



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance 28-07M

Slot A-8

Plan: Design #1

Standard Planning Report

29 April, 2015

Archer



Project: Mesa County, CO
Site: Piceance 28-05
Well: Piceance 28-07M
Wellbore: Slot A-8
Design: Design #1
Latitude: 39° 15' 3.510 N
Longitude: 107° 46' 45.910 W
Ground Level: 7556.0
Well @ 7578.0usft

Archer

PROJECT DETAILS: Mesa County, CO

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

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Piceance 28-07M, 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 28-07M

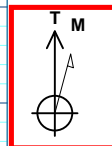
+N/-S	+E/-W	Northing	Ground Level:	Latitude	Longitude	Slot
0.0	0.0	1524399.51	7556.0	39° 15' 3.510 N	107° 46' 45.910 W	
			Easting 2354575.25			

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Piceance Federal 28-07M tgt	7891.0	-49.5	1345.9	1524316.23	2355919.49	39° 15' 3.020 N	107° 46' 28.800 W	Circle (Radius: 50.0)

SECTION DETAILS

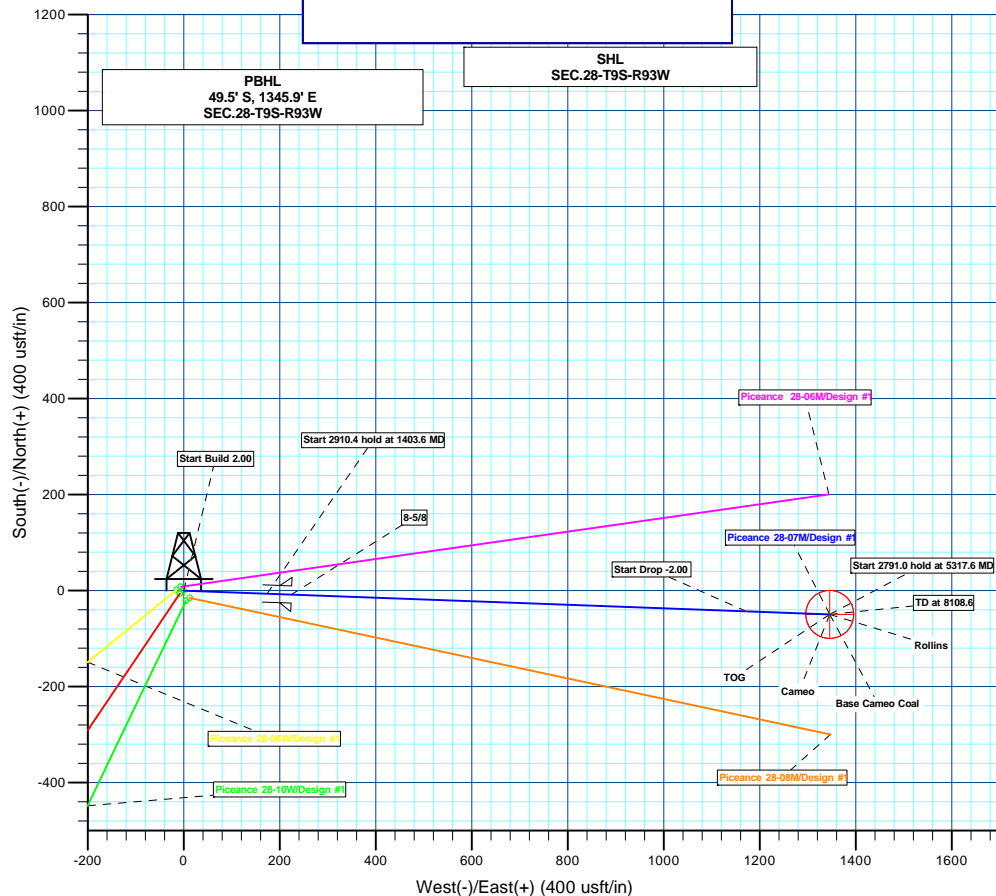
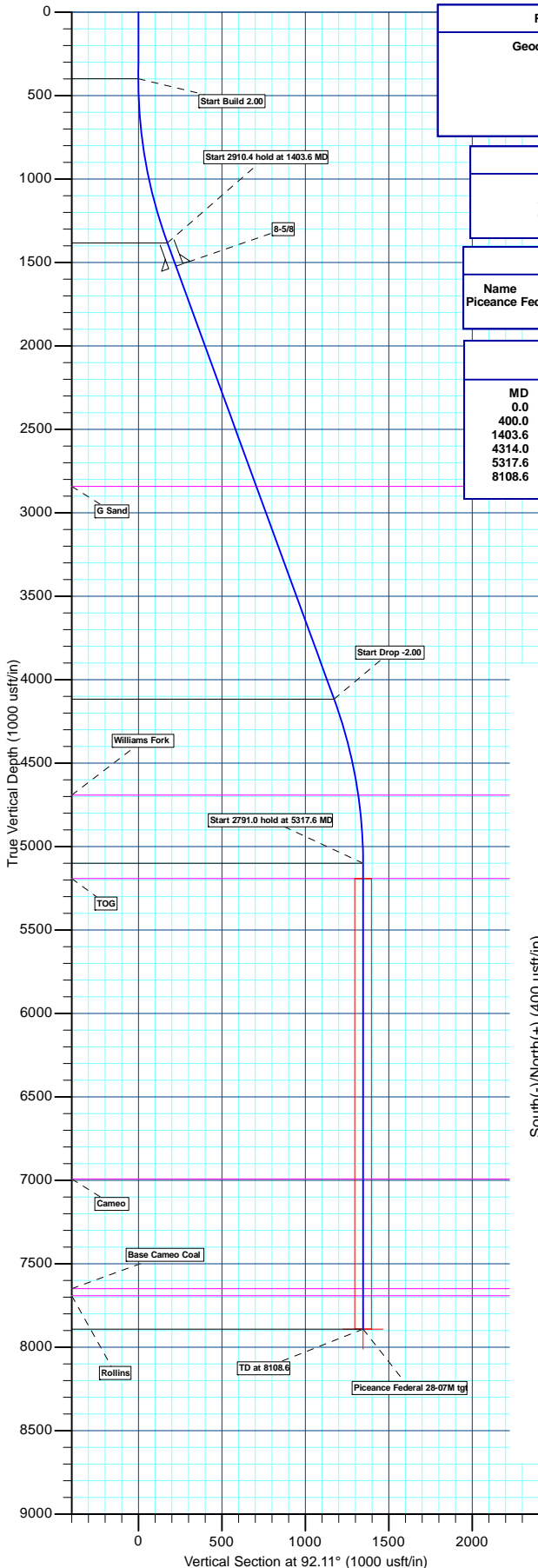
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.0	Start Build 2.00
1403.6	20.07	92.11	1383.2	-6.4	173.9	2.00	92.11	174.0	Start 2910.4 hold at 1403.6 MD
4314.0	20.07	92.11	4116.8	-43.1	1172.0	0.00	0.00	1172.8	Start Drop -2.00
5317.6	0.00	0.00	5100.0	-49.5	1345.9	2.00	180.00	1346.8	Start 2791.0 hold at 5317.6 MD
8108.6	0.00	0.00	7891.0	-49.5	1345.9	0.00	0.00	1346.8	TD at 8108.6



Azimuths to True North
Magnetic North: 9.72°
Magnetic Field
Strength: 51741.9snT
Dip Angle: 65.47°
Date: 2015/04/27
Model: IGRF2010

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2841.0	2955.7	G Sand
4691.0	4907.2	Williams Fork
5191.0	5408.6	TOG
6991.0	7208.6	Cameo
7649.0	7866.6	Base Cameo Coal
7691.0	7908.6	Rollins



Plan: Design #1 (Piceance 28-07M/Slot A-8)

Created By: Ricky Osburn Date: 8:33, April 29 2015



Archer Planning Report

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Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-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 28-07M				
Well Position	+N/-S	23.3 usft	Northing:	1,524,399.51 usft	Latitude: 39° 15' 3.510 N
	+E/-W	-18.9 usft	Easting:	2,354,575.25 usft	Longitude: 107° 46' 45.910 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level: 7,556.0 usft

Wellbore	Slot A-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	92.11

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	
400.0	0.00	0.00	400.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,403.6	20.07	92.11	1,383.2	-6.4	173.9	2.00	2.00	0.00	92.11	
4,314.0	20.07	92.11	4,116.8	-43.1	1,172.0	0.00	0.00	0.00	0.00	
5,317.6	0.00	0.00	5,100.0	-49.5	1,345.9	2.00	-2.00	0.00	180.00	
8,108.6	0.00	0.00	7,891.0	-49.5	1,345.9	0.00	0.00	0.00	0.00	Piceance Federal 28-1



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-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
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
Start Build 2.00									
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	2.00	92.11	500.0	-0.1	1.7	1.7	2.00	2.00	0.00
600.0	4.00	92.11	599.8	-0.3	7.0	7.0	2.00	2.00	0.00
700.0	6.00	92.11	699.5	-0.6	15.7	15.7	2.00	2.00	0.00
800.0	8.00	92.11	798.7	-1.0	27.9	27.9	2.00	2.00	0.00
900.0	10.00	92.11	897.5	-1.6	43.5	43.5	2.00	2.00	0.00
1,000.0	12.00	92.11	995.6	-2.3	62.6	62.6	2.00	2.00	0.00
1,100.0	14.00	92.11	1,093.1	-3.1	85.0	85.1	2.00	2.00	0.00
1,200.0	16.00	92.11	1,189.6	-4.1	110.9	111.0	2.00	2.00	0.00
1,300.0	18.00	92.11	1,285.3	-5.2	140.1	140.2	2.00	2.00	0.00
Start 2910.4 hold at 1403.6 MD									
1,403.6	20.07	92.11	1,383.2	-6.4	173.9	174.0	2.00	2.00	0.00
1,500.0	20.07	92.11	1,473.7	-7.6	206.9	207.1	0.00	0.00	0.00
8-5/8									
1,551.4	20.07	92.11	1,522.0	-8.3	224.6	224.7	0.00	0.00	0.00
1,600.0	20.07	92.11	1,567.7	-8.9	241.2	241.4	0.00	0.00	0.00
1,700.0	20.07	92.11	1,661.6	-10.1	275.5	275.7	0.00	0.00	0.00
1,800.0	20.07	92.11	1,755.5	-11.4	309.8	310.0	0.00	0.00	0.00
1,900.0	20.07	92.11	1,849.4	-12.7	344.1	344.4	0.00	0.00	0.00
2,000.0	20.07	92.11	1,943.4	-13.9	378.4	378.7	0.00	0.00	0.00
2,100.0	20.07	92.11	2,037.3	-15.2	412.7	413.0	0.00	0.00	0.00
2,200.0	20.07	92.11	2,131.2	-16.5	447.0	447.3	0.00	0.00	0.00
2,300.0	20.07	92.11	2,225.2	-17.7	481.3	481.6	0.00	0.00	0.00
2,400.0	20.07	92.11	2,319.1	-19.0	515.6	516.0	0.00	0.00	0.00
2,500.0	20.07	92.11	2,413.0	-20.2	549.9	550.3	0.00	0.00	0.00
2,600.0	20.07	92.11	2,506.9	-21.5	584.2	584.6	0.00	0.00	0.00
2,700.0	20.07	92.11	2,600.9	-22.8	618.5	618.9	0.00	0.00	0.00
2,800.0	20.07	92.11	2,694.8	-24.0	652.8	653.2	0.00	0.00	0.00
2,900.0	20.07	92.11	2,788.7	-25.3	687.1	687.6	0.00	0.00	0.00
G Sand									
2,955.7	20.07	92.11	2,841.0	-26.0	706.2	706.7	0.00	0.00	0.00
3,000.0	20.07	92.11	2,882.6	-26.5	721.4	721.9	0.00	0.00	0.00
3,100.0	20.07	92.11	2,976.6	-27.8	755.7	756.2	0.00	0.00	0.00
3,200.0	20.07	92.11	3,070.5	-29.1	790.0	790.5	0.00	0.00	0.00
3,300.0	20.07	92.11	3,164.4	-30.3	824.3	824.8	0.00	0.00	0.00
3,400.0	20.07	92.11	3,258.3	-31.6	858.6	859.2	0.00	0.00	0.00
3,500.0	20.07	92.11	3,352.3	-32.9	892.9	893.5	0.00	0.00	0.00
3,600.0	20.07	92.11	3,446.2	-34.1	927.2	927.8	0.00	0.00	0.00
3,700.0	20.07	92.11	3,540.1	-35.4	961.5	962.1	0.00	0.00	0.00
3,800.0	20.07	92.11	3,634.1	-36.6	995.8	996.4	0.00	0.00	0.00
3,900.0	20.07	92.11	3,728.0	-37.9	1,030.1	1,030.7	0.00	0.00	0.00
4,000.0	20.07	92.11	3,821.9	-39.2	1,064.3	1,065.1	0.00	0.00	0.00
4,100.0	20.07	92.11	3,915.8	-40.4	1,098.6	1,099.4	0.00	0.00	0.00
4,200.0	20.07	92.11	4,009.8	-41.7	1,132.9	1,133.7	0.00	0.00	0.00
4,300.0	20.07	92.11	4,103.7	-43.0	1,167.2	1,168.0	0.00	0.00	0.00
Start Drop -2.00									
4,314.0	20.07	92.11	4,116.8	-43.1	1,172.0	1,172.8	0.00	0.00	0.00
4,400.0	18.35	92.11	4,198.0	-44.2	1,200.3	1,201.1	2.00	-2.00	0.00
4,500.0	16.35	92.11	4,293.5	-45.3	1,230.1	1,230.9	2.00	-2.00	0.00



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-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)	
4,600.0	14.35	92.11	4,389.9	-46.2	1,256.6	1,257.4	2.00	-2.00	0.00	
4,700.0	12.35	92.11	4,487.2	-47.1	1,279.6	1,280.5	2.00	-2.00	0.00	
4,800.0	10.35	92.11	4,585.2	-47.8	1,299.3	1,300.2	2.00	-2.00	0.00	
4,900.0	8.35	92.11	4,683.9	-48.4	1,315.6	1,316.4	2.00	-2.00	0.00	
Williams Fork										
4,907.2	8.21	92.11	4,691.0	-48.5	1,316.6	1,317.5	2.00	-2.00	0.00	
5,000.0	6.35	92.11	4,783.1	-48.9	1,328.3	1,329.2	2.00	-2.00	0.00	
5,100.0	4.35	92.11	4,882.6	-49.2	1,337.7	1,338.6	2.00	-2.00	0.00	
5,200.0	2.35	92.11	4,982.5	-49.4	1,343.5	1,344.4	2.00	-2.00	0.00	
5,300.0	0.35	92.11	5,082.4	-49.5	1,345.9	1,346.8	2.00	-2.00	0.00	
Start 2791.0 hold at 5317.6 MD										
5,317.6	0.00	0.00	5,100.0	-49.5	1,345.9	1,346.8	2.00	-2.00	0.00	
5,400.0	0.00	0.00	5,182.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
TOG										
5,408.6	0.00	0.00	5,191.0	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
5,500.0	0.00	0.00	5,282.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
5,600.0	0.00	0.00	5,382.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
5,700.0	0.00	0.00	5,482.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
5,800.0	0.00	0.00	5,582.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
5,900.0	0.00	0.00	5,682.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,000.0	0.00	0.00	5,782.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,100.0	0.00	0.00	5,882.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,200.0	0.00	0.00	5,982.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,300.0	0.00	0.00	6,082.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,400.0	0.00	0.00	6,182.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,500.0	0.00	0.00	6,282.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,600.0	0.00	0.00	6,382.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,700.0	0.00	0.00	6,482.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,800.0	0.00	0.00	6,582.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
6,900.0	0.00	0.00	6,682.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,000.0	0.00	0.00	6,782.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,100.0	0.00	0.00	6,882.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,200.0	0.00	0.00	6,982.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
Cameo										
7,208.6	0.00	0.00	6,991.0	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,300.0	0.00	0.00	7,082.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,400.0	0.00	0.00	7,182.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,500.0	0.00	0.00	7,282.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,600.0	0.00	0.00	7,382.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,700.0	0.00	0.00	7,482.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,800.0	0.00	0.00	7,582.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
Base Cameo Coal										
7,866.6	0.00	0.00	7,649.0	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
7,900.0	0.00	0.00	7,682.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
Rollins										
7,908.6	0.00	0.00	7,691.0	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
8,000.0	0.00	0.00	7,782.4	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	
TD at 8108.6										
8,108.6	0.00	0.00	7,891.0	-49.5	1,345.9	1,346.8	0.00	0.00	0.00	



Database:	EDMDBBW	Local Co-ordinate Reference:	Well Piceance 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-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 28-071	0.00	0.00	7,891.0	-49.5	1,345.9	1,524,316.23	2,355,919.49	39° 15' 3.020 N	107° 46' 28.800 W
- plan hits target center									
- Circle (radius 50.0)									

Casing Points				
Measured Depth	Vertical Depth		Casing Diameter	Hole Diameter
(usft)	(usft)	Name	(")	(")
1,551.4	1,522.0	8-5/8	8-5/8	12-1/4

Formations					
Measured Depth	Vertical Depth			Dip	Dip Direction
(usft)	(usft)	Name	Lithology	(°)	(°)
2,955.7	2,841.0	G Sand		0.00	
4,907.2	4,691.0	Williams Fork		0.00	
5,408.6	5,191.0	TOG		0.00	
7,208.6	6,991.0	Cameo		0.00	
7,866.6	7,649.0	Base Cameo Coal		0.00	
7,908.6	7,691.0	Rollins		0.00	

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	Comment
400.0	400.0	0.0	0.0	Start Build 2.00
1,403.6	1,383.2	-6.4	173.9	Start 2910.4 hold at 1403.6 MD
4,314.0	4,116.8	-43.1	1,172.0	Start Drop -2.00
5,317.6	5,100.0	-49.5	1,345.9	Start 2791.0 hold at 5317.6 MD
8,108.6	7,891.0	-49.5	1,345.9	TD at 8108.6



Piceance Energy, LLC

Mesa County, CO

Piceance 28-05

Piceance Federal 28-07M

Slot A-8

Design #1

Anticollision Report

28 April, 2015

Archer



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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	8,108.6	Design #1 (Slot A-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	465.6	465.7	9.1	7.3	5.056	CC
Piceance Federal 28-06M - Slot A-7 - Design #1	500.0	500.1	9.2	7.3	4.730	ES
Piceance Federal 28-06M - Slot A-7 - Design #1	8,108.6	8,108.5	249.9	187.2	3.989	SF
Piceance Federal 28-08M - Slot A-9 - Design #1	200.0	200.0	19.7	19.1	31.553	CC, ES
Piceance Federal 28-08M - Slot A-9 - Design #1	8,108.6	8,100.8	249.9	187.5	4.003	SF
Piceance Federal 28-08W - Slot B-7 - Design #1	400.0	400.0	14.3	12.8	9.386	CC, ES
Piceance Federal 28-08W - Slot B-7 - Design #1	500.0	500.0	16.0	14.1	8.109	SF
Piceance Federal 28-09W - Slot B-8 - Design #1	100.0	100.0	9.9	9.8	56.675	CC, ES
Piceance Federal 28-09W - Slot B-8 - Design #1	300.0	299.0	16.7	15.6	15.744	SF
Piceance Federal 28-10W - Slot B-9 - Design #1	300.0	300.0	21.8	20.7	20.257	CC, ES
Piceance Federal 28-10W - Slot B-9 - Design #1	500.0	498.4	27.4	25.5	14.338	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	-37.87	8.1	-6.3	10.3					
100.0	100.0	100.0	100.0	0.1	0.1	-37.87	8.1	-6.3	10.3	10.1	0.18	58.479		
200.0	200.0	200.0	200.0	0.3	0.3	-37.87	8.1	-6.3	10.3	9.6	0.62	16.408		
300.0	300.0	300.0	300.0	0.5	0.5	-37.87	8.1	-6.3	10.3	9.2	1.07	9.543		
400.0	400.0	400.1	400.1	0.8	0.8	-28.67	8.3	-4.6	9.5	8.0	1.52	6.273		
465.6	465.6	465.7	465.6	0.9	0.9	-106.76	8.8	-1.5	9.1	7.3	1.80	5.056	CC	
500.0	500.0	500.1	500.0	1.0	1.0	-99.08	9.1	0.6	9.2	7.3	1.95	4.730	ES	
600.0	599.8	600.0	599.5	1.2	1.2	-79.86	10.3	9.2	10.8	8.4	2.40	4.496		
700.0	699.5	699.7	698.4	1.4	1.5	-67.88	12.0	21.3	13.8	10.9	2.91	4.747		
800.0	798.7	799.3	796.8	1.7	1.8	-61.52	14.2	36.7	17.7	14.2	3.47	5.106		
900.0	897.5	898.8	894.4	2.0	2.2	-58.45	16.9	55.4	22.2	18.1	4.08	5.440		
1,000.0	995.6	998.1	991.2	2.4	2.6	-57.23	20.0	77.5	27.2	22.4	4.77	5.704		
1,100.0	1,093.1	1,097.2	1,087.0	2.8	3.1	-57.05	23.6	102.8	32.7	27.1	5.55	5.889		
1,200.0	1,189.6	1,196.2	1,181.6	3.3	3.6	-57.47	27.7	131.4	38.6	32.2	6.44	6.000		
1,300.0	1,285.3	1,295.1	1,275.2	3.8	4.3	-58.25	32.2	163.1	45.0	37.6	7.44	6.045		
1,400.0	1,379.8	1,394.9	1,369.2	4.4	4.9	-60.99	37.0	196.4	50.5	41.9	8.63	5.855		

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 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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		
1,500.0	1,473.7	1,494.7	1,463.1	5.1	5.6	-64.98	41.7	229.8	55.4	45.4	9.98	5.552		
1,600.0	1,567.7	1,594.6	1,557.1	5.8	6.3	-68.32	46.5	263.2	60.5	49.1	11.36	5.319		
1,700.0	1,661.6	1,694.4	1,651.0	6.5	7.0	-71.13	51.2	296.5	65.7	52.9	12.78	5.140		
1,800.0	1,755.5	1,794.2	1,745.0	7.2	7.6	-73.53	56.0	329.9	71.1	56.9	14.21	5.000		
1,900.0	1,849.4	1,894.0	1,838.9	7.9	8.3	-75.58	60.7	363.3	76.5	60.9	15.65	4.890		
2,000.0	1,943.4	1,993.8	1,932.9	8.6	9.0	-77.36	65.5	396.6	82.1	65.0	17.10	4.802		
2,100.0	2,037.3	2,093.6	2,026.9	9.3	9.7	-78.92	70.2	430.0	87.7	69.2	18.54	4.732		
2,200.0	2,131.2	2,193.4	2,120.8	10.0	10.4	-80.28	75.0	463.3	93.4	73.4	19.99	4.674		
2,300.0	2,225.2	2,293.3	2,214.8	10.7	11.1	-81.49	79.7	496.7	99.2	77.7	21.44	4.626		
2,400.0	2,319.1	2,393.1	2,308.7	11.4	11.8	-82.56	84.4	530.1	104.9	82.1	22.88	4.586		
2,500.0	2,413.0	2,492.9	2,402.7	12.2	12.5	-83.53	89.2	563.4	110.8	86.4	24.33	4.552		
2,600.0	2,506.9	2,592.7	2,496.6	12.9	13.2	-84.39	93.9	596.8	116.6	90.8	25.77	4.524		
2,700.0	2,600.9	2,692.5	2,590.6	13.6	13.9	-85.18	98.7	630.2	122.4	95.2	27.21	4.500		
2,800.0	2,694.8	2,792.3	2,684.5	14.3	14.6	-85.89	103.4	663.5	128.3	99.7	28.65	4.479		
2,900.0	2,788.7	2,892.1	2,778.5	15.0	15.3	-86.54	108.2	696.9	134.2	104.1	30.09	4.460		
3,000.0	2,882.6	2,992.0	2,872.4	15.8	16.0	-87.13	112.9	730.2	140.1	108.6	31.53	4.444		
3,100.0	2,976.6	3,091.8	2,966.4	16.5	16.7	-87.68	117.7	763.6	146.1	113.1	32.97	4.430		
3,200.0	3,070.5	3,191.6	3,060.4	17.2	17.4	-88.18	122.4	797.0	152.0	117.6	34.41	4.418		
3,300.0	3,164.4	3,291.4	3,154.3	17.9	18.2	-88.65	127.2	830.3	158.0	122.1	35.84	4.407		
3,400.0	3,258.3	3,391.2	3,248.3	18.6	18.9	-89.08	131.9	863.7	163.9	126.7	37.28	4.398		
3,500.0	3,352.3	3,491.0	3,342.2	19.4	19.6	-89.48	136.7	897.1	169.9	131.2	38.71	4.389		
3,600.0	3,446.2	3,590.8	3,436.2	20.1	20.3	-89.86	141.4	930.4	175.9	135.7	40.15	4.381		
3,700.0	3,540.1	3,690.7	3,530.1	20.8	21.0	-90.21	146.2	963.8	181.9	140.3	41.58	4.374		
3,800.0	3,634.1	3,790.5	3,624.1	21.5	21.7	-90.53	150.9	997.1	187.9	144.8	43.01	4.368		
3,900.0	3,728.0	3,890.3	3,718.0	22.3	22.4	-90.84	155.7	1,030.5	193.9	149.4	44.44	4.362		
4,000.0	3,821.9	3,990.1	3,812.0	23.0	23.1	-91.13	160.4	1,063.9	199.9	154.0	45.87	4.357		
4,100.0	3,915.8	4,089.9	3,905.9	23.7	23.8	-91.40	165.2	1,097.2	205.9	158.6	47.30	4.352		
4,200.0	4,009.8	4,189.7	3,999.9	24.4	24.5	-91.66	169.9	1,130.6	211.9	163.1	48.73	4.348		
4,300.0	4,103.7	4,289.6	4,093.8	25.2	25.2	-91.90	174.7	1,164.0	217.9	167.7	50.16	4.344		
4,400.0	4,198.0	4,390.0	4,188.6	25.8	25.9	-92.05	179.4	1,197.0	223.8	172.3	51.46	4.349		
4,500.0	4,293.5	4,490.9	4,284.8	26.3	26.4	-92.14	183.7	1,227.1	229.1	176.6	52.48	4.366		
4,600.0	4,389.9	4,591.9	4,382.1	26.8	26.8	-92.22	187.5	1,253.8	233.9	180.5	53.39	4.380		
4,700.0	4,487.2	4,692.9	4,480.3	27.1	27.2	-92.29	190.8	1,277.2	238.0	183.8	54.20	4.392		
4,800.0	4,585.2	4,794.0	4,579.4	27.5	27.6	-92.34	193.6	1,297.1	241.5	186.6	54.90	4.400		
4,900.0	4,683.9	4,895.1	4,679.1	27.8	27.9	-92.39	196.0	1,313.5	244.5	189.0	55.49	4.405		
5,000.0	4,783.1	4,996.2	4,779.4	28.0	28.2	-92.42	197.8	1,326.5	246.7	190.8	55.99	4.407		
5,100.0	4,882.6	5,097.4	4,880.1	28.2	28.4	-92.45	199.2	1,336.0	248.4	192.0	56.38	4.406		
5,200.0	4,982.5	5,198.6	4,981.1	28.4	28.5	-92.46	200.0	1,341.9	249.5	192.8	56.68	4.401		
5,300.0	5,082.4	5,299.7	5,082.2	28.5	28.6	-92.47	200.4	1,344.3	249.9	193.0	56.89	4.393		
5,400.0	5,182.4	5,400.0	5,182.4	28.6	28.7	-0.36	200.4	1,344.3	249.9	192.9	57.04	4.381		
5,500.0	5,282.4	5,500.0	5,282.4	28.6	28.8	-0.36	200.4	1,344.3	249.9	192.7	57.21	4.368		
5,600.0	5,382.4	5,600.0	5,382.4	28.7	28.9	-0.36	200.4	1,344.3	249.9	192.5	57.39	4.355		
5,700.0	5,482.4	5,700.0	5,482.4	28.8	28.9	-0.36	200.4	1,344.3	249.9	192.3	57.56	4.341		
5,800.0	5,582.4	5,800.0	5,582.4	28.9	29.0	-0.36	200.4	1,344.3	249.9	192.2	57.74	4.328		
5,900.0	5,682.4	5,900.0	5,682.4	29.0	29.1	-0.36	200.4	1,344.3	249.9	192.0	57.93	4.314		
6,000.0	5,782.4	6,000.0	5,782.4	29.1	29.2	-0.36	200.4	1,344.3	249.9	191.8	58.11	4.300		
6,100.0	5,882.4	6,100.0	5,882.4	29.2	29.3	-0.36	200.4	1,344.3	249.9	191.6	58.30	4.286		
6,200.0	5,982.4	6,200.0	5,982.4	29.3	29.4	-0.36	200.4	1,344.3	249.9	191.4	58.49	4.272		
6,300.0	6,082.4	6,300.0	6,082.4	29.4	29.5	-0.36	200.4	1,344.3	249.9	191.2	58.69	4.258		
6,400.0	6,182.4	6,400.0	6,182.4	29.5	29.6	-0.36	200.4	1,344.3	249.9	191.0	58.88	4.244		
6,500.0	6,282.4	6,500.0	6,282.4	29.6	29.7	-0.36	200.4	1,344.3	249.9	190.8	59.08	4.230		
6,600.0	6,382.4	6,600.0	6,382.4	29.7	29.8	-0.36	200.4	1,344.3	249.9	190.6	59.29	4.215		

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 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre	Between Centres	Between Ellipses	Minimum Separation	Separation Factor				
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	+N/-S (usft)	+E/-W (usft)	(usft)	(usft)	(usft)				
6,700.0	6,482.4	6,700.0	6,482.4	29.8	29.9	-0.36	200.4	1,344.3	249.9	190.4	59.49	4.201			
6,800.0	6,582.4	6,800.0	6,582.4	29.9	30.0	-0.36	200.4	1,344.3	249.9	190.2	59.70	4.186			
6,900.0	6,682.4	6,900.0	6,682.4	30.0	30.1	-0.36	200.4	1,344.3	249.9	190.0	59.91	4.171			
7,000.0	6,782.4	7,000.0	6,782.4	30.1	30.2	-0.36	200.4	1,344.3	249.9	189.8	60.12	4.157			
7,100.0	6,882.4	7,100.0	6,882.4	30.2	30.3	-0.36	200.4	1,344.3	249.9	189.6	60.34	4.142			
7,200.0	6,982.4	7,200.0	6,982.4	30.3	30.4	-0.36	200.4	1,344.3	249.9	189.3	60.56	4.127			
7,300.0	7,082.4	7,300.0	7,082.4	30.4	30.5	-0.36	200.4	1,344.3	249.9	189.1	60.78	4.112			
7,400.0	7,182.4	7,400.0	7,182.4	30.5	30.7	-0.36	200.4	1,344.3	249.9	188.9	61.00	4.097			
7,500.0	7,282.4	7,500.0	7,282.4	30.6	30.8	-0.36	200.4	1,344.3	249.9	188.7	61.23	4.082			
7,600.0	7,382.4	7,600.0	7,382.4	30.8	30.9	-0.36	200.4	1,344.3	249.9	188.4	61.45	4.066			
7,700.0	7,482.4	7,700.0	7,482.4	30.9	31.0	-0.36	200.4	1,344.3	249.9	188.2	61.68	4.051			
7,800.0	7,582.4	7,800.0	7,582.4	31.0	31.1	-0.36	200.4	1,344.3	249.9	188.0	61.92	4.036			
7,900.0	7,682.4	7,900.0	7,682.4	31.1	31.2	-0.36	200.4	1,344.3	249.9	187.7	62.15	4.021			
8,000.0	7,782.4	8,000.0	7,782.4	31.2	31.3	-0.36	200.4	1,344.3	249.9	187.5	62.39	4.005			
8,100.0	7,882.4	8,100.0	7,882.4	31.3	31.5	-0.36	200.4	1,344.3	249.9	187.3	62.63	3.990			
8,108.6	7,891.0	8,108.5	7,891.0	31.3	31.5	-0.36	200.4	1,344.3	249.9	187.2	62.65	3.989 SF			



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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
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	112.457		
200.0	200.0	200.0	200.0	0.3	0.3	140.33	-15.2	12.6	19.7	19.1	0.62	31.553 CC, ES		
300.0	300.0	299.4	299.4	0.5	0.5	137.42	-15.5	14.3	21.1	20.0	1.06	19.890		
400.0	400.0	398.6	398.4	0.8	0.7	130.69	-16.6	19.3	25.5	24.0	1.51	16.957		
500.0	500.0	497.5	496.9	1.0	1.0	33.05	-18.4	27.7	31.9	29.9	1.95	16.355		
600.0	599.8	596.1	594.8	1.2	1.3	30.19	-20.9	39.3	38.7	36.3	2.41	16.028		
700.0	699.5	694.5	692.0	1.4	1.6	28.88	-24.0	54.2	45.7	42.8	2.90	15.753		
800.0	798.7	792.6	788.4	1.7	2.0	28.52	-27.9	72.3	53.0	49.5	3.42	15.499		
900.0	897.5	890.5	883.8	2.0	2.4	28.75	-32.4	93.6	60.4	56.4	3.96	15.238		
1,000.0	995.6	988.2	978.3	2.4	2.9	29.39	-37.6	118.0	68.0	63.4	4.54	14.953		
1,100.0	1,093.1	1,085.6	1,071.5	2.8	3.4	30.30	-43.5	145.4	75.7	70.5	5.18	14.627		
1,200.0	1,189.6	1,183.0	1,163.8	3.3	4.1	31.40	-50.0	175.9	83.6	77.8	5.87	14.251		
1,300.0	1,285.3	1,282.8	1,257.9	3.8	4.7	33.20	-56.9	208.4	89.9	83.2	6.65	13.512		
1,400.0	1,379.8	1,382.6	1,352.1	4.4	5.4	36.01	-63.8	240.8	93.4	85.8	7.57	12.334		
1,500.0	1,473.7	1,482.4	1,446.2	5.1	6.1	39.34	-70.7	273.3	95.6	87.0	8.61	11.109		
1,600.0	1,567.7	1,582.3	1,540.3	5.8	6.8	42.50	-77.6	305.8	98.2	88.4	9.75	10.073		
1,700.0	1,661.6	1,682.1	1,634.5	6.5	7.5	45.50	-84.5	338.3	101.0	90.1	10.97	9.206		
1,800.0	1,755.5	1,781.9	1,728.6	7.2	8.2	48.33	-91.4	370.8	104.1	91.9	12.27	8.485		
1,900.0	1,849.4	1,881.7	1,822.8	7.9	8.9	50.99	-98.4	403.2	107.5	93.8	13.63	7.885		
2,000.0	1,943.4	1,981.5	1,916.9	8.6	9.6	53.48	-105.3	435.7	111.0	96.0	15.03	7.385		
2,100.0	2,037.3	2,081.4	2,011.0	9.3	10.3	55.82	-112.2	468.2	114.8	98.3	16.48	6.968		
2,200.0	2,131.2	2,181.2	2,105.2	10.0	11.0	58.00	-119.1	500.7	118.7	100.8	17.94	6.617		
2,300.0	2,225.2	2,281.0	2,199.3	10.7	11.7	60.04	-126.0	533.2	122.8	103.4	19.43	6.322		
2,400.0	2,319.1	2,380.8	2,293.4	11.4	12.4	61.95	-132.9	565.6	127.1	106.1	20.93	6.070		
2,500.0	2,413.0	2,480.7	2,387.6	12.2	13.1	63.73	-139.9	598.1	131.5	109.0	22.45	5.856		
2,600.0	2,506.9	2,580.5	2,481.7	12.9	13.8	65.40	-146.8	630.6	136.0	112.0	23.97	5.672		
2,700.0	2,600.9	2,680.3	2,575.9	13.6	14.5	66.96	-153.7	663.1	140.6	115.1	25.49	5.513		
2,800.0	2,694.8	2,780.1	2,670.0	14.3	15.2	68.42	-160.6	695.6	145.3	118.2	27.02	5.376		
2,900.0	2,788.7	2,880.0	2,764.1	15.0	15.9	69.78	-167.5	728.0	150.0	121.5	28.55	5.256		
3,000.0	2,882.6	2,979.8	2,858.3	15.8	16.6	71.06	-174.4	760.5	154.9	124.8	30.08	5.151		
3,100.0	2,976.6	3,079.6	2,952.4	16.5	17.3	72.27	-181.4	793.0	159.9	128.2	31.60	5.058		
3,200.0	3,070.5	3,179.4	3,046.5	17.2	18.0	73.40	-188.3	825.5	164.9	131.7	33.12	4.977		
3,300.0	3,164.4	3,279.2	3,140.7	17.9	18.7	74.46	-195.2	858.0	169.9	135.3	34.64	4.905		
3,400.0	3,258.3	3,379.1	3,234.8	18.6	19.4	75.46	-202.1	890.4	175.0	138.9	36.16	4.841		
3,500.0	3,352.3	3,478.9	3,329.0	19.4	20.1	76.41	-209.0	922.9	180.2	142.5	37.67	4.784		
3,600.0	3,446.2	3,578.7	3,423.1	20.1	20.8	77.30	-215.9	955.4	185.4	146.3	39.18	4.732		
3,700.0	3,540.1	3,678.5	3,517.2	20.8	21.5	78.14	-222.8	987.9	190.7	150.0	40.69	4.686		
3,800.0	3,634.1	3,778.4	3,611.4	21.5	22.2	78.94	-229.8	1,020.4	196.0	153.8	42.19	4.645		
3,900.0	3,728.0	3,878.2	3,705.5	22.3	22.9	79.69	-236.7	1,052.8	201.3	157.6	43.69	4.608		
4,000.0	3,821.9	3,978.0	3,799.6	23.0	23.6	80.41	-243.6	1,085.3	206.7	161.5	45.19	4.574		
4,100.0	3,915.8	4,077.8	3,893.8	23.7	24.3	81.09	-250.5	1,117.8	212.1	165.4	46.68	4.543		
4,200.0	4,009.8	4,177.7	3,987.9	24.4	25.0	81.74	-257.4	1,150.3	217.5	169.4	48.17	4.516		
4,300.0	4,103.7	4,277.5	4,082.1	25.2	25.7	82.35	-264.3	1,182.8	223.0	173.3	49.66	4.490		
4,400.0	4,198.0	4,379.3	4,178.5	25.8	26.3	83.02	-271.1	1,214.7	228.3	177.3	50.95	4.480		
4,500.0	4,293.5	4,481.4	4,276.3	26.3	26.8	83.65	-277.3	1,243.4	233.0	181.0	52.03	4.478		
4,600.0	4,389.9	4,583.5	4,375.1	26.8	27.2	84.24	-282.6	1,268.6	237.2	184.2	52.99	4.475		
4,700.0	4,487.2	4,685.7	4,474.8	27.1	27.6	84.80	-287.3	1,290.4	240.7	186.9	53.84	4.471		
4,800.0	4,585.2	4,787.8	4,575.2	27.5	27.9	85.32	-291.2	1,308.7	243.7	189.2	54.58	4.466		
4,900.0	4,683.9	4,889.9	4,676.1	27.8	28.2	85.81	-294.3	1,323.5	246.2	190.9	55.22	4.458		
5,000.0	4,783.1	4,992.0	4,777.5	28.0	28.4	86.28	-296.7	1,334.8	248.0	192.2	55.74	4.449		
5,100.0	4,882.6	5,094.0	4,879.3	28.2	28.6	86.73	-298.4	1,342.5	249.2	193.0	56.16	4.437		

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 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre	Between Centres	Between Ellipses	Minimum Separation	Separation Factor			
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	+N/-S (usft)	+E/-W (usft)	(usft)	(usft)	(usft)			
5,200.0	4,982.5	5,196.0	4,981.1	28.4	28.7	87.15	-299.3	1,346.7	249.8	193.4	56.48	4.423		
5,300.0	5,082.4	5,297.3	5,082.4	28.5	28.8	87.52	-299.4	1,347.5	249.9	193.2	56.71	4.407		
5,345.5	5,127.9	5,342.7	5,127.9	28.5	28.9	87.57	-299.4	1,347.5	249.9	193.1	56.79	4.400		
5,400.0	5,182.4	5,397.3	5,182.4	28.6	28.9	179.64	-299.4	1,347.5	249.9	193.0	56.87	4.394		
5,500.0	5,282.4	5,497.3	5,282.4	28.6	29.0	179.64	-299.4	1,347.5	249.9	192.9	57.04	4.381		
5,600.0	5,382.4	5,597.3	5,382.4	28.7	29.1	179.64	-299.4	1,347.5	249.9	192.7	57.21	4.368		
5,700.0	5,482.4	5,697.3	5,482.4	28.8	29.2	179.64	-299.4	1,347.5	249.9	192.5	57.39	4.355		
5,800.0	5,582.4	5,797.3	5,582.4	28.9	29.2	179.64	-299.4	1,347.5	249.9	192.3	57.57	4.341		
5,900.0	5,682.4	5,897.3	5,682.4	29.0	29.3	179.64	-299.4	1,347.5	249.9	192.2	57.75	4.327		
6,000.0	5,782.4	5,997.3	5,782.4	29.1	29.4	179.64	-299.4	1,347.5	249.9	192.0	57.93	4.314		
6,100.0	5,882.4	6,097.3	5,882.4	29.2	29.5	179.64	-299.4	1,347.5	249.9	191.8	58.12	4.300		
6,200.0	5,982.4	6,197.3	5,982.4	29.3	29.6	179.64	-299.4	1,347.5	249.9	191.6	58.31	4.286		
6,300.0	6,082.4	6,297.3	6,082.4	29.4	29.7	179.64	-299.4	1,347.5	249.9	191.4	58.50	4.272		
6,400.0	6,182.4	6,397.3	6,182.4	29.5	29.8	179.64	-299.4	1,347.5	249.9	191.2	58.70	4.258		
6,500.0	6,282.4	6,497.3	6,282.4	29.6	29.9	179.64	-299.4	1,347.5	249.9	191.0	58.89	4.243		
6,600.0	6,382.4	6,597.3	6,382.4	29.7	30.0	179.64	-299.4	1,347.5	249.9	190.8	59.09	4.229		
6,700.0	6,482.4	6,697.3	6,482.4	29.8	30.1	179.64	-299.4	1,347.5	249.9	190.6	59.30	4.214		
6,800.0	6,582.4	6,797.3	6,582.4	29.9	30.2	179.64	-299.4	1,347.5	249.9	190.4	59.50	4.200		
6,900.0	6,682.4	6,897.3	6,682.4	30.0	30.3	179.64	-299.4	1,347.5	249.9	190.2	59.71	4.185		
7,000.0	6,782.4	6,997.3	6,782.4	30.1	30.4	179.64	-299.4	1,347.5	249.9	190.0	59.93	4.170		
7,100.0	6,882.4	7,097.3	6,882.4	30.2	30.5	179.64	-299.4	1,347.5	249.9	189.8	60.14	4.155		
7,200.0	6,982.4	7,197.3	6,982.4	30.3	30.6	179.64	-299.4	1,347.5	249.9	189.5	60.36	4.140		
7,300.0	7,082.4	7,297.3	7,082.4	30.4	30.7	179.64	-299.4	1,347.5	249.9	189.3	60.58	4.125		
7,400.0	7,182.4	7,397.3	7,182.4	30.5	30.8	179.64	-299.4	1,347.5	249.9	189.1	60.80	4.110		
7,500.0	7,282.4	7,497.3	7,282.4	30.6	30.9	179.64	-299.4	1,347.5	249.9	188.9	61.02	4.095		
7,600.0	7,382.4	7,597.3	7,382.4	30.8	31.0	179.64	-299.4	1,347.5	249.9	188.6	61.25	4.080		
7,700.0	7,482.4	7,697.3	7,482.4	30.9	31.2	179.64	-299.4	1,347.5	249.9	188.4	61.48	4.065		
7,800.0	7,582.4	7,797.3	7,582.4	31.0	31.3	179.64	-299.4	1,347.5	249.9	188.2	61.71	4.050		
7,900.0	7,682.4	7,897.3	7,682.4	31.1	31.4	179.64	-299.4	1,347.5	249.9	188.0	61.94	4.034		
8,000.0	7,782.4	7,997.3	7,782.4	31.2	31.5	179.64	-299.4	1,347.5	249.9	187.7	62.18	4.019		
8,100.0	7,882.4	8,097.3	7,882.4	31.3	31.6	179.64	-299.4	1,347.5	249.9	187.5	62.42	4.003		
8,100.7	7,883.1	8,098.0	7,883.1	31.3	31.6	179.64	-299.4	1,347.5	249.9	187.5	62.42	4.003		
8,108.6	7,891.0	8,100.8	7,886.0	31.3	31.6	179.64	-299.4	1,347.5	249.9	187.5	62.43	4.003 SF		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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		
0.0	0.0	0.0	0.0	0.0	0.0	-81.87	2.0	-14.2	14.3					
100.0	100.0	100.0	100.0	0.1	0.1	-81.87	2.0	-14.2	14.3	14.1	0.18	81.583		
200.0	200.0	200.0	200.0	0.3	0.3	-81.87	2.0	-14.2	14.3	13.7	0.62	22.890		
300.0	300.0	300.0	300.0	0.5	0.5	-81.87	2.0	-14.2	14.3	13.2	1.07	13.313		
400.0	400.0	400.0	400.0	0.8	0.8	-81.87	2.0	-14.2	14.3	12.8	1.52	9.386 CC, ES		
500.0	500.0	500.0	500.0	1.0	1.0	-174.63	2.0	-14.2	16.0	14.1	1.98	8.109 SF		
600.0	599.8	599.8	599.8	1.2	1.2	-175.94	2.0	-14.2	21.3	18.8	2.45	8.692		
700.0	699.5	698.7	698.7	1.4	1.4	-179.29	1.0	-15.5	31.2	28.3	2.91	10.729		
800.0	798.7	796.3	796.1	1.7	1.6	176.39	-2.2	-19.4	47.3	43.9	3.38	14.017		
900.0	897.5	892.1	891.6	2.0	1.8	172.93	-7.4	-25.7	69.7	65.8	3.86	18.055		
1,000.0	995.6	987.8	986.8	2.4	2.0	170.70	-13.8	-33.7	97.3	93.0	4.35	22.359		
1,100.0	1,093.1	1,082.9	1,081.3	2.8	2.3	169.66	-20.3	-41.6	128.3	123.5	4.84	26.492		
1,200.0	1,189.6	1,176.8	1,174.6	3.3	2.5	169.21	-26.6	-49.4	162.6	157.3	5.34	30.443		
1,300.0	1,285.3	1,269.5	1,266.8	3.8	2.8	169.05	-32.9	-57.2	200.1	194.2	5.84	34.236		
1,400.0	1,379.8	1,360.9	1,357.6	4.4	3.0	169.05	-39.1	-64.8	240.7	234.4	6.35	37.895		
1,500.0	1,473.7	1,451.5	1,447.7	5.1	3.3	169.24	-45.2	-72.4	283.0	276.2	6.83	41.446		
1,600.0	1,567.7	1,542.1	1,537.8	5.8	3.6	169.39	-51.4	-79.9	325.3	318.0	7.32	44.462		
1,700.0	1,661.6	1,632.7	1,627.9	6.5	3.8	169.50	-57.5	-87.5	367.7	359.8	7.82	47.043		
1,800.0	1,755.5	1,723.3	1,718.0	7.2	4.1	169.59	-63.6	-95.1	410.0	401.6	8.32	49.261		
1,900.0	1,849.4	1,813.9	1,808.0	7.9	4.3	169.67	-69.8	-102.6	452.3	443.4	8.84	51.183		
2,000.0	1,943.4	1,904.5	1,898.1	8.6	4.6	169.73	-75.9	-110.2	494.6	485.2	9.36	52.860		
2,100.0	2,037.3	1,995.1	1,988.2	9.3	4.9	169.78	-82.1	-117.7	536.9	527.0	9.88	54.332		
2,200.0	2,131.2	2,085.7	2,078.3	10.0	5.2	169.82	-88.2	-125.3	579.2	568.8	10.41	55.633		
2,300.0	2,225.2	2,176.3	2,168.4	10.7	5.4	169.86	-94.3	-132.9	621.5	610.6	10.94	56.790		
2,400.0	2,319.1	2,266.9	2,258.4	11.4	5.7	169.89	-100.5	-140.4	663.9	652.4	11.48	57.823		
2,500.0	2,413.0	2,357.5	2,348.5	12.2	6.0	169.92	-106.6	-148.0	706.2	694.2	12.02	58.751		
2,600.0	2,506.9	2,448.1	2,438.6	12.9	6.2	169.94	-112.8	-155.6	748.5	735.9	12.56	59.589		
2,700.0	2,600.9	2,538.7	2,528.7	13.6	6.5	169.97	-118.9	-163.1	790.8	777.7	13.10	60.348		
2,800.0	2,694.8	2,629.3	2,618.8	14.3	6.8	169.99	-125.0	-170.7	833.1	819.5	13.65	61.039		
2,900.0	2,788.7	2,719.9	2,708.8	15.0	7.1	170.01	-131.2	-178.3	875.4	861.3	14.20	61.669		
3,000.0	2,882.6	2,810.5	2,798.9	15.8	7.3	170.02	-137.3	-185.8	917.8	903.0	14.74	62.247		
3,100.0	2,976.6	2,901.1	2,889.0	16.5	7.6	170.04	-143.5	-193.4	960.1	944.8	15.29	62.779		

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 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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		
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	199.6	199.6	0.3	0.3	-130.36	-7.5	-8.8	11.6	11.0	0.61	19.069		
300.0	300.0	299.0	298.9	0.5	0.5	-135.18	-11.8	-11.7	16.7	15.6	1.06	15.744 SF		
400.0	400.0	397.9	397.4	0.8	0.8	-138.86	-18.9	-16.5	25.2	23.7	1.54	16.352		
500.0	500.0	496.0	494.8	1.0	1.1	128.62	-28.7	-23.1	38.3	36.3	2.00	19.144		
600.0	599.8	594.5	592.3	1.2	1.4	130.91	-40.0	-30.7	55.2	52.8	2.47	22.347		
700.0	699.5	692.6	689.5	1.4	1.7	133.99	-51.1	-38.2	74.6	71.6	2.96	25.200		
800.0	798.7	790.0	786.0	1.7	2.1	137.13	-62.2	-45.7	96.6	93.1	3.47	27.795		
900.0	897.5	886.7	881.7	2.0	2.4	140.06	-73.3	-53.1	121.3	117.3	4.01	30.244		
1,000.0	995.6	982.5	976.7	2.4	2.7	142.71	-84.2	-60.5	149.0	144.5	4.57	32.614		
1,100.0	1,093.1	1,077.4	1,070.6	2.8	3.0	145.07	-95.0	-67.8	179.7	174.6	5.14	34.948		
1,200.0	1,189.6	1,171.2	1,163.5	3.3	3.4	147.14	-105.7	-75.0	213.5	207.7	5.73	37.236		
1,300.0	1,285.3	1,263.8	1,255.3	3.8	3.7	148.96	-116.2	-82.1	250.3	243.9	6.33	39.547		
1,400.0	1,379.8	1,355.1	1,345.7	4.4	4.0	150.55	-126.6	-89.1	290.1	283.2	6.93	41.841		
1,500.0	1,473.7	1,445.6	1,435.4	5.1	4.3	152.24	-137.0	-96.1	331.7	324.2	7.53	44.076		
1,600.0	1,567.7	1,536.2	1,525.0	5.8	4.6	153.57	-147.3	-103.0	373.5	365.4	8.12	45.992		
1,700.0	1,661.6	1,626.7	1,614.7	6.5	4.9	154.63	-157.6	-110.0	415.4	406.7	8.72	47.645		
1,800.0	1,755.5	1,717.3	1,704.4	7.2	5.3	155.50	-167.9	-117.0	457.4	448.1	9.32	49.083		
1,900.0	1,849.4	1,807.8	1,794.1	7.9	5.6	156.22	-178.2	-123.9	499.5	489.6	9.92	50.343		
2,000.0	1,943.4	1,898.4	1,883.8	8.6	5.9	156.83	-188.6	-130.9	541.7	531.2	10.53	51.452		
2,100.0	2,037.3	1,988.9	1,973.5	9.3	6.2	157.35	-198.9	-137.8	583.9	572.7	11.13	52.437		
2,200.0	2,131.2	2,079.4	2,063.2	10.0	6.5	157.80	-209.2	-144.8	626.1	614.4	11.74	53.315		
2,300.0	2,225.2	2,170.0	2,152.8	10.7	6.8	158.20	-219.5	-151.7	668.4	656.0	12.35	54.102		
2,400.0	2,319.1	2,260.5	2,242.5	11.4	7.1	158.55	-229.8	-158.7	710.6	697.7	12.96	54.812		
2,500.0	2,413.0	2,351.1	2,332.2	12.2	7.5	158.86	-240.2	-165.6	752.9	739.3	13.58	55.454		
2,600.0	2,506.9	2,441.6	2,421.9	12.9	7.8	159.13	-250.5	-172.6	795.2	781.0	14.19	56.039		
2,700.0	2,600.9	2,532.2	2,511.6	13.6	8.1	159.38	-260.8	-179.5	837.6	822.8	14.81	56.572		
2,800.0	2,694.8	2,622.7	2,601.3	14.3	8.4	159.60	-271.1	-186.5	879.9	864.5	15.42	57.061		
2,900.0	2,788.7	2,713.3	2,691.0	15.0	8.7	159.81	-281.4	-193.5	922.2	906.2	16.04	57.510		
3,000.0	2,882.6	2,803.8	2,780.6	15.8	9.0	159.99	-291.8	-200.4	964.6	947.9	16.65	57.924		



Archer

Anticollision Report

Archer

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-8	Database:	EDMDBBW
Reference Design:	Design #1	Offset TVD Reference:	Reference Datum

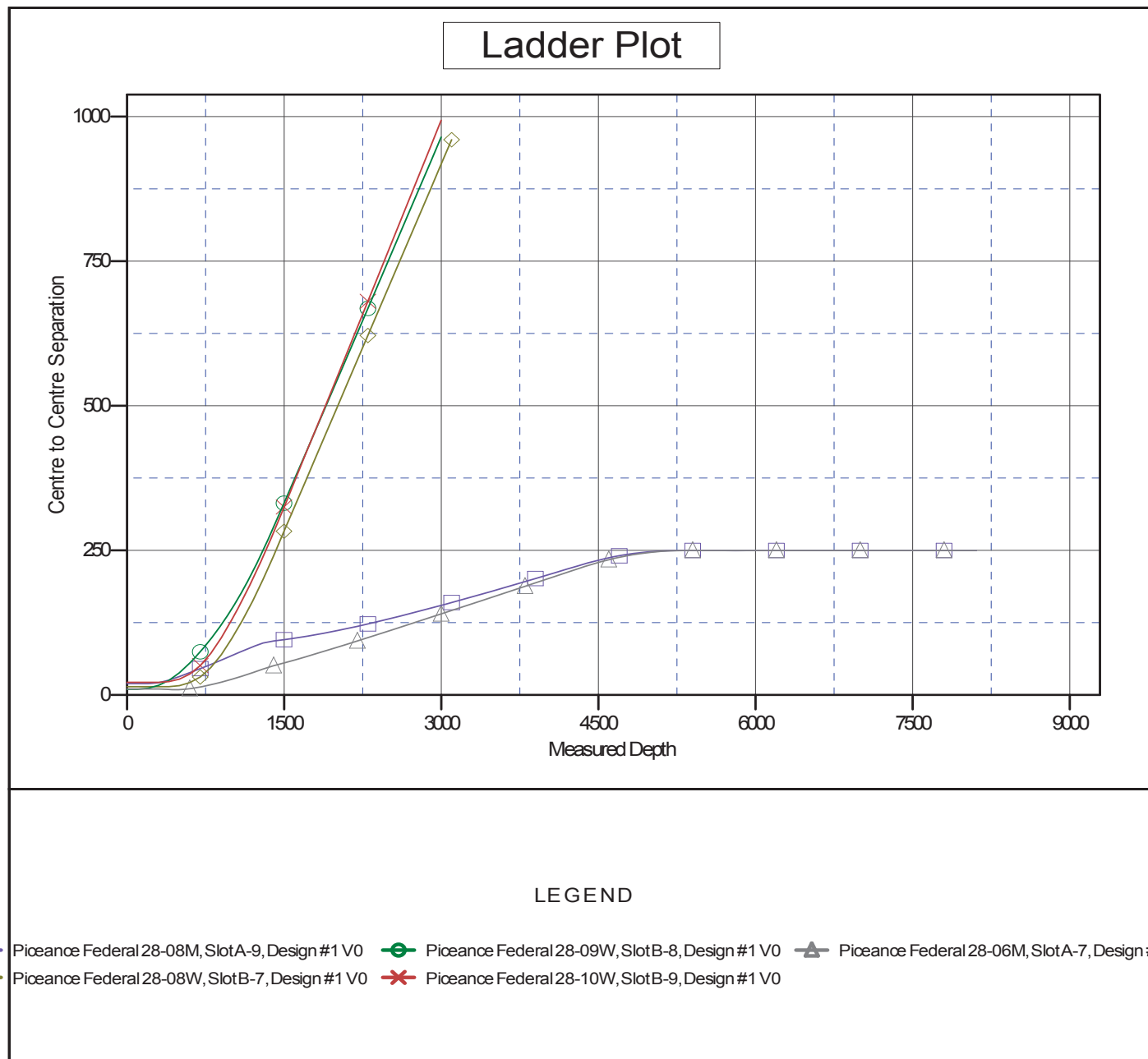
Offset Design Piceance 28-05 - Piceance Federal 28-10W - Slot B-9 - Design #1													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside 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	167.48	-21.2	4.7	21.8					
100.0	100.0	100.0	100.0	0.1	0.1	167.48	-21.2	4.7	21.8	21.6	0.18	124.139		
200.0	200.0	200.0	200.0	0.3	0.3	167.48	-21.2	4.7	21.8	21.1	0.62	34.830		
300.0	300.0	300.0	300.0	0.5	0.5	167.48	-21.2	4.7	21.8	20.7	1.07	20.257 CC, ES		
400.0	400.0	399.4	399.3	0.8	0.7	170.11	-22.8	4.0	23.2	21.7	1.50	15.447		
500.0	500.0	498.4	498.3	1.0	0.9	87.76	-27.4	1.7	27.4	25.5	1.91	14.338 SF		
600.0	599.8	596.7	596.2	1.2	1.2	101.79	-35.1	-1.9	36.1	33.8	2.35	15.378		
700.0	699.5	693.7	692.5	1.4	1.4	113.72	-45.6	-7.0	50.9	48.0	2.83	17.981		
800.0	798.7	789.0	786.7	1.7	1.7	121.96	-58.8	-13.3	71.9	68.6	3.35	21.479		
900.0	897.5	882.6	878.6	2.0	2.1	127.36	-74.4	-20.8	99.0	95.1	3.91	25.331		
1,000.0	995.6	977.4	971.5	2.4	2.4	131.33	-91.3	-28.9	129.9	125.4	4.48	28.975		
1,100.0	1,093.1	1,071.1	1,063.4	2.8	2.8	134.49	-108.0	-36.9	163.6	158.5	5.08	32.175		
1,200.0	1,189.6	1,163.7	1,154.2	3.3	3.2	137.09	-124.5	-44.8	200.0	194.3	5.71	35.021		
1,300.0	1,285.3	1,255.2	1,243.8	3.8	3.6	139.28	-140.8	-52.6	239.3	232.9	6.36	37.612		
1,400.0	1,379.8	1,345.3	1,332.2	4.4	4.0	141.15	-156.8	-60.3	281.4	274.4	7.04	39.978		
1,500.0	1,473.7	1,434.7	1,419.8	5.1	4.3	143.17	-172.7	-68.0	325.2	317.5	7.71	42.198		
1,600.0	1,567.7	1,524.0	1,507.4	5.8	4.7	144.74	-188.6	-75.6	369.2	360.9	8.38	44.062		
1,700.0	1,661.6	1,613.4	1,595.0	6.5	5.1	145.97	-204.5	-83.3	413.5	404.4	9.06	45.644		
1,800.0	1,755.5	1,702.8	1,682.6	7.2	5.5	146.96	-220.4	-90.9	457.8	448.1	9.74	46.998		
1,900.0	1,849.4	1,792.2	1,770.3	7.9	5.9	147.78	-236.3	-98.5	502.2	491.8	10.43	48.166		
2,000.0	1,943.4	1,881.5	1,857.9	8.6	6.3	148.47	-252.3	-106.2	546.8	535.6	11.12	49.182		
2,100.0	2,037.3	1,970.9	1,945.5	9.3	6.7	149.06	-268.2	-113.8	591.3	579.5	11.81	50.072		
2,200.0	2,131.2	2,060.3	2,033.1	10.0	7.0	149.56	-284.1	-121.4	635.9	623.4	12.50	50.858		
2,300.0	2,225.2	2,149.6	2,120.7	10.7	7.4	149.99	-300.0	-129.1	680.6	667.4	13.20	51.555		
2,400.0	2,319.1	2,239.0	2,208.3	11.4	7.8	150.38	-315.9	-136.7	725.2	711.3	13.90	52.178		
2,500.0	2,413.0	2,328.4	2,295.9	12.2	8.2	150.72	-331.8	-144.3	769.9	755.3	14.60	52.737		
2,600.0	2,506.9	2,417.8	2,383.5	12.9	8.6	151.02	-347.7	-152.0	814.6	799.3	15.30	53.241		
2,700.0	2,600.9	2,507.1	2,471.1	13.6	9.0	151.29	-363.6	-159.6	859.3	843.3	16.00	53.699		
2,800.0	2,694.8	2,596.5	2,558.8	14.3	9.4	151.53	-379.5	-167.3	904.1	887.4	16.71	54.115		
2,900.0	2,788.7	2,685.9	2,646.4	15.0	9.8	151.75	-395.4	-174.9	948.8	931.4	17.41	54.495		
3,000.0	2,882.6	2,775.2	2,734.0	15.8	10.2	151.95	-411.3	-182.5	993.6	975.5	18.12	54.843		



Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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 28-07M
Coordinate System is US State Plane 1983, Colorado Central Zone
Grid Convergence at Surface is: -1.44°





Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Piceance Federal 28-07M
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 28-07M	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-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 28-07M

Coordinate System is US State Plane 1983, Colorado Central Zone

Grid Convergence at Surface is: -1.44°

