	246.5	185.7	60.86	4.051		
5,400.0	5,013.5	5,463.3	5,004.8	36.4	39.2	-51.12	1,415.9	1,409.3	248.3	187.5	60.84	4.082		
5,500.0	5,113.5	5,569.7	5,111.1	36.5	39.3	-0.41	1,418.3	1,411.7	249.7	189.0	60.73	4.112		
5,600.0	5,213.5	5,672.1	5,213.5	36.6	39.4	-0.36	1,418.5	1,411.9	249.9	189.0	60.86	4.106		
5,700.0	5,313.5	5,772.1	5,313.5	36.6	39.4	-0.36	1,418.5	1,411.9	249.9	188.9	61.01	4.096		
5,800.0	5,413.5	5,872.1	5,413.5	36.7	39.5	-0.36	1,418.5	1,411.9	249.9	188.7	61.17	4.085		
5,900.0	5,513.5	5,972.1	5,513.5	36.8	39.5	-0.36	1,418.5	1,411.9	249.9	188.6	61.34	4.074		
6,000.0	5,613.5	6,072.1	5,613.5	36.8	39.6	-0.36	1,418.5	1,411.9	249.9	188.4	61.50	4.063		
6,100.0	5,713.5	6,172.1	5,713.5	36.9	39.7	-0.36	1,418.5	1,411.9	249.9	188.2	61.67	4.052		
6,200.0	5,813.5	6,272.1	5,813.5	37.0	39.7	-0.36	1,418.5	1,411.9	249.9	188.1	61.84	4.041		
6,300.0	5,913.5	6,372.1	5,913.5	37.1	39.8	-0.36	1,418.5	1,411.9	249.9	187.9	62.01	4.030		
6,400.0	6,013.5	6,472.1	6,013.5	37.1	39.9	-0.36	1,418.5	1,411.9	249.9	187.7	62.19	4.018		
6,500.0	6,113.5	6,572.1	6,113.5	37.2	39.9	-0.36	1,418.5	1,411.9	249.9	187.5	62.37	4.007		
6,600.0	6,213.5	6,672.1	6,213.5	37.3	40.0	-0.36	1,418.5	1,411.9	249.9	187.3	62.55	3.995		
6,700.0	6,313.5	6,772.1	6,313.5	37.4	40.1	-0.36	1,418.5	1,411.9	249.9	187.2	62.73	3.983		

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



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Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
6,800.0	6,413.5	6,872.1	6,413.5	37.4	40.2	-0.36	1,418.5	1,411.9	249.9	187.0	62.92	3.972		
6,900.0	6,513.5	6,972.1	6,513.5	37.5	40.2	-0.36	1,418.5	1,411.9	249.9	186.8	63.11	3.960		
7,000.0	6,613.5	7,072.1	6,613.5	37.6	40.3	-0.36	1,418.5	1,411.9	249.9	186.6	63.30	3.948		
7,100.0	6,713.5	7,172.1	6,713.5	37.7	40.4	-0.36	1,418.5	1,411.9	249.9	186.4	63.50	3.935		
7,200.0	6,813.5	7,272.1	6,813.5	37.8	40.5	-0.36	1,418.5	1,411.9	249.9	186.2	63.70	3.923		
7,300.0	6,913.5	7,372.1	6,913.5	37.8	40.5	-0.36	1,418.5	1,411.9	249.9	186.0	63.90	3.911		
7,400.0	7,013.5	7,472.1	7,013.5	37.9	40.6	-0.36	1,418.5	1,411.9	249.9	185.8	64.10	3.899		
7,500.0	7,113.5	7,572.1	7,113.5	38.0	40.7	-0.36	1,418.5	1,411.9	249.9	185.6	64.30	3.886		
7,600.0	7,213.5	7,672.1	7,213.5	38.1	40.8	-0.36	1,418.5	1,411.9	249.9	185.4	64.51	3.874		
7,700.0	7,313.5	7,772.1	7,313.5	38.2	40.9	-0.36	1,418.5	1,411.9	249.9	185.2	64.72	3.861		
7,800.0	7,413.5	7,872.1	7,413.5	38.3	40.9	-0.36	1,418.5	1,411.9	249.9	185.0	64.94	3.848		
7,900.0	7,513.5	7,972.1	7,513.5	38.4	41.0	-0.36	1,418.5	1,411.9	249.9	184.7	65.15	3.836		
8,000.0	7,613.5	8,072.1	7,613.5	38.5	41.1	-0.36	1,418.5	1,411.9	249.9	184.5	65.37	3.823		
8,100.0	7,713.5	8,172.1	7,713.5	38.6	41.2	-0.36	1,418.5	1,411.9	249.9	184.3	65.59	3.810		
8,200.0	7,813.5	8,272.1	7,813.5	38.7	41.3	-0.36	1,418.5	1,411.9	249.9	184.1	65.81	3.797		
8,300.0	7,913.5	8,372.1	7,913.5	38.8	41.4	-0.36	1,418.5	1,411.9	249.9	183.9	66.03	3.784		
8,302.5	7,916.0	8,374.6	7,916.0	38.8	41.4	-0.36	1,418.5	1,411.9	249.9	183.9	66.04	3.784		



Archer

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Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
0.0	0.0	0.0	0.0	0.0	0.0	-127.66	-6.1	-7.9	9.9					
100.0	100.0	100.0	100.0	0.1	0.1	-127.66	-6.1	-7.9	9.9	9.8	0.18	56.675	CC, ES	
200.0	200.0	200.0	200.0	0.3	0.3	-178.36	-6.1	-7.9	11.7	11.0	0.68	17.098		
300.0	299.8	300.4	300.4	0.6	0.5	-179.50	-5.1	-6.4	15.2	14.0	1.19	12.701		
400.0	399.5	400.9	400.7	0.8	0.8	178.55	-2.2	-2.0	18.7	17.0	1.70	10.963		
500.0	498.7	501.6	501.0	1.1	1.0	176.18	2.6	5.4	22.2	20.0	2.22	10.004		
600.0	597.5	602.3	601.0	1.4	1.3	173.58	9.3	15.8	25.8	23.1	2.75	9.391		
700.0	695.6	703.2	700.6	1.8	1.6	170.83	17.9	29.1	29.5	26.2	3.30	8.953		
800.0	793.1	804.2	799.7	2.3	2.0	168.03	28.5	45.4	33.4	29.5	3.88	8.604		
900.0	889.6	905.2	898.1	2.8	2.5	165.20	41.0	64.6	37.4	32.9	4.50	8.294		
1,000.0	985.3	1,006.4	995.8	3.3	3.0	162.38	55.4	86.7	41.5	36.3	5.19	7.995		
1,100.0	1,079.8	1,107.7	1,092.6	4.0	3.5	159.60	71.6	111.7	45.8	39.9	5.96	7.690		
1,200.0	1,173.2	1,209.1	1,188.3	4.7	4.2	156.88	89.8	139.6	50.4	43.6	6.84	7.372		
1,300.0	1,265.2	1,310.5	1,282.9	5.4	4.9	154.23	109.8	170.4	55.2	47.3	7.83	7.049		
1,400.0	1,355.8	1,412.1	1,376.2	6.2	5.6	151.66	131.6	203.9	60.2	51.2	8.96	6.720		
1,500.0	1,445.2	1,512.7	1,467.5	7.1	6.5	149.25	154.7	239.5	65.4	55.2	10.21	6.402		
1,600.0	1,534.5	1,612.5	1,557.9	8.0	7.3	147.19	177.7	275.0	70.6	59.1	11.54	6.121		
1,700.0	1,623.8	1,712.3	1,648.3	8.9	8.2	145.41	200.8	310.4	75.9	63.0	12.92	5.879		
1,800.0	1,713.1	1,812.2	1,738.7	9.8	9.0	143.87	223.9	345.9	81.3	67.0	14.34	5.672		
1,900.0	1,802.4	1,912.0	1,829.1	10.7	9.9	142.52	246.9	381.4	86.8	71.0	15.79	5.495		
2,000.0	1,891.7	2,011.8	1,919.5	11.6	10.7	141.33	270.0	416.9	92.3	75.0	17.27	5.343		
2,100.0	1,981.0	2,111.7	2,010.0	12.5	11.6	140.27	293.0	452.4	97.8	79.0	18.76	5.211		
2,200.0	2,070.3	2,211.5	2,100.4	13.4	12.4	139.33	316.1	487.9	103.3	83.1	20.27	5.097		
2,300.0	2,159.6	2,311.3	2,190.8	14.3	13.3	138.48	339.2	523.4	108.9	87.1	21.80	4.996		
2,400.0	2,248.9	2,411.2	2,281.2	15.2	14.1	137.72	362.2	558.9	114.5	91.2	23.33	4.908		
2,500.0	2,338.2	2,511.0	2,371.6	16.1	15.0	137.03	385.3	594.3	120.1	95.2	24.87	4.830		
2,600.0	2,427.4	2,610.8	2,462.0	17.0	15.9	136.40	408.4	629.8	125.7	99.3	26.41	4.761		
2,700.0	2,516.7	2,710.6	2,552.5	17.9	16.7	135.82	431.4	665.3	131.4	103.4	27.96	4.698		
2,800.0	2,606.0	2,810.5	2,642.9	18.8	17.6	135.29	454.5	700.8	137.0	107.5	29.52	4.642		
2,900.0	2,695.3	2,910.3	2,733.3	19.8	18.4	134.80	477.6	736.3	142.7	111.6	31.08	4.592		
3,000.0	2,784.6	3,010.1	2,823.7	20.7	19.3	134.35	500.6	771.8	148.4	115.7	32.64	4.546		
3,100.0	2,873.9	3,110.0	2,914.1	21.6	20.2	133.94	523.7	807.3	154.1	119.9	34.21	4.504		
3,200.0	2,963.2	3,209.8	3,004.5	22.5	21.0	133.55	546.7	842.8	159.8	124.0	35.78	4.466		
3,300.0	3,052.5	3,309.6	3,095.0	23.4	21.9	133.19	569.8	878.3	165.5	128.1	37.35	4.430		
3,400.0	3,141.8	3,409.5	3,185.4	24.3	22.8	132.85	592.9	913.7	171.2	132.2	38.92	4.398		
3,500.0	3,231.1	3,509.3	3,275.8	25.2	23.6	132.54	615.9	949.2	176.9	136.4	40.49	4.368		
3,600.0	3,320.4	3,609.1	3,366.2	26.1	24.5	132.24	639.0	984.7	182.6	140.5	42.07	4.341		
3,700.0	3,409.6	3,709.0	3,456.6	27.0	25.4	131.97	662.1	1,020.2	188.3	144.7	43.64	4.315		
3,800.0	3,498.9	3,808.8	3,547.0	28.0	26.2	131.71	685.1	1,055.7	194.0	148.8	45.22	4.291		
3,900.0	3,588.2	3,908.6	3,637.5	28.9	27.1	131.46	708.2	1,091.2	199.8	153.0	46.80	4.269		
4,000.0	3,677.5	4,008.5	3,727.9	29.8	28.0	131.23	731.3	1,126.7	205.5	157.1	48.38	4.248		
4,100.0	3,766.8	4,108.3	3,818.3	30.7	28.8	131.01	754.3	1,162.2	211.2	161.3	49.96	4.228		
4,200.0	3,856.3	4,207.1	3,907.8	31.5	29.7	130.78	777.1	1,197.2	216.7	165.2	51.49	4.209		
4,300.0	3,947.1	4,302.8	3,995.5	32.2	30.3	130.51	798.0	1,229.4	221.6	168.8	52.77	4.200		
4,400.0	4,039.4	4,400.0	4,085.8	32.9	30.9	130.27	817.6	1,259.5	226.1	172.2	53.95	4.191		
4,500.0	4,132.9	4,494.1	4,174.3	33.5	31.4	130.08	834.9	1,286.2	230.2	175.2	55.02	4.185		
4,600.0	4,227.6	4,589.7	4,265.3	34.0	31.9	129.90	851.0	1,310.9	234.0	178.0	55.99	4.179		
4,700.0	4,323.3	4,685.3	4,357.2	34.5	32.4	129.74	865.3	1,332.9	237.4	180.5	56.87	4.174		
4,800.0	4,420.1	4,780.9	4,449.9	34.9	32.8	129.61	878.0	1,352.4	240.3	182.7	57.64	4.169		
4,900.0	4,517.6	4,876.5	4,543.3	35.3	33.1	129.50	888.9	1,369.3	242.9	184.6	58.31	4.166		
5,000.0	4,615.8	4,972.0	4,637.4	35.6	33.4	129.41	898.2	1,383.5	245.1	186.2	58.88	4.162		
5,100.0	4,714.7	5,067.5	4,731.9	35.9	33.7	129.34	905.7	1,395.2	246.9	187.5	59.35	4.159		

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



Archer

Anticollision Report



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
5,200.0	4,814.0	5,163.1	4,826.8	36.1	33.9	129.28	911.6	1,404.1	248.2	188.5	59.72	4.156		
5,300.0	4,913.6	5,258.6	4,922.0	36.3	34.1	129.25	915.7	1,410.4	249.2	189.2	60.00	4.153		
5,400.0	5,013.5	5,354.1	5,017.4	36.4	34.2	129.22	918.0	1,414.1	249.7	189.6	60.17	4.151		
5,500.0	5,113.5	5,450.2	5,113.5	36.5	34.3	179.64	918.7	1,415.1	249.9	189.6	60.27	4.147		
5,600.0	5,213.5	5,550.2	5,213.5	36.6	34.3	179.64	918.7	1,415.1	249.9	189.5	60.42	4.136		
5,700.0	5,313.5	5,650.2	5,313.5	36.6	34.4	179.64	918.7	1,415.1	249.9	189.3	60.58	4.125		
5,800.0	5,413.5	5,750.2	5,413.5	36.7	34.5	179.64	918.7	1,415.1	249.9	189.2	60.74	4.114		
5,900.0	5,513.5	5,850.2	5,513.5	36.8	34.5	179.64	918.7	1,415.1	249.9	189.0	60.91	4.103		
6,000.0	5,613.5	5,950.2	5,613.5	36.8	34.6	179.64	918.7	1,415.1	249.9	188.8	61.08	4.091		
6,100.0	5,713.5	6,050.2	5,713.5	36.9	34.7	179.64	918.7	1,415.1	249.9	188.6	61.25	4.080		
6,200.0	5,813.5	6,150.2	5,813.5	37.0	34.8	179.64	918.7	1,415.1	249.9	188.5	61.42	4.068		
6,300.0	5,913.5	6,250.2	5,913.5	37.1	34.8	179.64	918.7	1,415.1	249.9	188.3	61.60	4.057		
6,400.0	6,013.5	6,350.2	6,013.5	37.1	34.9	179.64	918.7	1,415.1	249.9	188.1	61.78	4.045		
6,500.0	6,113.5	6,450.2	6,113.5	37.2	35.0	179.64	918.7	1,415.1	249.9	187.9	61.96	4.033		
6,600.0	6,213.5	6,550.2	6,213.5	37.3	35.1	179.64	918.7	1,415.1	249.9	187.7	62.15	4.021		
6,700.0	6,313.5	6,650.2	6,313.5	37.4	35.2	179.64	918.7	1,415.1	249.9	187.6	62.34	4.009		
6,800.0	6,413.5	6,750.2	6,413.5	37.4	35.3	179.64	918.7	1,415.1	249.9	187.4	62.53	3.997		
6,900.0	6,513.5	6,850.2	6,513.5	37.5	35.3	179.64	918.7	1,415.1	249.9	187.2	62.72	3.984		
7,000.0	6,613.5	6,950.2	6,613.5	37.6	35.4	179.64	918.7	1,415.1	249.9	187.0	62.92	3.972		
7,100.0	6,713.5	7,050.2	6,713.5	37.7	35.5	179.64	918.7	1,415.1	249.9	186.8	63.12	3.959		
7,200.0	6,813.5	7,150.2	6,813.5	37.8	35.6	179.64	918.7	1,415.1	249.9	186.6	63.32	3.947		
7,300.0	6,913.5	7,250.2	6,913.5	37.8	35.7	179.64	918.7	1,415.1	249.9	186.4	63.52	3.934		
7,400.0	7,013.5	7,350.2	7,013.5	37.9	35.8	179.64	918.7	1,415.1	249.9	186.2	63.73	3.921		
7,500.0	7,113.5	7,450.2	7,113.5	38.0	35.9	179.64	918.7	1,415.1	249.9	186.0	63.94	3.909		
7,600.0	7,213.5	7,550.2	7,213.5	38.1	36.0	179.64	918.7	1,415.1	249.9	185.8	64.15	3.896		
7,700.0	7,313.5	7,650.2	7,313.5	38.2	36.1	179.64	918.7	1,415.1	249.9	185.5	64.36	3.883		
7,800.0	7,413.5	7,750.2	7,413.5	38.3	36.2	179.64	918.7	1,415.1	249.9	185.3	64.58	3.870		
7,900.0	7,513.5	7,850.2	7,513.5	38.4	36.3	179.64	918.7	1,415.1	249.9	185.1	64.80	3.857		
8,000.0	7,613.5	7,950.2	7,613.5	38.5	36.4	179.64	918.7	1,415.1	249.9	184.9	65.02	3.844		
8,100.0	7,713.5	8,050.2	7,713.5	38.6	36.5	179.64	918.7	1,415.1	249.9	184.7	65.24	3.830		
8,200.0	7,813.5	8,150.2	7,813.5	38.7	36.6	179.64	918.7	1,415.1	249.9	184.4	65.47	3.817		
8,266.5	7,880.0	8,216.7	7,880.0	38.7	36.6	179.64	918.7	1,415.1	249.9	184.3	65.62	3.808		
8,300.0	7,913.5	8,249.7	7,913.0	38.8	36.7	179.64	918.7	1,415.1	249.9	184.2	65.69	3.804 SF		
8,302.5	7,916.0	8,249.7	7,913.0	38.8	36.7	179.64	918.7	1,415.1	249.9	184.2	65.70	3.804		

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 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
0.0	0.0	0.0	0.0	0.0	0.0	142.13	-8.1	6.3	10.3					
100.0	100.0	100.0	100.0	0.1	0.1	142.13	-8.1	6.3	10.3	10.1	0.18	58.478	CC	
115.0	115.0	115.0	115.0	0.1	0.1	91.94	-8.1	6.3	10.3	10.0	0.24	42.255		
200.0	200.0	200.0	200.0	0.3	0.3	101.32	-8.1	6.3	10.5	9.8	0.63	16.712	ES	
300.0	299.8	299.8	299.8	0.6	0.5	125.34	-8.1	6.3	12.6	11.4	1.13	11.164		
400.0	399.5	399.5	399.5	0.8	0.8	147.22	-8.1	6.3	19.0	17.3	1.68	11.279		
500.0	498.7	498.7	498.7	1.1	1.0	159.84	-8.1	6.3	30.0	27.8	2.23	13.428		
600.0	597.5	598.8	598.8	1.4	1.2	165.68	-7.4	7.8	43.5	40.8	2.75	15.798		
700.0	695.6	699.4	699.2	1.8	1.4	167.92	-5.1	12.5	57.5	54.3	3.27	17.621		
800.0	793.1	800.4	799.9	2.3	1.7	168.61	-1.3	20.5	71.8	68.1	3.79	18.962		
900.0	889.6	901.9	900.6	2.8	1.9	168.50	4.1	31.7	86.4	82.0	4.33	19.940		
1,000.0	985.3	1,003.8	1,001.2	3.3	2.2	167.94	11.0	46.1	101.1	96.2	4.90	20.632		
1,100.0	1,079.8	1,106.2	1,101.6	4.0	2.6	167.09	19.5	63.9	116.1	110.6	5.50	21.086		
1,200.0	1,173.2	1,208.9	1,201.7	4.7	3.0	166.04	29.7	85.0	131.2	125.1	6.15	21.329		
1,300.0	1,265.2	1,312.1	1,301.3	5.4	3.5	164.87	41.4	109.4	146.6	139.8	6.86	21.382		
1,400.0	1,355.8	1,415.7	1,400.2	6.2	4.1	163.61	54.7	137.1	162.3	154.6	7.63	21.261		
1,500.0	1,445.2	1,519.9	1,498.4	7.1	4.7	162.27	69.6	168.2	177.5	169.1	8.47	20.955		
1,600.0	1,534.5	1,624.7	1,596.0	8.0	5.4	160.59	86.2	202.8	190.1	180.6	9.44	20.143		
1,700.0	1,623.8	1,730.0	1,692.5	8.9	6.2	158.51	104.4	240.7	199.7	189.1	10.55	18.929		
1,800.0	1,713.1	1,831.3	1,784.2	9.8	7.0	156.24	123.0	279.5	207.3	195.5	11.79	17.578		
1,900.0	1,802.4	1,930.7	1,874.1	10.7	7.8	154.14	141.4	317.7	215.0	201.9	13.11	16.400		
2,000.0	1,891.7	2,030.1	1,964.0	11.6	8.7	152.19	159.7	356.0	223.0	208.5	14.50	15.380		
2,100.0	1,981.0	2,129.5	2,053.9	12.5	9.5	150.37	178.1	394.2	231.3	215.3	15.95	14.499		
2,200.0	2,070.3	2,228.9	2,143.8	13.4	10.4	148.68	196.4	432.4	239.7	222.3	17.45	13.738		
2,300.0	2,159.6	2,328.3	2,233.7	14.3	11.2	147.11	214.8	470.7	248.4	229.4	18.99	13.079		
2,400.0	2,248.9	2,427.7	2,323.6	15.2	12.1	145.65	233.1	508.9	257.2	236.7	20.57	12.506		
2,500.0	2,338.2	2,527.1	2,413.5	16.1	13.0	144.28	251.5	547.1	266.2	244.1	22.17	12.006		
2,600.0	2,427.4	2,626.5	2,503.4	17.0	13.8	143.00	269.8	585.4	275.4	251.6	23.81	11.567		
2,700.0	2,516.7	2,725.9	2,593.3	17.9	14.7	141.80	288.2	623.6	284.6	259.2	25.46	11.181		
2,800.0	2,606.0	2,825.3	2,683.2	18.8	15.6	140.68	306.5	661.8	294.0	266.9	27.12	10.839		
2,900.0	2,695.3	2,924.7	2,773.1	19.8	16.5	139.63	324.9	700.0	303.5	274.7	28.81	10.534		
3,000.0	2,784.6	3,024.1	2,863.0	20.7	17.3	138.64	343.2	738.3	313.0	282.5	30.50	10.263		
3,100.0	2,873.9	3,123.5	2,952.9	21.6	18.2	137.71	361.6	776.5	322.7	290.5	32.21	10.020		
3,200.0	2,963.2	3,222.9	3,042.8	22.5	19.1	136.84	379.9	814.7	332.5	298.5	33.92	9.801		
3,300.0	3,052.5	3,322.3	3,132.7	23.4	19.9	136.01	398.3	853.0	342.3	306.6	35.64	9.603		
3,400.0	3,141.8	3,421.7	3,222.6	24.3	20.8	135.23	416.6	891.2	352.1	314.8	37.37	9.423		
3,500.0	3,231.1	3,521.1	3,312.5	25.2	21.7	134.50	435.0	929.4	362.1	323.0	39.10	9.260		
3,600.0	3,320.4	3,620.5	3,402.4	26.1	22.6	133.80	453.3	967.7	372.1	331.3	40.84	9.111		
3,700.0	3,409.6	3,719.9	3,492.3	27.0	23.5	133.14	471.6	1,005.9	382.1	339.6	42.58	8.975		
3,800.0	3,498.9	3,819.3	3,582.2	28.0	24.3	132.51	490.0	1,044.1	392.2	347.9	44.32	8.850		
3,900.0	3,588.2	3,918.7	3,672.1	28.9	25.2	131.92	508.3	1,082.4	402.4	356.3	46.07	8.734		
4,000.0	3,677.5	4,018.1	3,762.0	29.8	26.1	131.35	526.7	1,120.6	412.6	364.7	47.82	8.628		
4,100.0	3,766.8	4,117.4	3,851.9	30.7	27.0	130.81	545.0	1,158.8	422.8	373.2	49.57	8.529		
4,200.0	3,856.3	4,212.2	3,938.0	31.5	27.7	130.45	562.2	1,194.6	433.1	382.0	51.14	8.469		
4,300.0	3,947.1	4,305.1	4,023.5	32.2	28.3	130.24	577.9	1,227.4	442.9	390.5	52.41	8.451		
4,400.0	4,039.4	4,400.0	4,112.0	32.9	28.9	130.04	592.7	1,258.2	452.0	398.4	53.61	8.432		
4,500.0	4,132.9	4,491.0	4,197.9	33.5	29.4	129.88	605.7	1,285.3	460.3	405.6	54.67	8.419		
4,600.0	4,227.6	4,584.0	4,286.6	34.0	29.9	129.74	617.8	1,310.4	467.8	412.2	55.65	8.407		
4,700.0	4,323.3	4,677.0	4,376.2	34.5	30.3	129.62	628.6	1,332.9	474.6	418.1	56.53	8.395		
4,800.0	4,420.1	4,770.0	4,466.5	34.9	30.7	129.52	638.1	1,352.7	480.6	423.3	57.31	8.386		
4,900.0	4,517.6	4,863.0	4,557.5	35.3	31.1	129.44	646.4	1,369.9	485.7	427.8	57.99	8.377		
5,000.0	4,615.8	4,956.0	4,649.2	35.6	31.3	129.37	653.3	1,384.5	490.1	431.6	58.56	8.369		

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



Archer
Anticollision Report



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
5,100.0	4,714.7	5,049.1	4,741.3	35.9	31.6	129.31	659.0	1,396.3	493.7	434.6	59.04	8.362		
5,200.0	4,814.0	5,142.1	4,833.8	36.1	31.8	129.27	663.4	1,405.5	496.4	437.0	59.42	8.355		
5,300.0	4,913.6	5,235.2	4,926.5	36.3	32.0	129.24	666.5	1,411.9	498.4	438.7	59.70	8.348		
5,400.0	5,013.5	5,328.3	5,019.5	36.4	32.1	129.22	668.3	1,415.6	499.5	439.6	59.88	8.342		
5,500.0	5,113.5	5,422.3	5,113.5	36.5	32.2	179.64	668.8	1,416.7	499.8	439.8	59.99	8.332		
5,600.0	5,213.5	5,522.3	5,213.5	36.6	32.2	179.64	668.8	1,416.7	499.8	439.7	60.14	8.311		
5,700.0	5,313.5	5,622.3	5,313.5	36.6	32.3	179.64	668.8	1,416.7	499.8	439.5	60.30	8.288		
5,800.0	5,413.5	5,722.3	5,413.5	36.7	32.4	179.64	668.8	1,416.7	499.8	439.3	60.46	8.266		
5,900.0	5,513.5	5,822.3	5,513.5	36.8	32.5	179.64	668.8	1,416.7	499.8	439.2	60.63	8.243		
6,000.0	5,613.5	5,922.3	5,613.5	36.8	32.5	179.64	668.8	1,416.7	499.8	439.0	60.80	8.220		
6,100.0	5,713.5	6,022.3	5,713.5	36.9	32.6	179.64	668.8	1,416.7	499.8	438.8	60.97	8.197		
6,200.0	5,813.5	6,122.3	5,813.5	37.0	32.7	179.64	668.8	1,416.7	499.8	438.6	61.15	8.173		
6,300.0	5,913.5	6,222.3	5,913.5	37.1	32.8	179.64	668.8	1,416.7	499.8	438.5	61.33	8.149		
6,400.0	6,013.5	6,322.3	6,013.5	37.1	32.9	179.64	668.8	1,416.7	499.8	438.3	61.51	8.125		
6,500.0	6,113.5	6,422.3	6,113.5	37.2	33.0	179.64	668.8	1,416.7	499.8	438.1	61.69	8.101		
6,600.0	6,213.5	6,522.3	6,213.5	37.3	33.1	179.64	668.8	1,416.7	499.8	437.9	61.88	8.077		
6,700.0	6,313.5	6,622.3	6,313.5	37.4	33.1	179.64	668.8	1,416.7	499.8	437.7	62.07	8.052		
6,800.0	6,413.5	6,722.3	6,413.5	37.4	33.2	179.64	668.8	1,416.7	499.8	437.5	62.26	8.027		
6,900.0	6,513.5	6,822.3	6,513.5	37.5	33.3	179.64	668.8	1,416.7	499.8	437.3	62.46	8.002		
7,000.0	6,613.5	6,922.3	6,613.5	37.6	33.4	179.64	668.8	1,416.7	499.8	437.1	62.65	7.977		
7,100.0	6,713.5	7,022.3	6,713.5	37.7	33.5	179.64	668.8	1,416.7	499.8	436.9	62.85	7.952		
7,200.0	6,813.5	7,122.3	6,813.5	37.8	33.6	179.64	668.8	1,416.7	499.8	436.7	63.06	7.926		
7,300.0	6,913.5	7,222.3	6,913.5	37.8	33.7	179.64	668.8	1,416.7	499.8	436.5	63.26	7.900		
7,400.0	7,013.5	7,322.3	7,013.5	37.9	33.8	179.64	668.8	1,416.7	499.8	436.3	63.47	7.875		
7,500.0	7,113.5	7,422.3	7,113.5	38.0	33.9	179.64	668.8	1,416.7	499.8	436.1	63.68	7.849		
7,600.0	7,213.5	7,522.3	7,213.5	38.1	34.0	179.64	668.8	1,416.7	499.8	435.9	63.89	7.822		
7,700.0	7,313.5	7,622.3	7,313.5	38.2	34.1	179.64	668.8	1,416.7	499.8	435.7	64.11	7.796		
7,800.0	7,413.5	7,722.3	7,413.5	38.3	34.2	179.64	668.8	1,416.7	499.8	435.5	64.32	7.770		
7,900.0	7,513.5	7,822.3	7,513.5	38.4	34.3	179.64	668.8	1,416.7	499.8	435.3	64.54	7.743		
8,000.0	7,613.5	7,922.3	7,613.5	38.5	34.4	179.64	668.8	1,416.7	499.8	435.0	64.77	7.717		
8,100.0	7,713.5	8,022.3	7,713.5	38.6	34.5	179.64	668.8	1,416.7	499.8	434.8	64.99	7.690		
8,200.0	7,813.5	8,122.3	7,813.5	38.7	34.6	179.64	668.8	1,416.7	499.8	434.6	65.22	7.663		
8,264.7	7,878.2	8,187.0	7,878.2	38.7	34.7	179.64	668.8	1,416.7	499.8	434.4	65.37	7.646		
8,300.0	7,913.5	8,216.8	7,908.0	38.8	34.7	179.64	668.8	1,416.7	499.8	434.4	65.44	7.638 SF		
8,302.5	7,916.0	8,216.8	7,908.0	38.8	34.7	179.64	668.8	1,416.7	499.9	434.4	65.44	7.638		

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 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
0.0	0.0	0.0	0.0	0.0	0.0	-173.66	-14.2	-1.6	14.3					
100.0	100.0	100.0	100.0	0.1	0.1	-173.66	-14.2	-1.6	14.3	14.1	0.18	81.288	CC, ES	
200.0	200.0	200.0	200.0	0.3	0.3	140.38	-14.2	-1.6	15.6	14.9	0.66	23.572		
300.0	299.8	299.8	299.8	0.6	0.5	150.00	-14.2	-1.6	19.9	18.7	1.18	16.876		
400.0	399.5	399.5	399.5	0.8	0.8	158.97	-14.2	-1.6	27.8	26.1	1.71	16.238		
500.0	498.7	498.7	498.7	1.1	1.0	165.28	-14.2	-1.6	39.4	37.1	2.24	17.574		
600.0	597.5	597.5	597.5	1.4	1.2	169.39	-14.2	-1.6	54.7	51.9	2.77	19.747		
700.0	695.6	695.6	695.6	1.8	1.4	172.08	-14.2	-1.6	73.5	70.2	3.29	22.325		
800.0	793.1	795.8	795.8	2.3	1.6	173.45	-13.7	0.0	94.5	90.7	3.81	24.824		
900.0	889.6	896.8	896.8	2.8	1.9	173.65	-12.2	4.9	115.9	111.6	4.31	26.862		
1,000.0	985.3	998.3	997.8	3.3	2.1	173.21	-9.6	13.3	137.6	132.8	4.84	28.452		
1,100.0	1,079.8	1,100.4	1,099.1	4.0	2.4	172.38	-6.0	25.1	159.7	154.4	5.38	29.677		
1,200.0	1,173.2	1,203.1	1,200.5	4.7	2.6	171.30	-1.3	40.6	182.2	176.3	5.96	30.586		
1,300.0	1,265.2	1,306.3	1,301.8	5.4	3.0	170.05	4.5	59.6	205.2	198.6	6.57	31.207		
1,400.0	1,355.8	1,410.1	1,402.8	6.2	3.4	168.68	11.4	82.2	228.5	221.3	7.24	31.557		
1,500.0	1,445.2	1,514.5	1,503.6	7.1	3.9	167.26	19.4	108.4	251.7	243.8	7.96	31.620		
1,600.0	1,534.5	1,620.0	1,604.3	8.0	4.4	165.65	28.6	138.5	272.3	263.6	8.77	31.062		
1,700.0	1,623.8	1,726.5	1,704.6	8.9	5.1	163.79	38.9	172.4	290.2	280.6	9.69	29.951		
1,800.0	1,713.1	1,833.5	1,804.2	9.8	5.8	161.69	50.4	210.1	305.5	294.8	10.76	28.392		
1,900.0	1,802.4	1,940.9	1,902.4	10.7	6.6	159.32	63.0	251.5	318.4	306.4	12.00	26.536		
2,000.0	1,891.7	2,042.6	1,994.3	11.6	7.4	156.89	75.8	293.3	329.5	316.1	13.36	24.670		
2,100.0	1,981.0	2,141.1	2,083.1	12.5	8.2	154.67	88.2	334.0	340.9	326.2	14.78	23.065		
2,200.0	2,070.3	2,239.6	2,171.9	13.4	9.1	152.60	100.6	374.7	352.9	336.6	16.28	21.676		
2,300.0	2,159.6	2,338.1	2,260.7	14.3	9.9	150.66	113.0	415.4	365.3	347.4	17.84	20.477		
2,400.0	2,248.9	2,436.5	2,349.6	15.2	10.8	148.84	125.4	456.1	378.1	358.6	19.45	19.442		
2,500.0	2,338.2	2,535.0	2,438.4	16.1	11.7	147.15	137.8	496.8	391.2	370.1	21.09	18.546		
2,600.0	2,427.4	2,633.5	2,527.2	17.0	12.5	145.57	150.3	537.5	404.6	381.9	22.77	17.768		
2,700.0	2,516.7	2,732.0	2,616.0	17.9	13.4	144.08	162.7	578.2	418.4	393.9	24.48	17.090		
2,800.0	2,606.0	2,830.5	2,704.8	18.8	14.3	142.70	175.1	618.9	432.4	406.1	26.21	16.496		
2,900.0	2,695.3	2,929.0	2,793.6	19.8	15.2	141.39	187.5	659.6	446.6	418.6	27.96	15.974		
3,000.0	2,784.6	3,027.4	2,882.5	20.7	16.1	140.17	199.9	700.3	461.0	431.3	29.72	15.513		
3,100.0	2,873.9	3,125.9	2,971.3	21.6	17.0	139.03	212.3	741.0	475.7	444.2	31.49	15.104		
3,200.0	2,963.2	3,224.4	3,060.1	22.5	17.8	137.95	224.7	781.7	490.5	457.2	33.27	14.740		
3,300.0	3,052.5	3,322.9	3,148.9	23.4	18.7	136.93	237.2	822.4	505.5	470.4	35.06	14.415		
3,400.0	3,141.8	3,421.4	3,237.7	24.3	19.6	135.97	249.6	863.1	520.6	483.7	36.86	14.123		
3,500.0	3,231.1	3,519.9	3,326.5	25.2	20.5	135.07	262.0	903.8	535.8	497.2	38.66	13.859		
3,600.0	3,320.4	3,618.3	3,415.4	26.1	21.4	134.22	274.4	944.5	551.2	510.8	40.47	13.621		
3,700.0	3,409.6	3,716.8	3,504.2	27.0	22.3	133.41	286.8	985.2	566.7	524.4	42.27	13.405		
3,800.0	3,498.9	3,815.3	3,593.0	28.0	23.2	132.64	299.2	1,025.9	582.3	538.2	44.08	13.209		
3,900.0	3,588.2	3,913.8	3,681.8	28.9	24.1	131.92	311.6	1,066.6	598.0	552.1	45.90	13.030		
4,000.0	3,677.5	4,012.3	3,770.6	29.8	25.0	131.23	324.1	1,107.3	613.8	566.1	47.71	12.866		
4,100.0	3,766.8	4,110.8	3,859.4	30.7	25.9	130.58	336.5	1,148.0	629.7	580.1	49.52	12.715		
4,200.0	3,856.3	4,209.5	3,940.5	31.5	26.6	130.03	347.4	1,183.8	645.8	594.7	51.08	12.644		
4,300.0	3,947.1	4,294.5	4,027.5	32.2	27.2	130.03	358.1	1,219.0	661.1	608.7	52.40	12.615		
4,400.0	4,039.4	4,386.4	4,113.3	32.9	27.8	129.87	367.8	1,250.6	675.2	621.6	53.61	12.594		
4,500.0	4,132.9	4,478.6	4,200.3	33.5	28.3	129.74	376.6	1,279.6	688.1	633.4	54.72	12.576		
4,600.0	4,227.6	4,570.9	4,288.4	34.0	28.8	129.63	384.7	1,306.0	699.9	644.1	55.73	12.559		
4,700.0	4,323.3	4,663.4	4,377.5	34.5	29.2	129.53	391.9	1,329.7	710.4	653.8	56.63	12.544		
4,800.0	4,420.1	4,756.0	4,467.4	34.9	29.6	129.45	398.3	1,350.6	719.7	662.3	57.44	12.530		
4,900.0	4,517.6	4,848.7	4,558.2	35.3	29.9	129.39	403.8	1,368.8	727.8	669.6	58.14	12.518		
5,000.0	4,615.8	4,941.5	4,649.6	35.6	30.2	129.33	408.5	1,384.2	734.6	675.9	58.74	12.507		
5,100.0	4,714.7	5,034.3	4,741.5	35.9	30.5	129.29	412.3	1,396.7	740.2	680.9	59.23	12.496		

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



Archer
Anticollision Report



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
5,200.0	4,814.0	5,127.3	4,833.9	36.1	30.7	129.26	415.3	1,406.4	744.4	684.8	59.63	12.485		
5,300.0	4,913.6	5,220.3	4,926.6	36.3	30.8	129.23	417.4	1,413.2	747.5	687.6	59.92	12.474		
5,400.0	5,013.5	5,313.3	5,019.5	36.4	31.0	129.22	418.6	1,417.2	749.2	689.1	60.12	12.463		
5,500.0	5,113.5	5,407.3	5,113.5	36.5	31.0	179.64	418.9	1,418.2	749.7	689.5	60.23	12.448		
5,600.0	5,213.5	5,507.3	5,213.5	36.6	31.1	179.64	418.9	1,418.2	749.7	689.3	60.39	12.415		
5,700.0	5,313.5	5,607.3	5,313.5	36.6	31.2	179.64	418.9	1,418.2	749.7	689.1	60.55	12.382		
5,800.0	5,413.5	5,707.3	5,413.5	36.7	31.3	179.64	418.9	1,418.2	749.7	689.0	60.71	12.348		
5,900.0	5,513.5	5,807.3	5,513.5	36.8	31.4	179.64	418.9	1,418.2	749.7	688.8	60.88	12.314		
6,000.0	5,613.5	5,907.3	5,613.5	36.8	31.4	179.64	418.9	1,418.2	749.7	688.6	61.05	12.280		
6,100.0	5,713.5	6,007.3	5,713.5	36.9	31.5	179.64	418.9	1,418.2	749.7	688.5	61.22	12.246		
6,200.0	5,813.5	6,107.3	5,813.5	37.0	31.6	179.64	418.9	1,418.2	749.7	688.3	61.40	12.211		
6,300.0	5,913.5	6,207.3	5,913.5	37.1	31.7	179.64	418.9	1,418.2	749.7	688.1	61.58	12.175		
6,400.0	6,013.5	6,307.3	6,013.5	37.1	31.8	179.64	418.9	1,418.2	749.7	687.9	61.76	12.139		
6,500.0	6,113.5	6,407.3	6,113.5	37.2	31.9	179.64	418.9	1,418.2	749.7	687.8	61.94	12.103		
6,600.0	6,213.5	6,507.3	6,213.5	37.3	32.0	179.64	418.9	1,418.2	749.7	687.6	62.13	12.067		
6,700.0	6,313.5	6,607.3	6,313.5	37.4	32.1	179.64	418.9	1,418.2	749.7	687.4	62.32	12.030		
6,800.0	6,413.5	6,707.3	6,413.5	37.4	32.2	179.64	418.9	1,418.2	749.7	687.2	62.51	11.994		
6,900.0	6,513.5	6,807.3	6,513.5	37.5	32.3	179.64	418.9	1,418.2	749.7	687.0	62.70	11.956		
7,000.0	6,613.5	6,907.3	6,613.5	37.6	32.4	179.64	418.9	1,418.2	749.7	686.8	62.90	11.919		
7,100.0	6,713.5	7,007.3	6,713.5	37.7	32.4	179.64	418.9	1,418.2	749.7	686.6	63.10	11.881		
7,200.0	6,813.5	7,107.3	6,813.5	37.8	32.5	179.64	418.9	1,418.2	749.7	686.4	63.30	11.843		
7,300.0	6,913.5	7,207.3	6,913.5	37.8	32.6	179.64	418.9	1,418.2	749.7	686.2	63.51	11.805		
7,400.0	7,013.5	7,307.3	7,013.5	37.9	32.7	179.64	418.9	1,418.2	749.7	686.0	63.71	11.767		
7,500.0	7,113.5	7,407.3	7,113.5	38.0	32.9	179.64	418.9	1,418.2	749.7	685.8	63.92	11.728		
7,600.0	7,213.5	7,507.3	7,213.5	38.1	33.0	179.64	418.9	1,418.2	749.7	685.6	64.14	11.689		
7,700.0	7,313.5	7,607.3	7,313.5	38.2	33.1	179.64	418.9	1,418.2	749.7	685.3	64.35	11.650		
7,800.0	7,413.5	7,707.3	7,413.5	38.3	33.2	179.64	418.9	1,418.2	749.7	685.1	64.57	11.611		
7,900.0	7,513.5	7,807.3	7,513.5	38.4	33.3	179.64	418.9	1,418.2	749.7	684.9	64.79	11.572		
8,000.0	7,613.5	7,907.3	7,613.5	38.5	33.4	179.64	418.9	1,418.2	749.7	684.7	65.01	11.532		
8,100.0	7,713.5	8,007.3	7,713.5	38.6	33.5	179.64	418.9	1,418.2	749.7	684.5	65.23	11.492		
8,200.0	7,813.5	8,107.3	7,813.5	38.7	33.6	179.64	418.9	1,418.2	749.7	684.2	65.46	11.453		
8,262.8	7,876.3	8,170.0	7,876.3	38.7	33.7	179.64	418.9	1,418.2	749.7	684.1	65.60	11.428		
8,300.0	7,913.5	8,196.8	7,903.0	38.8	33.7	179.64	418.9	1,418.2	749.8	684.1	65.68	11.416 SF		
8,302.5	7,916.0	8,196.8	7,903.0	38.8	33.7	179.64	418.9	1,418.2	749.8	684.1	65.68	11.416		

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 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
0.0	0.0	0.0	0.0	0.0	0.0	-66.00	9.1	-20.5	22.4					
100.0	100.0	100.0	100.0	0.1	0.1	-66.00	9.1	-20.5	22.4	22.2	0.18	127.697	CC, ES	
200.0	200.0	200.0	200.0	0.3	0.3	-120.26	9.1	-20.5	23.2	22.6	0.64	36.378		
300.0	299.8	299.8	299.8	0.6	0.5	-130.13	9.1	-20.5	26.2	25.1	1.13	23.165		
400.0	399.5	399.5	399.5	0.8	0.8	-141.84	9.1	-20.5	32.6	30.9	1.66	19.567		
500.0	498.7	498.7	498.7	1.1	1.0	-151.85	9.1	-20.5	42.8	40.6	2.21	19.393	SF	
600.0	597.5	597.5	597.5	1.4	1.2	-159.16	9.1	-20.5	57.1	54.4	2.75	20.781		
700.0	695.6	695.6	695.6	1.8	1.4	-164.23	9.1	-20.5	75.3	72.0	3.28	22.939		
800.0	793.1	790.1	790.1	2.3	1.6	-167.42	8.8	-21.8	98.6	94.8	3.80	25.930		
900.0	889.6	882.0	881.8	2.8	1.8	-169.22	7.8	-26.1	128.3	124.0	4.32	29.707		
1,000.0	985.3	973.0	972.7	3.3	2.0	-170.21	6.3	-32.9	164.0	159.2	4.85	33.845		
1,100.0	1,079.8	1,064.9	1,064.3	4.0	2.2	-170.95	4.7	-40.1	203.4	198.0	5.36	37.974		
1,200.0	1,173.2	1,155.4	1,154.4	4.7	2.4	-171.53	3.1	-47.2	245.9	240.0	5.87	41.915		
1,300.0	1,265.2	1,244.3	1,243.1	5.4	2.6	-172.00	1.6	-54.2	291.5	285.1	6.38	45.696		
1,400.0	1,355.8	1,331.6	1,330.1	6.2	2.9	-172.39	0.0	-61.1	340.2	333.3	6.89	49.346		
1,500.0	1,445.2	1,417.5	1,415.7	7.1	3.1	-172.79	-1.5	-67.9	391.4	384.0	7.38	53.004		
1,600.0	1,534.5	1,503.3	1,501.2	8.0	3.3	-173.15	-3.0	-74.7	442.8	434.9	7.87	56.271		
1,700.0	1,623.8	1,589.0	1,586.6	8.9	3.5	-173.44	-4.5	-81.4	494.2	485.8	8.36	59.087		
1,800.0	1,713.1	1,674.8	1,672.1	9.8	3.7	-173.67	-6.0	-88.2	545.6	536.7	8.86	61.544		
1,900.0	1,802.4	1,760.6	1,757.6	10.7	4.0	-173.87	-7.5	-94.9	597.0	587.6	9.37	63.681		
2,000.0	1,891.7	1,846.3	1,843.1	11.6	4.2	-174.03	-9.0	-101.7	648.4	638.5	9.89	65.561		
2,100.0	1,981.0	1,932.1	1,928.6	12.5	4.4	-174.17	-10.5	-108.5	699.8	689.4	10.41	67.221		
2,200.0	2,070.3	2,017.8	2,014.0	13.4	4.6	-174.29	-12.0	-115.2	751.2	740.3	10.94	68.695		
2,300.0	2,159.6	2,103.6	2,099.5	14.3	4.9	-174.39	-13.5	-122.0	802.6	791.2	11.46	70.011		
2,400.0	2,248.9	2,189.4	2,185.0	15.2	5.1	-174.48	-15.0	-128.7	854.0	842.0	12.00	71.190		
2,500.0	2,338.2	2,275.1	2,270.5	16.1	5.3	-174.56	-16.5	-135.5	905.5	892.9	12.53	72.252		
2,600.0	2,427.4	2,360.9	2,356.0	17.0	5.6	-174.63	-18.0	-142.3	956.9	943.8	13.07	73.212		

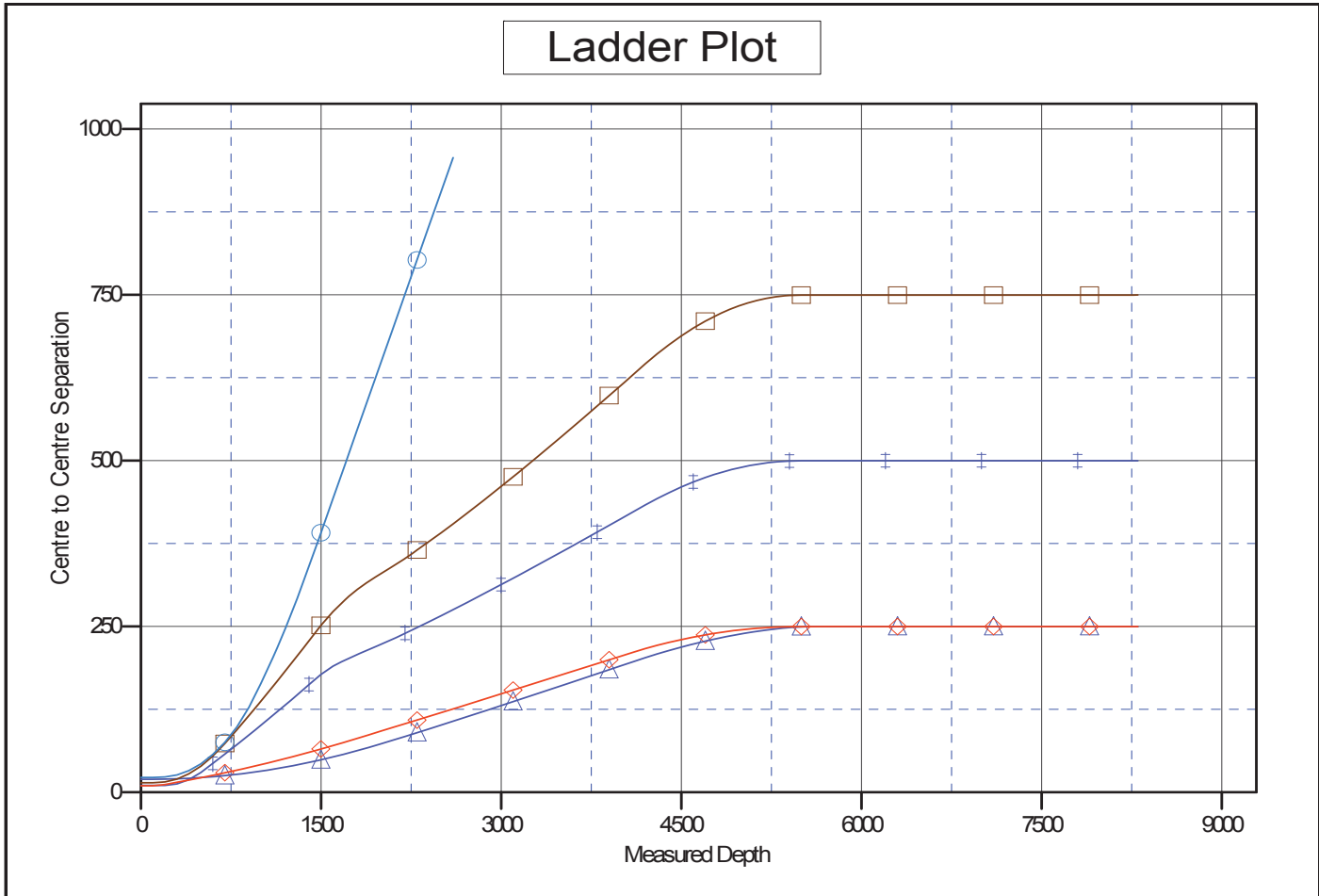
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Reference Depths are relative to Well @ 7578.0usft
 Offset Depths are relative to Offset Datum
 Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Piceance Federal 28-02M
 Coordinate System is US State Plane 1983, Colorado Central Zone
 Grid Convergence at Surface is: -1.44°



LEGEND

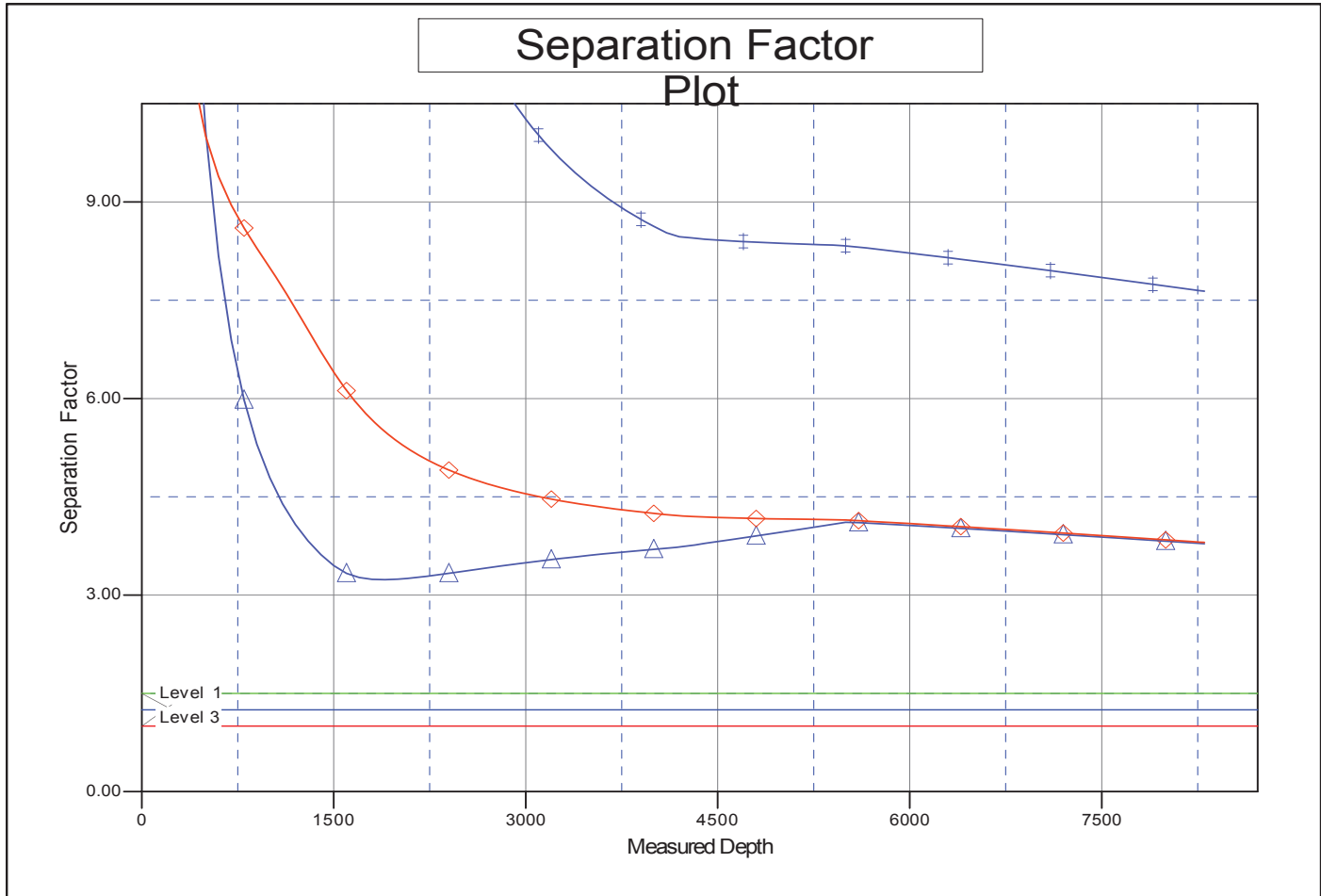
- Piceance Federal 28-01M, SlotA-4, Design #1 V0
- Piceance federal 28-05M, SlotB-6, Design #1 V0
- ◆ Piceance Federal 28-03M, SlotB-5, Design #1 V0
- ▲ Piceance federal 28-04M, SlotA-6, Design #1 V0
- Piceance Federal 28-07W, SlotB-4, Design #1 V0



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-02M
Project:	Mesa County, CO	TVD Reference:	Well @ 7578.0usft
Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-02M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-5	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Reference Depths are relative to Well @ 7578.0usft
 Offset Depths are relative to Offset Datum
 Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Piceance Federal 28-02M
 Coordinate System is US State Plane 1983, Colorado Central Zone
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LEGEND

- Piceance Federal 28-01M, SlotA-4, Design #1 V0
 — Piceance federal 28-05M, SlotB-6, Design #1 V0
 — Piceance Federal 28-03M, SlotB-5, Design #1 V0
- Piceance federal 28-04M, SlotA-6, Design #1 V0
 — Piceance Federal 28-07W, SlotB-4, Design #1 V0