



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance 28-09W

Slot B-8

Plan: Design #1

Standard Planning Report

29 April, 2015

Archer



Project: Mesa County, CO
Site: Piceance 28-05
Well: Piceance 28-09W
Wellbore: Slot B-8
Design: Design #1
Latitude: 39° 15' 3.450 N
Longitude: 107° 46' 46.010 W
Ground Level: 7556.0
Well @ 7578.0usft

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PROJECT DETAILS: Mesa County, CO

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

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Piceance 28-09W, True North
Vertical (TVD) Reference: Well @ 7578.0usft
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: Well @ 7578.0usft
Calculation Method: Minimum Curvature

WELL DETAILS: Piceance 28-09W

+N/-S	+E/-W	Northing	Ground Level: Easting	Latitude	Longitude	Slot
0.0	0.0	1524393.64	2354567.23	39° 15' 3.450 N	107° 46' 46.010 W	

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance Federal 28-09W tgt	7828.0	-524.1	-353.2	1523878.61	2354200.99	39° 14' 58.270 N	107° 46' 50.500 W	Circle (Radius: 50.0)

SECTION DETAILS

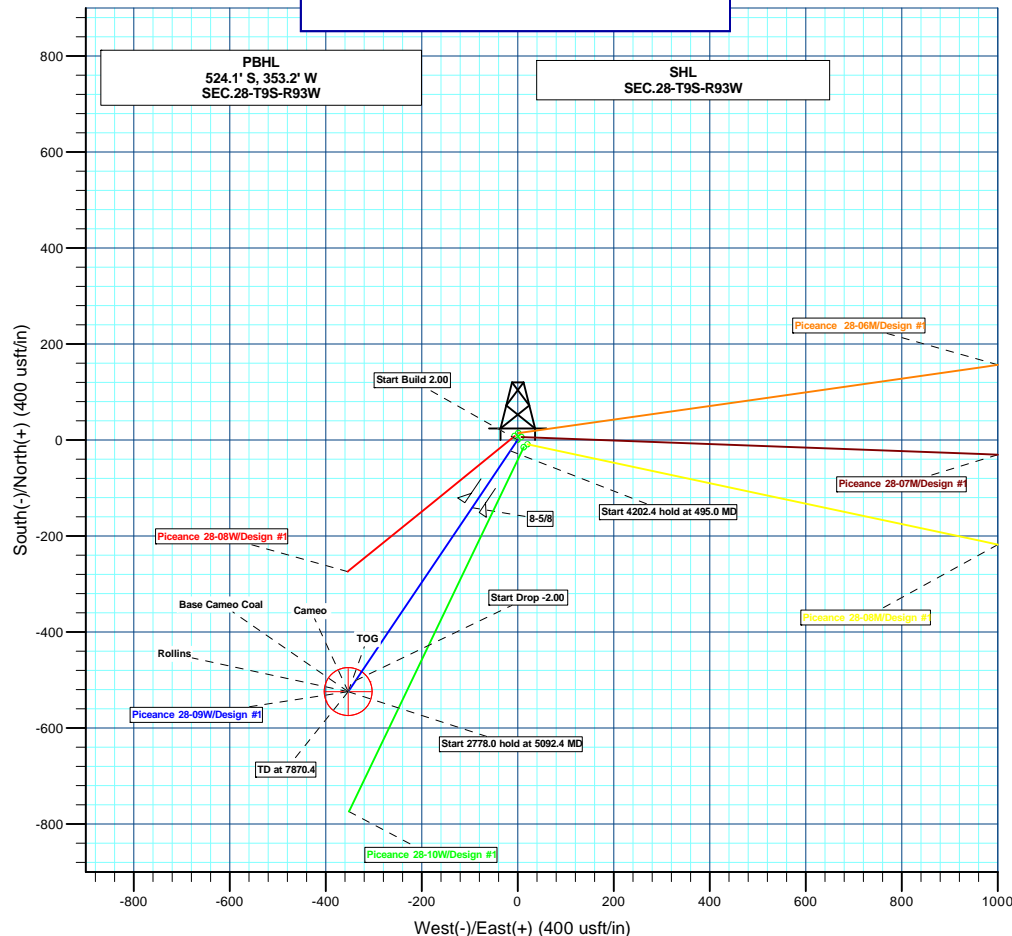
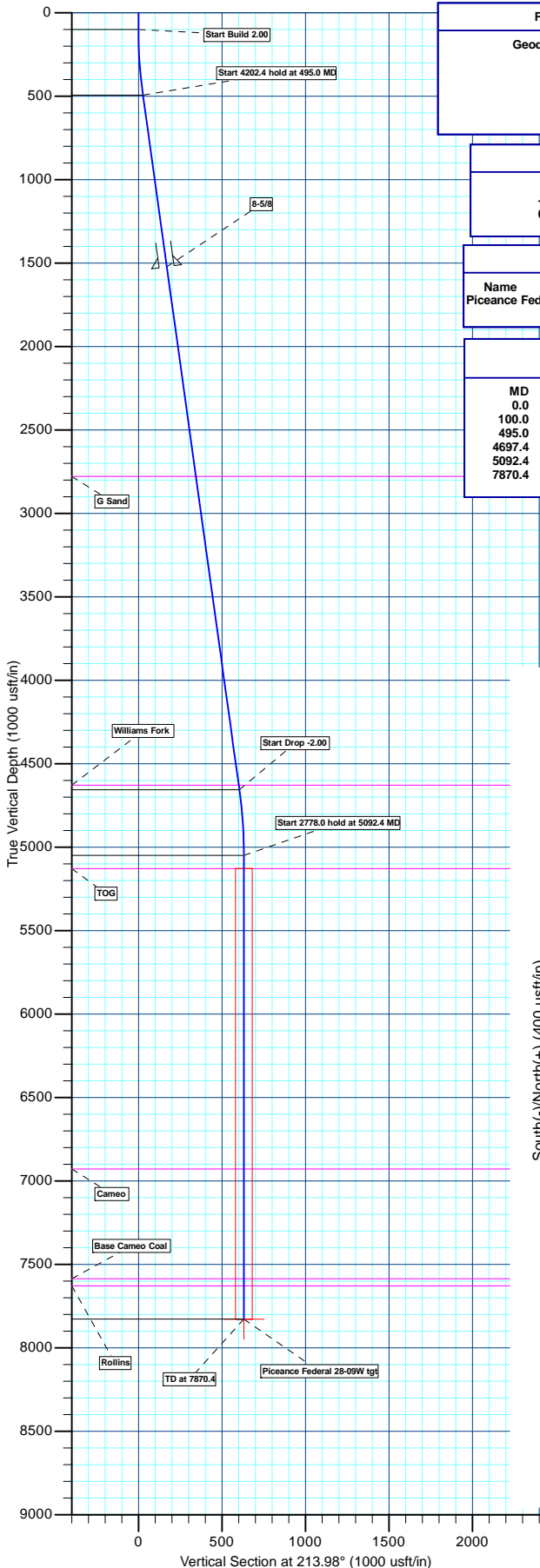
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
100.0	0.00	0.00	100.0	0.0	0.0	0.00	0.00	0.0	Start Build 2.00
495.0	7.90	213.98	493.7	-22.5	-15.2	2.00	213.98	27.2	Start 4202.4 hold at 495.0 MD
4697.4	7.90	213.98	4656.3	-501.5	-338.0	0.00	0.00	604.8	Start Drop -2.00
5092.4	0.00	0.00	5050.0	-524.1	-353.2	2.00	180.00	632.0	Start 2778.0 hold at 5092.4 MD
7870.4	0.00	0.00	7828.0	-524.1	-353.2	0.00	0.00	632.0	TD at 7870.4



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

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2778.0	2801.1	G Sand
4628.0	4668.9	Williams Fork
5128.0	5170.4	TOG
6928.0	6970.4	Cameo
7586.0	7628.4	Base Cameo Coal
7628.0	7670.4	Rollins



Plan: Design #1 (Piceance 28-09W/Slot B-8)

Created By: Ricky Osburn Date: 8:39, April 29 2015



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Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-8		
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 28-09W					
Well Position	+N/-S	17.2 usft	Northing:	1,524,393.64 usft	Latitude:	39° 15' 3.450 N
	+E/-W	-26.7 usft	Easting:	2,354,567.23 usft	Longitude:	107° 46' 46.010 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,556.0 usft

Wellbore	Slot B-8				
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	213.98

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	
495.0	7.90	213.98	493.7	-22.5	-15.2	2.00	2.00	0.00	213.98	
4,697.4	7.90	213.98	4,656.3	-501.5	-338.0	0.00	0.00	0.00	0.00	
5,092.4	0.00	0.00	5,050.0	-524.1	-353.2	2.00	-2.00	0.00	180.00	
7,870.4	0.00	0.00	7,828.0	-524.1	-353.2	0.00	0.00	0.00	0.00	Piceance Federal 28-0



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-8		
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	213.98	200.0	-1.4	-1.0	1.7	2.00	2.00	0.00
300.0	4.00	213.98	299.8	-5.8	-3.9	7.0	2.00	2.00	0.00
400.0	6.00	213.98	399.5	-13.0	-8.8	15.7	2.00	2.00	0.00
Start 4202.4 hold at 495.0 MD									
495.0	7.90	213.98	493.7	-22.5	-15.2	27.2	2.00	2.00	0.00
500.0	7.90	213.98	498.7	-23.1	-15.6	27.9	0.00	0.00	0.00
600.0	7.90	213.98	597.8	-34.5	-23.3	41.6	0.00	0.00	0.00
700.0	7.90	213.98	696.8	-45.9	-30.9	55.4	0.00	0.00	0.00
800.0	7.90	213.98	795.9	-57.3	-38.6	69.1	0.00	0.00	0.00
900.0	7.90	213.98	894.9	-68.7	-46.3	82.9	0.00	0.00	0.00
1,000.0	7.90	213.98	994.0	-80.1	-54.0	96.6	0.00	0.00	0.00
1,100.0	7.90	213.98	1,093.0	-91.5	-61.7	110.3	0.00	0.00	0.00
1,200.0	7.90	213.98	1,192.1	-102.9	-69.4	124.1	0.00	0.00	0.00
1,300.0	7.90	213.98	1,291.1	-114.3	-77.0	137.8	0.00	0.00	0.00
1,400.0	7.90	213.98	1,390.2	-125.7	-84.7	151.6	0.00	0.00	0.00
1,500.0	7.90	213.98	1,489.2	-137.1	-92.4	165.3	0.00	0.00	0.00
8-5/8									
1,533.1	7.90	213.98	1,522.0	-140.9	-94.9	169.9	0.00	0.00	0.00
1,600.0	7.90	213.98	1,588.3	-148.5	-100.1	179.1	0.00	0.00	0.00
1,700.0	7.90	213.98	1,687.3	-159.9	-107.8	192.8	0.00	0.00	0.00
1,800.0	7.90	213.98	1,786.4	-171.3	-115.4	206.6	0.00	0.00	0.00
1,900.0	7.90	213.98	1,885.4	-182.7	-123.1	220.3	0.00	0.00	0.00
2,000.0	7.90	213.98	1,984.5	-194.1	-130.8	234.0	0.00	0.00	0.00
2,100.0	7.90	213.98	2,083.5	-205.5	-138.5	247.8	0.00	0.00	0.00
2,200.0	7.90	213.98	2,182.6	-216.9	-146.2	261.5	0.00	0.00	0.00
2,300.0	7.90	213.98	2,281.6	-228.3	-153.8	275.3	0.00	0.00	0.00
2,400.0	7.90	213.98	2,380.7	-239.7	-161.5	289.0	0.00	0.00	0.00
2,500.0	7.90	213.98	2,479.7	-251.1	-169.2	302.8	0.00	0.00	0.00
2,600.0	7.90	213.98	2,578.8	-262.5	-176.9	316.5	0.00	0.00	0.00
2,700.0	7.90	213.98	2,677.8	-273.9	-184.6	330.3	0.00	0.00	0.00
2,800.0	7.90	213.98	2,776.9	-285.3	-192.3	344.0	0.00	0.00	0.00
G Sand									
2,801.1	7.90	213.98	2,778.0	-285.4	-192.3	344.2	0.00	0.00	0.00
2,900.0	7.90	213.98	2,875.9	-296.7	-199.9	357.7	0.00	0.00	0.00
3,000.0	7.90	213.98	2,975.0	-308.1	-207.6	371.5	0.00	0.00	0.00
3,100.0	7.90	213.98	3,074.0	-319.4	-215.3	385.2	0.00	0.00	0.00
3,200.0	7.90	213.98	3,173.1	-330.8	-223.0	399.0	0.00	0.00	0.00
3,300.0	7.90	213.98	3,272.1	-342.2	-230.7	412.7	0.00	0.00	0.00
3,400.0	7.90	213.98	3,371.2	-353.6	-238.3	426.5	0.00	0.00	0.00
3,500.0	7.90	213.98	3,470.2	-365.0	-246.0	440.2	0.00	0.00	0.00
3,600.0	7.90	213.98	3,569.3	-376.4	-253.7	454.0	0.00	0.00	0.00
3,700.0	7.90	213.98	3,668.3	-387.8	-261.4	467.7	0.00	0.00	0.00
3,800.0	7.90	213.98	3,767.4	-399.2	-269.1	481.4	0.00	0.00	0.00
3,900.0	7.90	213.98	3,866.4	-410.6	-276.8	495.2	0.00	0.00	0.00
4,000.0	7.90	213.98	3,965.5	-422.0	-284.4	508.9	0.00	0.00	0.00
4,100.0	7.90	213.98	4,064.5	-433.4	-292.1	522.7	0.00	0.00	0.00
4,200.0	7.90	213.98	4,163.6	-444.8	-299.8	536.4	0.00	0.00	0.00
4,300.0	7.90	213.98	4,262.6	-456.2	-307.5	550.2	0.00	0.00	0.00
4,400.0	7.90	213.98	4,361.7	-467.6	-315.2	563.9	0.00	0.00	0.00
4,500.0	7.90	213.98	4,460.7	-479.0	-322.8	577.7	0.00	0.00	0.00
4,600.0	7.90	213.98	4,559.8	-490.4	-330.5	591.4	0.00	0.00	0.00



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-8		
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)
Williams Fork									
4,668.9	7.90	213.98	4,628.0	-498.3	-335.8	600.9	0.00	0.00	0.00
Start Drop -2.00									
4,697.4	7.90	213.98	4,656.3	-501.5	-338.0	604.8	0.00	0.00	0.00
4,700.0	7.85	213.98	4,658.8	-501.8	-338.2	605.1	2.00	-2.00	0.00
4,800.0	5.85	213.98	4,758.1	-511.7	-344.9	617.1	2.00	-2.00	0.00
4,900.0	3.85	213.98	4,857.8	-518.7	-349.6	625.5	2.00	-2.00	0.00
5,000.0	1.85	213.98	4,957.6	-522.8	-352.4	630.5	2.00	-2.00	0.00
Start 2778.0 hold at 5092.4 MD									
5,092.4	0.00	0.00	5,050.0	-524.1	-353.2	632.0	2.00	-2.00	0.00
5,100.0	0.00	0.00	5,057.6	-524.1	-353.2	632.0	0.00	0.00	0.00
TOG									
5,170.4	0.00	0.00	5,128.0	-524.1	-353.2	632.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,157.6	-524.1	-353.2	632.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,257.6	-524.1	-353.2	632.0	0.00	0.00	0.00
5,400.0	0.00	0.00	5,357.6	-524.1	-353.2	632.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,457.6	-524.1	-353.2	632.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,557.6	-524.1	-353.2	632.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,657.6	-524.1	-353.2	632.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,757.6	-524.1	-353.2	632.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,857.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,000.0	0.00	0.00	5,957.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,057.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,157.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,257.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,400.0	0.00	0.00	6,357.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,457.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,557.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,657.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,757.6	-524.1	-353.2	632.0	0.00	0.00	0.00
6,900.0	0.00	0.00	6,857.6	-524.1	-353.2	632.0	0.00	0.00	0.00
Cameo									
6,970.4	0.00	0.00	6,928.0	-524.1	-353.2	632.0	0.00	0.00	0.00
7,000.0	0.00	0.00	6,957.6	-524.1	-353.2	632.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,057.6	-524.1	-353.2	632.0	0.00	0.00	0.00
7,200.0	0.00	0.00	7,157.6	-524.1	-353.2	632.0	0.00	0.00	0.00
7,300.0	0.00	0.00	7,257.6	-524.1	-353.2	632.0	0.00	0.00	0.00
7,400.0	0.00	0.00	7,357.6	-524.1	-353.2	632.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,457.6	-524.1	-353.2	632.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,557.6	-524.1	-353.2	632.0	0.00	0.00	0.00
Base Cameo Coal									
7,628.4	0.00	0.00	7,586.0	-524.1	-353.2	632.0	0.00	0.00	0.00
Rollins									
7,670.4	0.00	0.00	7,628.0	-524.1	-353.2	632.0	0.00	0.00	0.00
7,700.0	0.00	0.00	7,657.6	-524.1	-353.2	632.0	0.00	0.00	0.00
7,800.0	0.00	0.00	7,757.6	-524.1	-353.2	632.0	0.00	0.00	0.00
TD at 7870.4									
7,870.4	0.00	0.00	7,828.0	-524.1	-353.2	632.0	0.00	0.00	0.00



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot B-8		
Design:	Design #1		

Design Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
Piceance Federal 28-09' - plan hits target center - Circle (radius 50.0)	0.00	0.00	7,828.0	-524.1	-353.2	1,523,878.61	2,354,200.99	39° 14' 58.270 N	107° 46' 50.500 W

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,533.1	1,522.0	8-5/8	8-5/8	12-1/4

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,801.1	2,778.0	G Sand		0.00	
4,668.9	4,628.0	Williams Fork		0.00	
5,170.4	5,128.0	TOG		0.00	
6,970.4	6,928.0	Cameo		0.00	
7,628.4	7,586.0	Base Cameo Coal		0.00	
7,670.4	7,628.0	Rollins		0.00	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
100.0	100.0	0.0	0.0	Start Build 2.00	
495.0	493.7	-22.5	-15.2	Start 4202.4 hold at 495.0 MD	
4,697.4	4,656.3	-501.5	-338.0	Start Drop -2.00	
5,092.4	5,050.0	-524.1	-353.2	Start 2778.0 hold at 5092.4 MD	
7,870.4	7,828.0	-524.1	-353.2	TD at 7870.4	



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance Federal 28-09W

Slot B-8

Design #1

Anticollision Report

28 April, 2015

Archer



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	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	7,870.4	Design #1 (Slot B-8)	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 28-05						
Piceance Federal 28-06M - Slot A-7 - Design #1	100.0	100.0	14.3	14.1	81.287	CC, ES
Piceance Federal 28-06M - Slot A-7 - Design #1	300.0	299.8	20.7	19.5	17.660	SF
Piceance Federal 28-07M - Slot A-8 - Design #1	100.0	100.0	9.9	9.8	56.675	CC, ES
Piceance Federal 28-07M - Slot A-8 - Design #1	300.0	299.8	16.7	15.5	14.166	SF
Piceance Federal 28-08M - Slot A-9 - Design #1	100.0	100.0	22.4	22.2	127.696	CC
Piceance Federal 28-08M - Slot A-9 - Design #1	200.0	200.0	22.8	22.1	37.150	ES
Piceance Federal 28-08M - Slot A-9 - Design #1	400.0	397.2	36.0	34.4	22.394	SF
Piceance Federal 28-08W - Slot B-7 - Design #1	100.0	100.0	10.3	10.1	58.479	CC, ES
Piceance Federal 28-08W - Slot B-7 - Design #1	7,870.4	7,851.5	249.9	213.9	6.944	SF
Piceance Federal 28-10W - Slot B-9 - Design #1	278.4	278.2	18.9	18.0	19.643	CC
Piceance Federal 28-10W - Slot B-9 - Design #1	300.0	299.8	19.0	17.9	17.870	ES
Piceance Federal 28-10W - Slot B-9 - Design #1	1,200.0	1,200.9	36.7	29.9	5.396	SF

Offset Design												Piceance 28-05 - Piceance Federal 28-06M - Slot A-7 - Design #1		Offset Site Error:		0.0 usf	
Survey Program:				0-MWD								Offset Well Error:				0.0 usf	
Reference		Offset		Semi Major Axis			Distance										
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	Warning				
0.0	0.0	0.0	0.0	0.0	0.0	6.34	14.2	1.6	14.3								
100.0	100.0	100.0	100.0	0.1	0.1	6.34	14.2	1.6	14.3	14.1	0.18	81.287	CC, ES				
200.0	200.0	200.0	200.0	0.3	0.3	155.28	14.2	1.6	15.8	15.2	0.66	23.967					
300.0	299.8	299.8	299.8	0.5	0.5	161.32	14.2	1.6	20.7	19.5	1.17	17.660	SF				
400.0	399.5	398.9	398.9	0.8	0.8	169.64	14.4	3.3	29.9	28.3	1.69	17.686					
500.0	498.7	496.9	496.7	1.1	1.0	177.94	15.1	8.3	45.1	42.9	2.22	20.322					
600.0	597.8	593.5	593.0	1.4	1.2	-175.88	16.3	16.4	64.6	62.0	2.65	24.438					
700.0	696.8	688.8	687.7	1.8	1.5	-171.20	17.9	27.7	87.1	84.0	3.10	28.109					
800.0	795.9	782.7	780.5	2.1	1.8	-167.47	19.9	41.7	112.5	108.9	3.58	31.462					
900.0	894.9	875.0	871.2	2.4	2.1	-164.43	22.3	58.5	140.8	136.7	4.07	34.586					
1,000.0	994.0	965.6	959.6	2.8	2.5	-161.90	25.0	77.8	172.0	167.4	4.58	37.541					
1,100.0	1,093.0	1,054.2	1,045.5	3.1	2.9	-159.76	28.1	99.3	206.1	201.0	5.10	40.369					
1,200.0	1,192.1	1,140.8	1,128.8	3.5	3.3	-157.94	31.4	122.9	242.9	237.2	5.64	43.101					
1,300.0	1,291.1	1,225.4	1,209.4	3.8	3.8	-156.36	35.0	148.3	282.4	276.2	6.17	45.750					
1,400.0	1,390.2	1,310.0	1,289.3	4.2	4.4	-154.96	39.0	175.9	324.4	317.7	6.72	48.247					
1,500.0	1,489.2	1,400.2	1,374.1	4.5	5.0	-153.76	43.3	206.1	367.2	360.0	7.28	50.447					

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 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.0 usft
Piceance 28-05 - Piceance Federal 28-06M - Slot A-7 - 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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
1,600.0	1,588.3	1,490.3	1,458.9	4.9	5.6	-152.80	47.6	236.2	410.2	402.3	7.84	52.325		
1,700.0	1,687.3	1,580.4	1,543.8	5.2	6.2	-152.03	51.9	266.3	453.2	444.8	8.40	53.948		
1,800.0	1,786.4	1,670.5	1,628.6	5.5	6.8	-151.39	56.1	296.4	496.2	487.3	8.96	55.359		
1,900.0	1,885.4	1,760.7	1,713.4	5.9	7.4	-150.85	60.4	326.6	539.3	529.8	9.53	56.596		
2,000.0	1,984.5	1,850.8	1,798.3	6.2	8.0	-150.39	64.7	356.7	582.5	572.4	10.10	57.688		
2,100.0	2,083.5	1,940.9	1,883.1	6.6	8.7	-150.00	69.0	386.8	625.6	615.0	10.67	58.659		
2,200.0	2,182.6	2,031.0	1,967.9	6.9	9.3	-149.65	73.3	416.9	668.8	657.6	11.24	59.527		
2,300.0	2,281.6	2,121.2	2,052.8	7.3	9.9	-149.35	77.6	447.1	712.0	700.2	11.81	60.308		
2,400.0	2,380.7	2,211.3	2,137.6	7.6	10.5	-149.08	81.9	477.2	755.3	742.9	12.38	61.013		
2,500.0	2,479.7	2,301.4	2,222.4	8.0	11.2	-148.84	86.2	507.3	798.5	785.5	12.95	61.653		
2,600.0	2,578.8	2,391.5	2,307.3	8.3	11.8	-148.63	90.4	537.4	841.7	828.2	13.52	62.236		
2,700.0	2,677.8	2,481.7	2,392.1	8.7	12.4	-148.43	94.7	567.6	885.0	870.9	14.10	62.769		
2,800.0	2,776.9	2,571.8	2,476.9	9.0	13.1	-148.26	99.0	597.7	928.2	913.6	14.67	63.260		
2,900.0	2,875.9	2,661.9	2,561.8	9.4	13.7	-148.10	103.3	627.8	971.5	956.2	15.25	63.711		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-05 - Piceance Federal 28-07M - Slot A-8 - Design #1													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 usft
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	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	52.34	6.1	7.9	9.9					
100.0	100.0	100.0	100.0	0.1	0.1	52.34	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	-164.34	6.1	7.9	11.6	10.9	0.67	17.432		
300.0	299.8	299.8	299.8	0.5	0.5	-169.17	6.1	7.9	16.7	15.5	1.18	14.166 SF		
400.0	399.5	399.5	399.5	0.8	0.8	-172.86	6.1	7.9	25.3	23.6	1.70	14.897		
500.0	498.7	497.9	497.9	1.1	1.0	-173.12	6.0	9.5	38.5	36.3	2.21	17.421		
600.0	597.8	595.4	595.3	1.4	1.2	-170.71	5.8	14.5	55.3	52.7	2.62	21.136		
700.0	696.8	692.0	691.5	1.8	1.4	-167.52	5.5	22.7	74.5	71.5	3.06	24.371		
800.0	795.9	787.5	786.3	2.1	1.7	-164.30	5.1	34.0	96.2	92.7	3.53	27.292		
900.0	894.9	881.6	879.3	2.4	1.9	-161.27	4.6	48.2	120.6	116.6	4.02	30.000		
1,000.0	994.0	974.2	970.4	2.8	2.3	-158.53	4.0	65.2	147.7	143.2	4.54	32.559		
1,100.0	1,093.0	1,065.2	1,059.2	3.1	2.6	-156.07	3.2	84.7	177.6	172.5	5.07	35.014		
1,200.0	1,192.1	1,154.4	1,145.7	3.5	3.0	-153.89	2.4	106.6	210.2	204.6	5.62	37.395		
1,300.0	1,291.1	1,241.7	1,229.6	3.8	3.5	-151.96	1.6	130.5	245.5	239.4	6.18	39.723		
1,400.0	1,390.2	1,327.0	1,310.9	4.2	4.0	-150.25	0.6	156.4	283.5	276.8	6.75	42.012		
1,500.0	1,489.2	1,410.9	1,390.0	4.5	4.5	-148.71	-0.4	184.2	324.1	316.8	7.32	44.255		
1,600.0	1,588.3	1,501.4	1,475.1	4.9	5.1	-147.32	-1.6	215.3	365.9	357.9	7.92	46.175		
1,700.0	1,687.3	1,592.0	1,560.1	5.2	5.7	-146.22	-2.7	246.4	407.8	399.3	8.52	47.871		
1,800.0	1,786.4	1,682.5	1,645.2	5.5	6.4	-145.32	-3.8	277.4	449.8	440.7	9.11	49.349		
1,900.0	1,885.4	1,773.1	1,730.2	5.9	7.0	-144.58	-5.0	308.5	491.9	482.1	9.71	50.644		
2,000.0	1,984.5	1,863.6	1,815.3	6.2	7.6	-143.95	-6.1	339.5	534.0	523.7	10.31	51.788		
2,100.0	2,083.5	1,954.1	1,900.3	6.6	8.3	-143.41	-7.3	370.6	576.2	565.3	10.91	52.805		
2,200.0	2,182.6	2,044.7	1,985.4	6.9	8.9	-142.95	-8.4	401.6	618.4	606.9	11.51	53.714		
2,300.0	2,281.6	2,135.2	2,070.4	7.3	9.5	-142.54	-9.6	432.7	660.6	648.5	12.12	54.531		
2,400.0	2,380.7	2,225.8	2,155.4	7.6	10.2	-142.19	-10.7	463.7	702.9	690.2	12.72	55.269		
2,500.0	2,479.7	2,316.3	2,240.5	8.0	10.8	-141.87	-11.8	494.8	745.2	731.9	13.32	55.939		
2,600.0	2,578.8	2,406.9	2,325.5	8.3	11.5	-141.59	-13.0	525.8	787.5	773.6	13.93	56.549		
2,700.0	2,677.8	2,497.4	2,410.6	8.7	12.1	-141.34	-14.1	556.9	829.8	815.3	14.53	57.107		
2,800.0	2,776.9	2,588.0	2,495.6	9.0	12.8	-141.11	-15.3	587.9	872.2	857.0	15.14	57.620		
2,900.0	2,875.9	2,678.5	2,580.7	9.4	13.4	-140.90	-16.4	619.0	914.5	898.8	15.74	58.092		
3,000.0	2,975.0	2,769.0	2,665.7	9.7	14.1	-140.71	-17.6	650.0	956.9	940.5	16.35	58.529		
3,100.0	3,074.0	2,859.6	2,750.8	10.0	14.7	-140.54	-18.7	681.1	999.2	982.3	16.96	58.933		

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 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-05 - Piceance Federal 28-08M - Slot A-9 - Design #1													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 usft
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	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	114.00	-9.1	20.5	22.4					
100.0	100.0	100.0	100.0	0.1	0.1	114.00	-9.1	20.5	22.4	22.2	0.18	127.696 CC		
200.0	200.0	200.0	200.0	0.3	0.3	-104.30	-9.1	20.5	22.8	22.1	0.61	37.150 ES		
300.0	299.8	299.0	298.9	0.5	0.5	-115.76	-9.5	22.1	26.3	25.2	1.08	24.414		
400.0	399.5	397.2	397.1	0.8	0.7	-127.49	-10.5	27.1	36.0	34.4	1.61	22.394 SF		
500.0	498.7	494.3	493.8	1.1	1.0	-135.25	-12.3	35.2	52.2	50.0	2.17	24.043		
600.0	597.8	590.2	589.0	1.4	1.3	-139.01	-14.6	46.4	73.0	70.3	2.67	27.298		
700.0	696.8	684.8	682.5	1.8	1.6	-140.14	-17.6	60.5	96.8	93.6	3.19	30.349		
800.0	795.9	778.1	774.2	2.1	1.9	-140.10	-21.2	77.3	123.3	119.6	3.72	33.138		
900.0	894.9	869.8	863.7	2.4	2.3	-139.51	-25.3	96.7	152.6	148.4	4.27	35.712		
1,000.0	994.0	959.9	951.0	2.8	2.8	-138.67	-30.0	118.4	184.6	179.8	4.84	38.130		
1,100.0	1,093.0	1,048.1	1,035.7	3.1	3.2	-137.73	-35.1	142.3	219.3	213.9	5.42	40.436		
1,200.0	1,192.1	1,134.4	1,117.9	3.5	3.8	-136.78	-40.6	168.2	256.5	250.5	6.01	42.657		
1,300.0	1,291.1	1,223.1	1,201.6	3.8	4.3	-135.83	-46.7	196.8	295.9	289.3	6.62	44.690		
1,400.0	1,390.2	1,314.8	1,288.1	4.2	4.9	-135.06	-53.0	226.6	335.6	328.4	7.23	46.392		
1,500.0	1,489.2	1,406.4	1,374.6	4.5	5.6	-134.45	-59.4	256.5	375.4	367.5	7.85	47.821		
1,600.0	1,588.3	1,498.1	1,461.0	4.9	6.2	-133.96	-65.7	286.3	415.1	406.7	8.47	49.024		
1,700.0	1,687.3	1,589.8	1,547.5	5.2	6.8	-133.56	-72.1	316.1	454.9	445.8	9.09	50.049		
1,800.0	1,786.4	1,681.5	1,634.0	5.5	7.5	-133.22	-78.4	346.0	494.7	485.0	9.71	50.933		
1,900.0	1,885.4	1,773.2	1,720.5	5.9	8.1	-132.93	-84.8	375.8	534.5	524.2	10.34	51.702		
2,000.0	1,984.5	1,864.9	1,806.9	6.2	8.7	-132.68	-91.1	405.7	574.4	563.4	10.97	52.378		
2,100.0	2,083.5	1,956.6	1,893.4	6.6	9.4	-132.46	-97.5	435.5	614.2	602.6	11.59	52.976		
2,200.0	2,182.6	2,048.3	1,979.9	6.9	10.0	-132.27	-103.8	465.3	654.1	641.8	12.22	53.509		
2,300.0	2,281.6	2,140.0	2,066.4	7.3	10.7	-132.10	-110.2	495.2	693.9	681.0	12.85	53.986		
2,400.0	2,380.7	2,231.7	2,152.8	7.6	11.3	-131.95	-116.5	525.0	733.8	720.3	13.48	54.416		
2,500.0	2,479.7	2,323.4	2,239.3	8.0	11.9	-131.82	-122.9	554.8	773.6	759.5	14.12	54.806		
2,600.0	2,578.8	2,415.1	2,325.8	8.3	12.6	-131.69	-129.2	584.7	813.5	798.7	14.75	55.160		
2,700.0	2,677.8	2,506.8	2,412.3	8.7	13.2	-131.58	-135.6	614.5	853.3	837.9	15.38	55.484		
2,800.0	2,776.9	2,598.5	2,498.8	9.0	13.9	-131.48	-142.0	644.3	893.2	877.2	16.01	55.780		
2,900.0	2,875.9	2,690.2	2,585.2	9.4	14.5	-131.39	-148.3	674.2	933.1	916.4	16.65	56.053		
3,000.0	2,975.0	2,781.9	2,671.7	9.7	15.2	-131.31	-154.7	704.0	972.9	955.6	17.28	56.305		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-05 - Piceance Federal 28-08W - Slot B-7 - Design #1													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	-37.86	8.1	-6.3	10.3					
100.0	100.0	100.0	100.0	0.1	0.1	-37.86	8.1	-6.3	10.3	10.1	0.18	58.479	CC, ES	
200.0	200.0	200.0	200.0	0.3	0.3	116.87	8.1	-6.3	10.9	10.3	0.62	17.563		
300.0	299.8	299.8	299.8	0.5	0.5	136.17	8.1	-6.3	14.1	13.0	1.13	12.504		
400.0	399.5	399.5	399.5	0.8	0.8	152.59	8.1	-6.3	21.3	19.6	1.67	12.725		
500.0	498.7	498.7	498.7	1.1	1.0	162.43	8.1	-6.3	32.6	30.4	2.20	14.786		
600.0	597.8	597.8	597.8	1.4	1.2	167.62	8.1	-6.3	45.9	43.2	2.62	17.474		
700.0	696.8	696.8	696.8	1.8	1.4	169.76	7.0	-7.6	57.9	54.8	3.03	19.085		
800.0	795.9	800.2	800.0	2.1	1.6	169.81	3.7	-11.7	66.8	63.4	3.44	19.424		
900.0	894.9	902.2	901.6	2.4	1.8	168.56	-1.9	-18.7	72.6	68.7	3.87	18.733		
1,000.0	994.0	1,002.2	1,001.1	2.8	2.1	166.78	-8.7	-27.0	76.6	72.3	4.33	17.703		
1,100.0	1,093.0	1,102.1	1,100.4	3.1	2.3	165.18	-15.5	-35.3	80.8	76.0	4.80	16.817		
1,200.0	1,192.1	1,202.0	1,199.7	3.5	2.6	163.73	-22.3	-43.7	85.0	79.7	5.29	16.061		
1,300.0	1,291.1	1,301.9	1,299.0	3.8	2.9	162.43	-29.0	-52.0	89.2	83.4	5.79	15.412		
1,400.0	1,390.2	1,401.8	1,398.3	4.2	3.2	161.24	-35.8	-60.4	93.5	87.2	6.30	14.850		
1,500.0	1,489.2	1,501.7	1,497.6	4.5	3.4	160.16	-42.6	-68.7	97.8	91.0	6.81	14.361		
1,600.0	1,588.3	1,601.6	1,597.0	4.9	3.7	159.16	-49.3	-77.0	102.2	94.8	7.33	13.933		
1,700.0	1,687.3	1,701.5	1,696.3	5.2	4.0	158.25	-56.1	-85.4	106.5	98.7	7.86	13.554		
1,800.0	1,786.4	1,801.4	1,795.6	5.5	4.3	157.42	-62.9	-93.7	111.0	102.6	8.39	13.219		
1,900.0	1,885.4	1,901.2	1,894.9	5.9	4.6	156.64	-69.6	-102.0	115.4	106.4	8.93	12.919		
2,000.0	1,984.5	2,001.1	1,994.2	6.2	4.9	155.93	-76.4	-110.4	119.8	110.4	9.47	12.650		
2,100.0	2,083.5	2,101.0	2,093.5	6.6	5.2	155.26	-83.2	-118.7	124.3	114.3	10.02	12.408		
2,200.0	2,182.6	2,200.9	2,192.8	6.9	5.5	154.64	-89.9	-127.1	128.8	118.2	10.56	12.189		
2,300.0	2,281.6	2,300.8	2,292.1	7.3	5.8	154.06	-96.7	-135.4	133.3	122.1	11.11	11.990		
2,400.0	2,380.7	2,400.7	2,391.4	7.6	6.1	153.52	-103.5	-143.7	137.8	126.1	11.67	11.808		
2,500.0	2,479.7	2,500.6	2,490.8	8.0	6.4	153.02	-110.3	-152.1	142.3	130.1	12.22	11.642		
2,600.0	2,578.8	2,600.5	2,590.1	8.3	6.7	152.54	-117.0	-160.4	146.8	134.0	12.78	11.489		
2,700.0	2,677.8	2,700.4	2,689.4	8.7	7.0	152.10	-123.8	-168.8	151.3	138.0	13.34	11.348		
2,800.0	2,776.9	2,800.3	2,788.7	9.0	7.3	151.68	-130.6	-177.1	155.9	142.0	13.90	11.218		
2,900.0	2,875.9	2,900.1	2,888.0	9.4	7.6	151.28	-137.3	-185.4	160.4	146.0	14.46	11.098		
3,000.0	2,975.0	3,000.0	2,987.3	9.7	7.9	150.91	-144.1	-193.8	165.0	150.0	15.02	10.986		
3,100.0	3,074.0	3,099.9	3,086.6	10.0	8.2	150.55	-150.9	-202.1	169.6	154.0	15.58	10.882		
3,200.0	3,173.1	3,199.8	3,185.9	10.4	8.5	150.22	-157.6	-210.4	174.1	158.0	16.15	10.784		
3,300.0	3,272.1	3,299.7	3,285.2	10.7	8.8	149.90	-164.4	-218.8	178.7	162.0	16.71	10.693		
3,400.0	3,371.2	3,399.6	3,384.6	11.1	9.1	149.60	-171.2	-227.1	183.3	166.0	17.28	10.608		
3,500.0	3,470.2	3,499.5	3,483.9	11.4	9.4	149.31	-177.9	-235.5	187.9	170.0	17.85	10.528		
3,600.0	3,569.3	3,599.4	3,583.2	11.8	9.7	149.03	-184.7	-243.8	192.5	174.1	18.42	10.453		
3,700.0	3,668.3	3,699.3	3,682.5	12.1	10.0	148.77	-191.5	-252.1	197.1	178.1	18.98	10.382		
3,800.0	3,767.4	3,799.2	3,781.8	12.5	10.3	148.52	-198.3	-260.5	201.7	182.1	19.55	10.315		
3,900.0	3,866.4	3,899.0	3,881.1	12.8	10.6	148.29	-205.0	-268.8	206.3	186.2	20.12	10.251		
4,000.0	3,965.5	3,998.9	3,980.4	13.2	10.9	148.06	-211.8	-277.1	210.9	190.2	20.69	10.191		
4,100.0	4,064.5	4,098.8	4,079.7	13.5	11.2	147.84	-218.6	-285.5	215.5	194.2	21.26	10.135		
4,200.0	4,163.6	4,198.7	4,179.0	13.9	11.5	147.63	-225.3	-293.8	220.1	198.3	21.84	10.081		
4,300.0	4,262.6	4,298.6	4,278.4	14.2	11.9	147.43	-232.1	-302.2	224.7	202.3	22.41	10.029		
4,400.0	4,361.7	4,398.5	4,377.7	14.6	12.2	147.24	-238.9	-310.5	229.4	206.4	22.98	9.981		
4,500.0	4,460.7	4,498.4	4,477.0	14.9	12.5	147.05	-245.6	-318.8	234.0	210.4	23.55	9.934		
4,600.0	4,559.8	4,598.3	4,576.3	15.2	12.8	146.88	-252.4	-327.2	238.6	214.5	24.13	9.890		
4,700.0	4,658.8	4,698.2	4,675.6	15.6	13.1	146.71	-259.2	-335.5	243.2	218.5	24.70	9.848		
4,800.0	4,758.1	4,796.4	4,773.3	15.8	13.4	146.38	-265.7	-343.6	246.4	221.2	25.21	9.776		
4,900.0	4,857.8	4,891.2	4,867.7	16.0	13.5	146.07	-270.5	-349.5	248.4	222.8	25.61	9.699		
5,000.0	4,957.6	4,986.0	4,962.4	16.2	13.7	145.89	-273.3	-352.9	249.5	223.6	25.95	9.618		
5,100.0	5,057.6	5,081.2	5,057.6	16.3	13.9	-0.18	-274.2	-354.0	249.9	223.6	26.25	9.521		

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 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	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	5,157.6	5,181.2	5,157.6	16.4	14.0	-0.18	-274.2	-354.0	249.9	223.3	26.56	9.408		
5,300.0	5,257.6	5,281.2	5,257.6	16.6	14.2	-0.18	-274.2	-354.0	249.9	223.0	26.88	9.298		
5,400.0	5,357.6	5,381.2	5,357.6	16.7	14.3	-0.18	-274.2	-354.0	249.9	222.7	27.20	9.188		
5,500.0	5,457.6	5,481.2	5,457.6	16.8	14.5	-0.18	-274.2	-354.0	249.9	222.4	27.52	9.081		
5,600.0	5,557.6	5,581.2	5,557.6	16.9	14.6	-0.18	-274.2	-354.0	249.9	222.0	27.85	8.974		
5,700.0	5,657.6	5,681.2	5,657.6	17.1	14.8	-0.18	-274.2	-354.0	249.9	221.7	28.18	8.869		
5,800.0	5,757.6	5,781.2	5,757.6	17.2	15.0	-0.18	-274.2	-354.0	249.9	221.4	28.51	8.765		
5,900.0	5,857.6	5,881.2	5,857.6	17.3	15.1	-0.18	-274.2	-354.0	249.9	221.0	28.85	8.663		
6,000.0	5,957.6	5,981.2	5,957.6	17.5	15.3	-0.18	-274.2	-354.0	249.9	220.7	29.19	8.562		
6,100.0	6,057.6	6,081.2	6,057.6	17.6	15.5	-0.18	-274.2	-354.0	249.9	220.4	29.53	8.463		
6,200.0	6,157.6	6,181.2	6,157.6	17.7	15.6	-0.18	-274.2	-354.0	249.9	220.0	29.87	8.365		
6,300.0	6,257.6	6,281.2	6,257.6	17.9	15.8	-0.18	-274.2	-354.0	249.9	219.7	30.22	8.268		
6,400.0	6,357.6	6,381.2	6,357.6	18.0	16.0	-0.18	-274.2	-354.0	249.9	219.3	30.57	8.173		
6,500.0	6,457.6	6,481.2	6,457.6	18.2	16.1	-0.18	-274.2	-354.0	249.9	219.0	30.93	8.080		
6,600.0	6,557.6	6,581.2	6,557.6	18.3	16.3	-0.18	-274.2	-354.0	249.9	218.6	31.28	7.988		
6,700.0	6,657.6	6,681.2	6,657.6	18.5	16.5	-0.18	-274.2	-354.0	249.9	218.3	31.64	7.898		
6,800.0	6,757.6	6,781.2	6,757.6	18.6	16.6	-0.18	-274.2	-354.0	249.9	217.9	32.00	7.809		
6,900.0	6,857.6	6,881.2	6,857.6	18.8	16.8	-0.18	-274.2	-354.0	249.9	217.5	32.36	7.721		
7,000.0	6,957.6	6,981.2	6,957.6	18.9	17.0	-0.18	-274.2	-354.0	249.9	217.2	32.73	7.635		
7,100.0	7,057.6	7,081.2	7,057.6	19.1	17.2	-0.18	-274.2	-354.0	249.9	216.8	33.10	7.551		
7,200.0	7,157.6	7,181.2	7,157.6	19.2	17.4	-0.18	-274.2	-354.0	249.9	216.4	33.47	7.467		
7,300.0	7,257.6	7,281.2	7,257.6	19.4	17.5	-0.18	-274.2	-354.0	249.9	216.1	33.84	7.385		
7,400.0	7,357.6	7,381.2	7,357.6	19.5	17.7	-0.18	-274.2	-354.0	249.9	215.7	34.21	7.305		
7,500.0	7,457.6	7,481.2	7,457.6	19.7	17.9	-0.18	-274.2	-354.0	249.9	215.3	34.58	7.226		
7,600.0	7,557.6	7,581.2	7,557.6	19.8	18.1	-0.18	-274.2	-354.0	249.9	214.9	34.96	7.148		
7,700.0	7,657.6	7,681.2	7,657.6	20.0	18.3	-0.18	-274.2	-354.0	249.9	214.6	35.34	7.072		
7,800.0	7,757.6	7,781.2	7,757.6	20.2	18.5	-0.18	-274.2	-354.0	249.9	214.2	35.72	6.996		
7,870.4	7,828.0	7,851.5	7,828.0	20.3	18.6	-0.18	-274.2	-354.0	249.9	213.9	35.99	6.944 SF		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

Offset Design Piceance 28-05 - Piceance Federal 28-10W - Slot B-9 - Design #1													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	140.33	-15.2	12.6	19.7					
100.0	100.0	100.0	100.0	0.1	0.1	140.33	-15.2	12.6	19.7	19.5	0.18	112.455		
200.0	200.0	200.0	200.0	0.3	0.3	-78.63	-15.2	12.6	19.3	18.7	0.61	31.567		
278.4	278.2	278.2	278.2	0.5	0.5	-90.00	-15.2	12.6	18.9	18.0	0.96	19.643 CC		
300.0	299.8	299.8	299.8	0.5	0.5	-94.31	-15.2	12.6	19.0	17.9	1.06	17.870 ES		
400.0	399.5	399.7	399.6	0.8	0.7	-113.67	-16.7	11.8	20.9	19.4	1.55	13.510		
500.0	498.7	499.7	499.6	1.1	0.9	-127.72	-21.4	9.6	25.2	23.1	2.08	12.145		
600.0	597.8	600.1	599.6	1.4	1.2	-134.16	-29.3	5.8	29.6	27.0	2.57	11.482		
700.0	696.8	700.7	699.4	1.8	1.4	-134.12	-40.4	0.5	32.0	28.9	3.11	10.303		
800.0	795.9	801.3	798.8	2.1	1.8	-129.03	-54.6	-6.3	32.5	28.8	3.72	8.740		
900.0	894.9	901.5	897.1	2.4	2.1	-118.78	-71.7	-14.6	32.0	27.5	4.46	7.163		
924.0	918.7	925.4	920.6	2.5	2.2	-115.97	-76.0	-16.6	31.9	27.3	4.66	6.858		
1,000.0	994.0	1,001.3	994.9	2.8	2.5	-107.14	-89.5	-23.1	32.3	27.0	5.27	6.130		
1,100.0	1,093.0	1,101.1	1,092.8	3.1	2.9	-96.19	-107.3	-31.6	33.9	27.9	6.06	5.597		
1,200.0	1,192.1	1,200.9	1,190.6	3.5	3.4	-86.55	-125.0	-40.1	36.7	29.9	6.80	5.396 SF		
1,300.0	1,291.1	1,300.6	1,288.4	3.8	3.8	-78.44	-142.8	-48.7	40.3	32.8	7.46	5.400		
1,400.0	1,390.2	1,400.4	1,386.2	4.2	4.2	-71.77	-160.5	-57.2	44.6	36.5	8.07	5.522		
1,500.0	1,489.2	1,500.2	1,484.1	4.5	4.6	-66.33	-178.3	-65.7	49.4	40.7	8.65	5.708		
1,600.0	1,588.3	1,600.0	1,581.9	4.9	5.1	-61.88	-196.1	-74.2	54.5	45.3	9.20	5.925		
1,700.0	1,687.3	1,699.8	1,679.7	5.2	5.5	-58.21	-213.8	-82.8	59.9	50.2	9.74	6.153		
1,800.0	1,786.4	1,799.6	1,777.5	5.5	5.9	-55.16	-231.6	-91.3	65.6	55.3	10.27	6.382		
1,900.0	1,885.4	1,899.4	1,875.3	5.9	6.3	-52.60	-249.4	-99.8	71.3	60.5	10.80	6.606		
2,000.0	1,984.5	1,999.1	1,973.2	6.2	6.8	-50.43	-267.1	-108.3	77.2	65.9	11.33	6.819		
2,100.0	2,083.5	2,098.9	2,071.0	6.6	7.2	-48.57	-284.9	-116.9	83.2	71.4	11.85	7.022		
2,200.0	2,182.6	2,198.7	2,168.8	6.9	7.6	-46.96	-302.6	-125.4	89.3	76.9	12.38	7.214		
2,300.0	2,281.6	2,298.5	2,266.6	7.3	8.1	-45.55	-320.4	-133.9	95.5	82.5	12.91	7.394		
2,400.0	2,380.7	2,398.3	2,364.4	7.6	8.5	-44.32	-338.2	-142.5	101.6	88.2	13.44	7.563		
2,500.0	2,479.7	2,498.1	2,462.3	8.0	8.9	-43.22	-355.9	-151.0	107.9	93.9	13.97	7.721		
2,600.0	2,578.8	2,597.9	2,560.1	8.3	9.4	-42.25	-373.7	-159.5	114.1	99.6	14.50	7.870		
2,700.0	2,677.8	2,697.6	2,657.9	8.7	9.8	-41.38	-391.5	-168.0	120.4	105.4	15.03	8.009		
2,800.0	2,776.9	2,797.4	2,755.7	9.0	10.3	-40.59	-409.2	-176.6	126.7	111.2	15.57	8.140		
2,900.0	2,875.9	2,897.2	2,853.6	9.4	10.7	-39.88	-427.0	-185.1	133.1	117.0	16.10	8.263		
3,000.0	2,975.0	2,997.0	2,951.4	9.7	11.1	-39.24	-444.7	-193.6	139.4	122.8	16.64	8.379		
3,100.0	3,074.0	3,096.8	3,049.2	10.0	11.6	-38.65	-462.5	-202.1	145.8	128.6	17.18	8.488		
3,200.0	3,173.1	3,196.6	3,147.0	10.4	12.0	-38.11	-480.3	-210.7	152.2	134.5	17.71	8.591		
3,300.0	3,272.1	3,296.4	3,244.8	10.7	12.4	-37.61	-498.0	-219.2	158.6	140.3	18.25	8.688		
3,400.0	3,371.2	3,396.1	3,342.7	11.1	12.9	-37.15	-515.8	-227.7	165.0	146.2	18.79	8.780		
3,500.0	3,470.2	3,495.9	3,440.5	11.4	13.3	-36.73	-533.6	-236.2	171.4	152.1	19.33	8.866		
3,600.0	3,569.3	3,595.7	3,538.3	11.8	13.7	-36.34	-551.3	-244.8	177.8	158.0	19.87	8.949		
3,700.0	3,668.3	3,695.5	3,636.1	12.1	14.2	-35.97	-569.1	-253.3	184.3	163.9	20.41	9.027		
3,800.0	3,767.4	3,795.3	3,733.9	12.5	14.6	-35.63	-586.8	-261.8	190.7	169.8	20.95	9.101		
3,900.0	3,866.4	3,895.1	3,831.8	12.8	15.0	-35.31	-604.6	-270.3	197.2	175.7	21.50	9.172		
4,000.0	3,965.5	3,994.9	3,929.6	13.2	15.5	-35.01	-622.4	-278.9	203.6	181.6	22.04	9.239		
4,100.0	4,064.5	4,094.7	4,027.4	13.5	15.9	-34.73	-640.1	-287.4	210.1	187.5	22.58	9.303		
4,200.0	4,163.6	4,194.4	4,125.2	13.9	16.4	-34.47	-657.9	-295.9	216.5	193.4	23.12	9.364		
4,300.0	4,262.6	4,294.2	4,223.1	14.2	16.8	-34.22	-675.7	-304.4	223.0	199.3	23.67	9.422		
4,400.0	4,361.7	4,394.0	4,320.9	14.6	17.2	-33.99	-693.4	-313.0	229.5	205.3	24.21	9.478		
4,500.0	4,460.7	4,493.8	4,418.7	14.9	17.7	-33.77	-711.2	-321.5	235.9	211.2	24.76	9.531		
4,600.0	4,559.8	4,596.3	4,519.2	15.2	18.1	-33.57	-729.2	-330.2	242.2	216.9	25.30	9.575		
4,700.0	4,658.8	4,704.6	4,626.0	15.6	18.4	-33.69	-745.5	-338.0	245.9	220.1	25.84	9.516		
4,800.0	4,758.1	4,813.0	4,733.5	15.8	18.6	-33.98	-758.1	-344.0	247.7	221.4	26.29	9.421		
4,900.0	4,857.8	4,921.4	4,841.5	16.0	18.9	-34.19	-767.1	-348.3	248.9	222.3	26.67	9.333		

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 28-09W
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 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

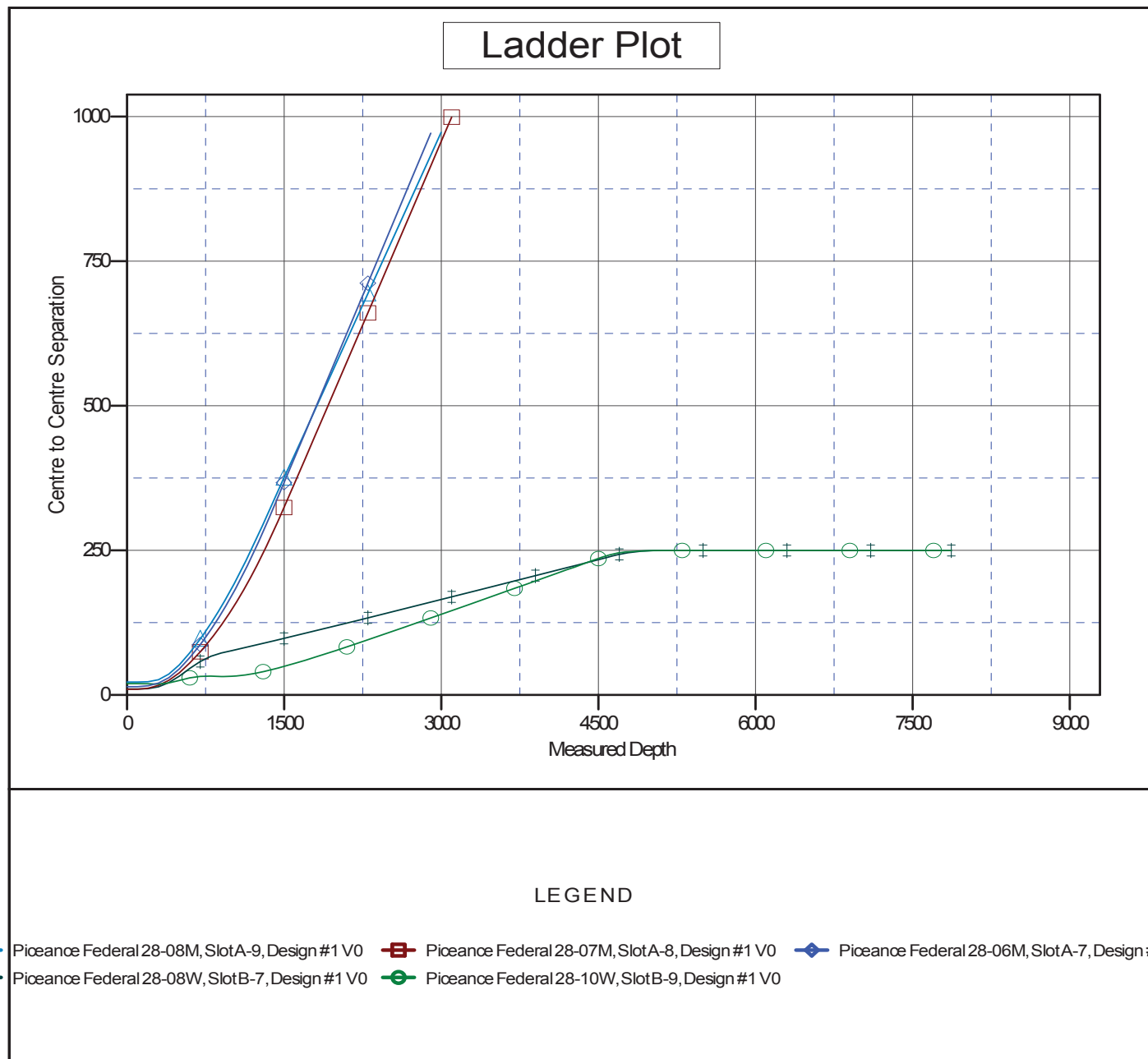
Offset Design Piceance 28-05 - Piceance Federal 28-10W - Slot B-9 - Design #1													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	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		
5,000.0	4,957.6	5,029.9	4,949.8	16.2	19.0	-34.30	-772.4	-350.9	249.7	222.7	26.98	9.253		
5,100.0	5,057.6	5,137.8	5,057.6	16.3	19.2	179.64	-773.9	-351.6	249.9	222.6	27.26	9.169		
5,200.0	5,157.6	5,237.8	5,157.6	16.4	19.3	179.64	-773.9	-351.6	249.9	222.3	27.56	9.069		
5,300.0	5,257.6	5,337.8	5,257.6	16.6	19.4	179.64	-773.9	-351.6	249.9	222.0	27.85	8.972		
5,400.0	5,357.6	5,437.8	5,357.6	16.7	19.5	179.64	-773.9	-351.6	249.9	221.7	28.15	8.876		
5,500.0	5,457.6	5,537.8	5,457.6	16.8	19.6	179.64	-773.9	-351.6	249.9	221.4	28.46	8.782		
5,600.0	5,557.6	5,637.8	5,557.6	16.9	19.7	179.64	-773.9	-351.6	249.9	221.1	28.77	8.687		
5,700.0	5,657.6	5,737.8	5,657.6	17.1	19.8	179.64	-773.9	-351.6	249.9	220.8	29.08	8.594		
5,800.0	5,757.6	5,837.8	5,757.6	17.2	19.9	179.64	-773.9	-351.6	249.9	220.5	29.39	8.502		
5,900.0	5,857.6	5,937.8	5,857.6	17.3	20.0	179.64	-773.9	-351.6	249.9	220.2	29.71	8.411		
6,000.0	5,957.6	6,037.8	5,957.6	17.5	20.1	179.64	-773.9	-351.6	249.9	219.9	30.03	8.321		
6,100.0	6,057.6	6,137.8	6,057.6	17.6	20.3	179.64	-773.9	-351.6	249.9	219.5	30.36	8.232		
6,200.0	6,157.6	6,237.8	6,157.6	17.7	20.4	179.64	-773.9	-351.6	249.9	219.2	30.69	8.143		
6,300.0	6,257.6	6,337.8	6,257.6	17.9	20.5	179.64	-773.9	-351.6	249.9	218.9	31.02	8.056		
6,400.0	6,357.6	6,437.8	6,357.6	18.0	20.6	179.64	-773.9	-351.6	249.9	218.5	31.35	7.971		
6,500.0	6,457.6	6,537.8	6,457.6	18.2	20.8	179.64	-773.9	-351.6	249.9	218.2	31.69	7.886		
6,600.0	6,557.6	6,637.8	6,557.6	18.3	20.9	179.64	-773.9	-351.6	249.9	217.9	32.03	7.802		
6,700.0	6,657.6	6,737.8	6,657.6	18.5	21.0	179.64	-773.9	-351.6	249.9	217.5	32.37	7.719		
6,800.0	6,757.6	6,837.8	6,757.6	18.6	21.1	179.64	-773.9	-351.6	249.9	217.2	32.72	7.638		
6,900.0	6,857.6	6,937.8	6,857.6	18.8	21.3	179.64	-773.9	-351.6	249.9	216.8	33.07	7.558		
7,000.0	6,957.6	7,037.8	6,957.6	18.9	21.4	179.64	-773.9	-351.6	249.9	216.5	33.42	7.478		
7,100.0	7,057.6	7,137.8	7,057.6	19.1	21.5	179.64	-773.9	-351.6	249.9	216.1	33.77	7.400		
7,200.0	7,157.6	7,237.8	7,157.6	19.2	21.7	179.64	-773.9	-351.6	249.9	215.8	34.12	7.323		
7,300.0	7,257.6	7,337.8	7,257.6	19.4	21.8	179.64	-773.9	-351.6	249.9	215.4	34.48	7.247		
7,400.0	7,357.6	7,437.8	7,357.6	19.5	22.0	179.64	-773.9	-351.6	249.9	215.1	34.84	7.173		
7,500.0	7,457.6	7,537.8	7,457.6	19.7	22.1	179.64	-773.9	-351.6	249.9	214.7	35.20	7.099		
7,600.0	7,557.6	7,637.8	7,557.6	19.8	22.2	179.64	-773.9	-351.6	249.9	214.3	35.56	7.027		
7,700.0	7,657.6	7,737.8	7,657.6	20.0	22.4	179.64	-773.9	-351.6	249.9	214.0	35.93	6.955		
7,800.0	7,757.6	7,837.8	7,757.6	20.2	22.5	179.64	-773.9	-351.6	249.9	213.6	36.30	6.885		
7,842.6	7,800.2	7,880.3	7,800.2	20.2	22.6	179.64	-773.9	-351.6	249.9	213.4	36.45	6.855		
7,870.4	7,828.0	7,897.2	7,817.0	20.3	22.6	179.64	-773.9	-351.6	250.1	213.6	36.54	6.846		



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Reference Site:	Piceance 28-05	MD Reference:	Well @ 7578.0usft
Site Error:	0.0 usft	North Reference:	True
Reference Well:	Piceance Federal 28-09W	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot B-8	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 28-09W
Coordinate System is US State Plane 1983, Colorado Central Zone
Grid Convergence at Surface is: -1.44°





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