



Piceance Energy, LLC

Mesa County, CO

Bruton 30-10 Pad

Bruton 30-21E

Slot A-4

Plan: Design #2

Standard Planning Report

09 July, 2015



Project: Mesa County, CO
Site: Bruton 30-10 Pad
Well: Bruton 30-21E
Wellbore: Slot A-4
Design: Design #2
Latitude: 39° 14' 52.829 N
Longitude: 107° 48' 31.871 W
Ground Level: 7643.00
Well @ 7665.00usft

Archer

PROJECT DETAILS: Mesa County, CO

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

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Bruton 30-21E, True North
Vertical (TVD) Reference: Well @ 7665.00usft
Section (VS) Reference: Slot - (0.00N, 0.00E)
Measured Depth Reference: Well @ 7665.00usft
Calculation Method: Minimum Curvature

WELL DETAILS: Bruton 30-21E

+N/-S	+E/-W	Northings	Ground Level: Easting	Latitude	Longitude	Slot
0.00	0.00	1523529.693	2346215.364	39° 14' 52.829 N	107° 48' 31.871 W	

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

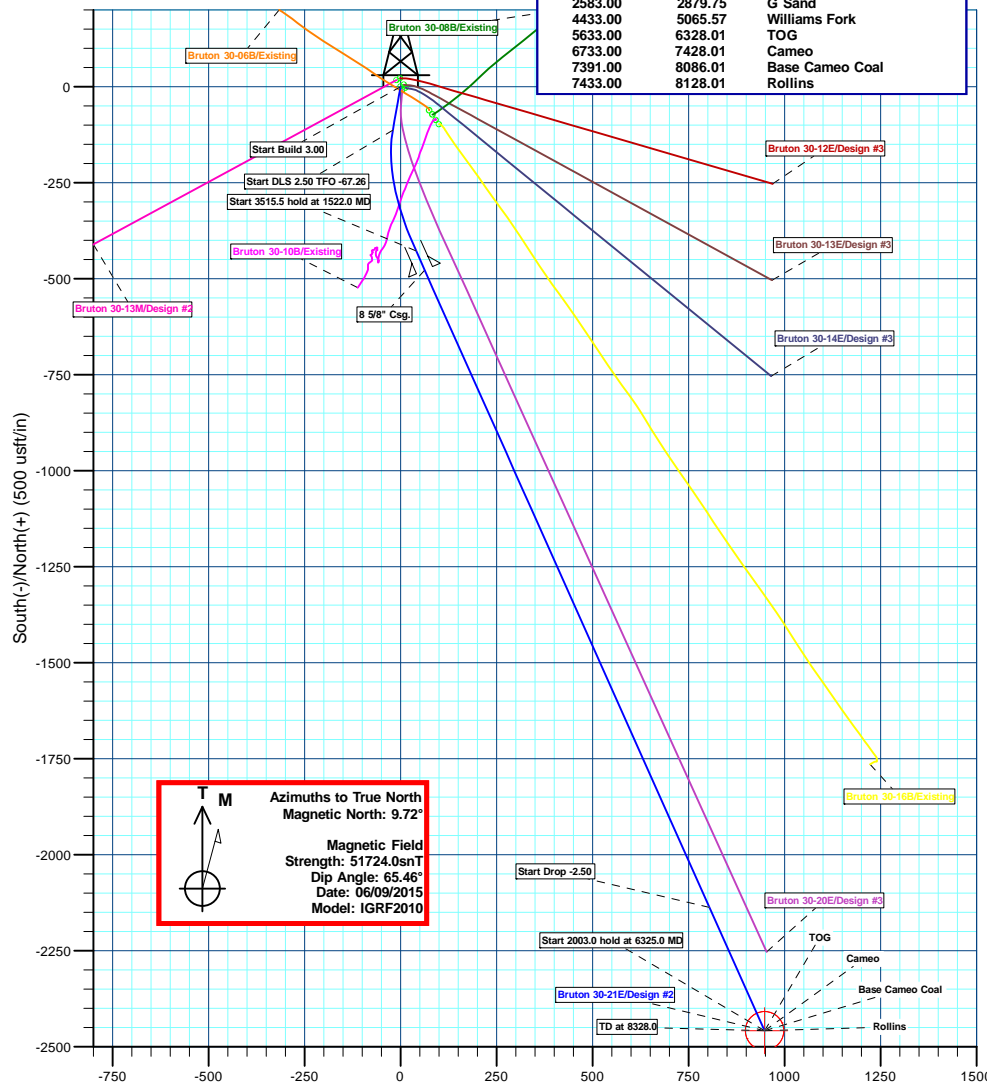
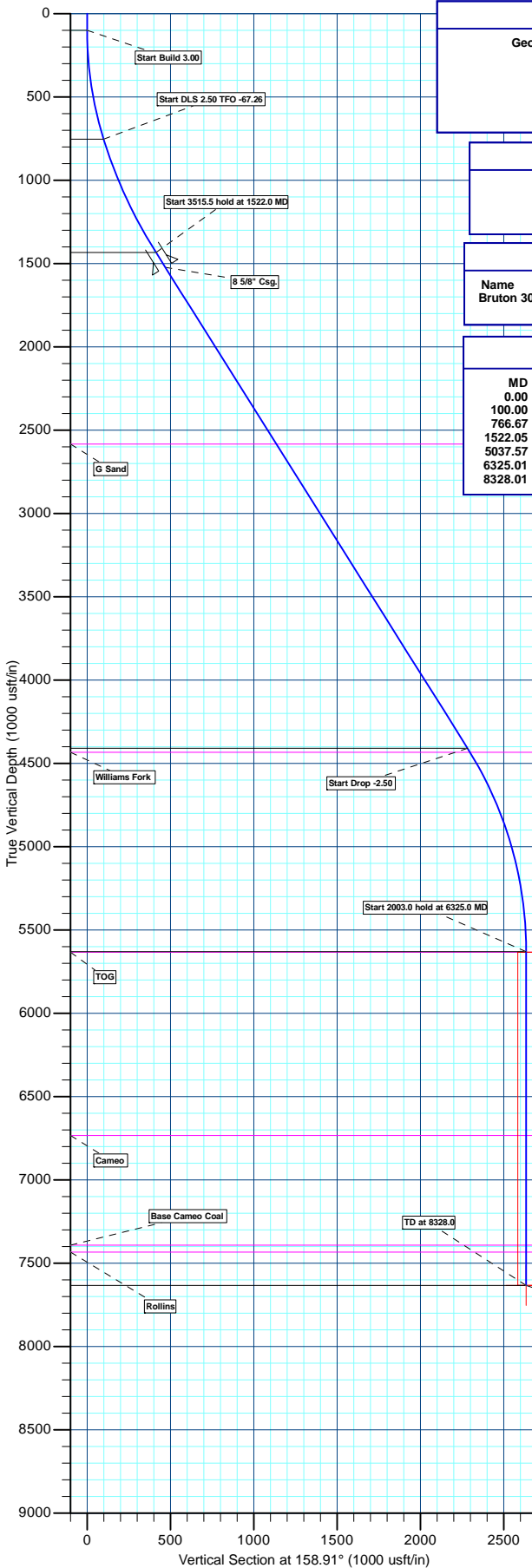
Name	TVD	+N/-S	+E/-W	Northings	Easting	Latitude	Longitude	Shape
Bruton 30-21E tgt	7633.00	-2458.31	948.07	1521048.081	2347100.656	39° 14' 28.530 N	107° 48' 19.820 W	Circle (Radius: 50.00)

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	Start Build 3.00
766.67	20.00	190.00	753.21	-113.43	-20.00	3.00	190.00	98.63	Start DLS 2.50 TFO -67.26
1522.05	32.19	155.92	1433.94	-427.16	40.21	2.50	-67.26	413.02	Start 3515.5 hold at 1522.0 MD
5037.57	32.19	155.92	4409.21	-2136.77	804.35	0.00	0.00	2283.07	Start Drop -2.50
6325.01	0.00	0.00	5630.00	-2458.31	948.07	2.50	180.00	2634.79	Start 2003.0 hold at 6325.0 MD
8328.01	0.00	0.00	7633.00	-2458.31	948.07	0.00	0.00	2634.79	TD at 8328.0

FORMATION TOP DETAILS

TVDPATH	MDPATH	Formation
2583.00	2879.75	G Sand
4433.00	5065.57	Williams Fork
5633.00	6328.01	TOG
6733.00	7428.01	Cameo
7391.00	8086.01	Base Cameo Coal
7433.00	8128.01	Rollins



Azimuths to True North
Magnetic North: 9.72°
Magnetic Field
Strength: 51724.0snT
Dip Angle: 65.46°
Date: 06/09/2015
Model: IGRF2010

Plan: Design #2 (Bruton 30-21E/Slot A-4)

Created By: Ricky Osburn Date: 14:21, July 09 2015



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Planning Report

Database:	EDMDBBW	Local Co-ordinate Reference:	Well Bruton 30-21E
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7665.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7665.00usft
Site:	Bruton 30-10 Pad	North Reference:	True
Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-4		
Design:	Design #2		

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

Site	Bruton 30-10 Pad				
Site Position:		Northing:	1,523,574.982 usft	Latitude:	39° 14' 53.270 N
From:	Lat/Long	Easting:	2,346,190.611 usft	Longitude:	107° 48' 32.200 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.46 °

Well	Bruton 30-21E					
Well Position	+N/-S	-44.65 usft	Northing:	1,523,529.693 usft	Latitude:	39° 14' 52.829 N
	+E/-W	25.90 usft	Easting:	2,346,215.364 usft	Longitude:	107° 48' 31.871 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	7,643.00 usft

Wellbore	Slot A-4				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2015/06/09	9.72	65.46	51,724

Design	Design #2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	158.91

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
766.67	20.00	190.00	753.21	-113.43	-20.00	3.00	3.00	0.00	190.00	
1,522.05	32.19	155.92	1,433.94	-427.16	40.21	2.50	1.61	-4.51	-67.26	
5,037.57	32.19	155.92	4,409.21	-2,136.77	804.35	0.00	0.00	0.00	0.00	
6,325.01	0.00	0.00	5,630.00	-2,458.31	948.07	2.50	-2.50	0.00	180.00	
8,328.01	0.00	0.00	7,633.00	-2,458.31	948.07	0.00	0.00	0.00	0.00	Bruton 30-21E tgt



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Planning Report

Database:	EDMDBBW	Local Co-ordinate Reference:	Well Bruton 30-21E
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7665.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7665.00usft
Site:	Bruton 30-10 Pad	North Reference:	True
Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-4		
Design:	Design #2		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 3.00									
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	3.00	190.00	199.95	-2.58	-0.45	2.24	3.00	3.00	0.00
300.00	6.00	190.00	299.63	-10.30	-1.82	8.96	3.00	3.00	0.00
400.00	9.00	190.00	398.77	-23.16	-4.08	20.14	3.00	3.00	0.00
500.00	12.00	190.00	497.08	-41.10	-7.25	35.74	3.00	3.00	0.00
600.00	15.00	190.00	594.31	-64.09	-11.30	55.73	3.00	3.00	0.00
700.00	18.00	190.00	690.18	-92.06	-16.23	80.05	3.00	3.00	0.00
Start DLS 2.50 TFO -67.26									
766.67	20.00	190.00	753.21	-113.43	-20.00	98.63	3.00	3.00	0.00
800.00	20.34	187.79	784.50	-124.78	-21.78	108.59	2.50	1.01	-6.64
900.00	21.50	181.59	877.92	-160.32	-24.64	140.72	2.50	1.16	-6.20
1,000.00	22.87	176.04	970.52	-198.03	-23.80	176.20	2.50	1.37	-5.54
1,100.00	24.41	171.13	1,062.14	-237.84	-19.28	214.97	2.50	1.54	-4.91
1,200.00	26.09	166.79	1,152.59	-279.67	-11.06	256.96	2.50	1.68	-4.34
1,300.00	27.89	162.95	1,241.70	-323.44	0.82	302.07	2.50	1.80	-3.84
1,400.00	29.78	159.56	1,329.31	-369.08	16.35	350.24	2.50	1.89	-3.40
1,500.00	31.74	156.54	1,415.24	-416.48	35.50	401.36	2.50	1.97	-3.02
Start 3515.5 hold at 1522.0 MD									
1,522.05	32.19	155.92	1,433.94	-427.16	40.21	413.02	2.50	2.01	-2.81
1,600.00	32.19	155.92	1,499.92	-465.07	57.15	454.48	0.00	0.00	0.00
8 5/8" Csg.									
1,626.09	32.19	155.92	1,522.00	-477.76	62.82	468.36	0.00	0.00	0.00
1,700.00	32.19	155.92	1,584.55	-513.70	78.89	507.68	0.00	0.00	0.00
1,800.00	32.19	155.92	1,669.18	-562.33	100.63	560.87	0.00	0.00	0.00
1,900.00	32.19	155.92	1,753.82	-610.96	122.36	614.07	0.00	0.00	0.00
2,000.00	32.19	155.92	1,838.45	-659.59	144.10	667.26	0.00	0.00	0.00
2,100.00	32.19	155.92	1,923.08	-708.22	165.83	720.46	0.00	0.00	0.00
2,200.00	32.19	155.92	2,007.71	-756.85	187.57	773.65	0.00	0.00	0.00
2,300.00	32.19	155.92	2,092.34	-805.48	209.31	826.84	0.00	0.00	0.00
2,400.00	32.19	155.92	2,176.98	-854.11	231.04	880.04	0.00	0.00	0.00
2,500.00	32.19	155.92	2,261.61	-902.74	252.78	933.23	0.00	0.00	0.00
2,600.00	32.19	155.92	2,346.24	-951.37	274.52	986.43	0.00	0.00	0.00
2,700.00	32.19	155.92	2,430.87	-1,000.00	296.25	1,039.62	0.00	0.00	0.00
2,800.00	32.19	155.92	2,515.51	-1,048.63	317.99	1,092.82	0.00	0.00	0.00
G Sand									
2,879.75	32.19	155.92	2,583.00	-1,087.42	335.32	1,135.24	0.00	0.00	0.00
2,900.00	32.19	155.92	2,600.14	-1,097.26	339.72	1,146.01	0.00	0.00	0.00
3,000.00	32.19	155.92	2,684.77	-1,145.89	361.46	1,199.20	0.00	0.00	0.00
3,100.00	32.19	155.92	2,769.40	-1,194.52	383.20	1,252.40	0.00	0.00	0.00
3,200.00	32.19	155.92	2,854.04	-1,243.15	404.93	1,305.59	0.00	0.00	0.00
3,300.00	32.19	155.92	2,938.67	-1,291.79	426.67	1,358.79	0.00	0.00	0.00
3,400.00	32.19	155.92	3,023.30	-1,340.42	448.40	1,411.98	0.00	0.00	0.00
3,500.00	32.19	155.92	3,107.93	-1,389.05	470.14	1,465.18	0.00	0.00	0.00
3,600.00	32.19	155.92	3,192.56	-1,437.68	491.88	1,518.37	0.00	0.00	0.00
3,700.00	32.19	155.92	3,277.20	-1,486.31	513.61	1,571.56	0.00	0.00	0.00
3,800.00	32.19	155.92	3,361.83	-1,534.94	535.35	1,624.76	0.00	0.00	0.00
3,900.00	32.19	155.92	3,446.46	-1,583.57	557.09	1,677.95	0.00	0.00	0.00
4,000.00	32.19	155.92	3,531.09	-1,632.20	578.82	1,731.15	0.00	0.00	0.00
4,100.00	32.19	155.92	3,615.73	-1,680.83	600.56	1,784.34	0.00	0.00	0.00
4,200.00	32.19	155.92	3,700.36	-1,729.46	622.29	1,837.54	0.00	0.00	0.00
4,300.00	32.19	155.92	3,784.99	-1,778.09	644.03	1,890.73	0.00	0.00	0.00
4,400.00	32.19	155.92	3,869.62	-1,826.72	665.77	1,943.92	0.00	0.00	0.00



Archer

Planning Report

Database:	EDMDBBW	Local Co-ordinate Reference:	Well Bruton 30-21E
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7665.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7665.00usft
Site:	Bruton 30-10 Pad	North Reference:	True
Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-4		
Design:	Design #2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,500.00	32.19	155.92	3,954.26	-1,875.35	687.50	1,997.12	0.00	0.00	0.00	
4,600.00	32.19	155.92	4,038.89	-1,923.98	709.24	2,050.31	0.00	0.00	0.00	
4,700.00	32.19	155.92	4,123.52	-1,972.61	730.98	2,103.51	0.00	0.00	0.00	
4,800.00	32.19	155.92	4,208.15	-2,021.24	752.71	2,156.70	0.00	0.00	0.00	
4,900.00	32.19	155.92	4,292.79	-2,069.87	774.45	2,209.90	0.00	0.00	0.00	
5,000.00	32.19	155.92	4,377.42	-2,118.50	796.18	2,263.09	0.00	0.00	0.00	
Start Drop -2.50										
5,037.57	32.19	155.92	4,409.21	-2,136.77	804.35	2,283.07	0.00	0.00	0.00	
Williams Fork										
5,065.57	31.49	155.92	4,433.00	-2,150.25	810.38	2,297.82	2.50	-2.50	0.00	
5,100.00	30.63	155.92	4,462.50	-2,166.47	817.62	2,315.56	2.50	-2.50	0.00	
5,200.00	28.13	155.92	4,549.63	-2,211.25	837.64	2,364.54	2.50	-2.50	0.00	
5,300.00	25.63	155.92	4,638.82	-2,252.52	856.08	2,409.68	2.50	-2.50	0.00	
5,400.00	23.13	155.92	4,729.90	-2,290.19	872.92	2,450.89	2.50	-2.50	0.00	
5,500.00	20.63	155.92	4,822.70	-2,324.20	888.13	2,488.10	2.50	-2.50	0.00	
5,600.00	18.13	155.92	4,917.02	-2,354.49	901.66	2,521.23	2.50	-2.50	0.00	
5,700.00	15.63	155.92	5,012.71	-2,380.99	913.51	2,550.21	2.50	-2.50	0.00	
5,800.00	13.13	155.92	5,109.57	-2,403.65	923.64	2,575.00	2.50	-2.50	0.00	
5,900.00	10.63	155.92	5,207.42	-2,422.44	932.03	2,595.55	2.50	-2.50	0.00	
6,000.00	8.13	155.92	5,306.08	-2,437.31	938.68	2,611.82	2.50	-2.50	0.00	
6,100.00	5.63	155.92	5,405.35	-2,448.24	943.57	2,623.77	2.50	-2.50	0.00	
6,200.00	3.13	155.92	5,505.05	-2,455.20	946.68	2,631.39	2.50	-2.50	0.00	
6,300.00	0.63	155.92	5,604.99	-2,458.19	948.01	2,634.66	2.50	-2.50	0.00	
Start 2003.0 hold at 6325.0 MD										
6,325.01	0.00	0.00	5,630.00	-2,458.31	948.07	2,634.79	2.50	-2.50	0.00	
TOG										
6,328.01	0.00	0.00	5,633.00	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
6,400.00	0.00	0.00	5,704.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
6,500.00	0.00	0.00	5,804.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
6,600.00	0.00	0.00	5,904.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,004.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,104.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,204.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,000.00	0.00	0.00	6,304.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,100.00	0.00	0.00	6,404.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,200.00	0.00	0.00	6,504.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,300.00	0.00	0.00	6,604.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,400.00	0.00	0.00	6,704.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
Cameo										
7,428.01	0.00	0.00	6,733.00	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,500.00	0.00	0.00	6,804.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,600.00	0.00	0.00	6,904.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,700.00	0.00	0.00	7,004.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,800.00	0.00	0.00	7,104.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
7,900.00	0.00	0.00	7,204.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
8,000.00	0.00	0.00	7,304.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
Base Cameo Coal										
8,086.01	0.00	0.00	7,391.00	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
8,100.00	0.00	0.00	7,404.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
Rollins										
8,128.01	0.00	0.00	7,433.00	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
8,200.00	0.00	0.00	7,504.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	
8,300.00	0.00	0.00	7,604.99	-2,458.31	948.07	2,634.79	0.00	0.00	0.00	



Archer

Planning Report

Database:	EDMDBBW	Local Co-ordinate Reference:	Well Bruton 30-21E
Company:	Piceance Energy, LLC	TVD Reference:	Well @ 7665.00usft
Project:	Mesa County, CO	MD Reference:	Well @ 7665.00usft
Site:	Bruton 30-10 Pad	North Reference:	True
Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slot A-4		
Design:	Design #2		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
TD at 8328.0									
8,328.01	0.00	0.00	7,633.00	-2,458.31	948.07	2,634.79	0.00	0.00	0.00

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Bruton 30-21E tgt	0.00	0.00	7,633.00	-2,458.31	948.07	1,521,048.081	2,347,100.656	39° 14' 28.530 N	107° 48' 19.820 W
- plan hits target center									
- Circle (radius 50.00)									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
1,626.09	1,522.00	8 5/8" Csg.	8-5/8	12-1/4	

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
2,879.75	2,583.00	G Sand		0.00		
5,065.57	4,433.00	Williams Fork		0.00		
6,328.01	5,633.00	TOG		0.00		
7,428.01	6,733.00	Cameo		0.00		
8,086.01	7,391.00	Base Cameo Coal		0.00		
8,128.01	7,433.00	Rollins		0.00		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
100.00	100.00	0.00	0.00	Start Build 3.00	
766.67	753.21	-113.43	-20.00	Start DLS 2.50 TFO -67.26	
1,522.05	1,433.94	-427.16	40.21	Start 3515.5 hold at 1522.0 MD	
5,037.57	4,409.21	-2,136.77	804.35	Start Drop -2.50	
6,325.01	5,630.00	-2,458.31	948.07	Start 2003.0 hold at 6325.0 MD	
8,328.01	7,633.00	-2,458.31	948.07	TD at 8328.0	



Piceance Energy, LLC

**Mesa County, CO
Bruton 30-10 Pad
Bruton 30-21E**

**Slot A-4
Design #2**

Anticollision Report

09 July, 2015



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

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

Survey Tool Program		Date	2015/07/09		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	8,328.01	Design #2 (Slot A-4)	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						
Bruton 30-10 Pad						
Bruton 30-06B - Existing - Existing	561.36	545.78	63.93	61.20	23.482	CC, ES
Bruton 30-06B - Existing - Existing	700.00	676.69	80.90	77.01	20.796	SF
Bruton 30-08B - Existing - Existing	488.79	465.23	99.63	97.58	48.460	CC
Bruton 30-08B - Existing - Existing	500.00	475.67	99.69	97.57	47.002	ES
Bruton 30-08B - Existing - Existing	700.00	657.69	124.59	120.96	34.271	SF
Bruton 30-10B - Existing - Existing	670.05	645.75	96.51	93.16	28.879	CC, ES
Bruton 30-10B - Existing - Existing	900.00	868.85	111.26	106.22	22.078	SF
Bruton 30-12E - Slot B-5 - Design #3	100.00	100.00	22.26	22.09	126.983	CC, ES
Bruton 30-12E - Slot B-5 - Design #3	400.00	398.77	45.45	43.52	23.481	SF
Bruton 30-13E - Slot B-4 - Design #3	100.00	100.00	10.15	9.98	57.909	CC, ES
Bruton 30-13E - Slot B-4 - Design #3	300.00	299.63	18.70	17.40	14.400	SF
Bruton 30-13M - Slot A-5 - Design #2	100.00	100.00	20.24	20.06	115.436	CC, ES
Bruton 30-13M - Slot A-5 - Design #2	400.00	398.77	41.10	39.19	21.530	SF
Bruton 30-14E - Slot B-3 - Design #3	146.18	146.17	13.61	13.24	36.249	CC
Bruton 30-14E - Slot B-3 - Design #3	200.00	199.95	13.77	13.16	22.496	ES
Bruton 30-14E - Slot B-3 - Design #3	300.00	299.12	18.26	17.10	15.799	SF
Bruton 30-16B - Existing - Existing	400.00	371.00	133.31	131.74	84.730	CC, ES
Bruton 30-16B - Existing - Existing	8,328.01	7,994.45	748.25	673.48	10.007	SF
Bruton 30-20E - Slot A-3 - Design #3	272.04	271.80	6.21	5.28	6.684	CC, ES
Bruton 30-20E - Slot A-3 - Design #3	4,900.00	4,917.79	135.61	74.33	2.213	SF

Offset Design Bruton 30-10 Pad - Bruton 30-06B - Existing - Existing												Offset Site Error:	0.00 usft
Survey Program: 98-MWD												Offset Well Error:	0.00 usft
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
0.00	0.00	0.00	18.00	0.00	0.00	129.31	-61.33	74.91	98.47				
100.00	100.00	82.33	100.33	0.09	0.09	129.15	-61.04	74.97	96.67	96.49	0.18	536.056	
200.00	199.95	184.31	202.29	0.31	0.31	-63.02	-59.33	74.65	94.16	93.52	0.64	147.322	
300.00	299.63	286.35	304.24	0.56	0.54	-68.80	-55.88	72.26	87.09	85.96	1.13	76.996	
400.00	398.77	387.58	405.21	0.85	0.78	-79.19	-51.30	66.65	76.40	74.75	1.65	46.245	
500.00	497.08	486.26	503.43	1.23	1.05	-96.64	-46.14	58.65	66.39	64.14	2.25	29.503	
561.36	556.88	545.78	562.53	1.52	1.22	-111.68	-42.34	52.85	63.93	61.20	2.72	23.482	CC, ES
600.00	594.31	582.65	599.10	1.70	1.33	-122.15	-39.63	48.91	65.17	62.12	3.05	21.396	

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



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-06B - Existing - Existing													Offset Site Error:	0.00 usft
Survey Program: 98-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
700.00	690.18	676.69	692.14	2.25	1.64	-147.06	-31.84	37.75	80.90	77.01	3.89	20.796 SF		
800.00	784.50	768.63	782.74	2.87	1.97	-162.10	-23.94	24.26	110.86	106.32	4.55	24.385		
900.00	877.92	856.07	868.51	3.51	2.32	-167.17	-15.44	9.50	149.14	144.07	5.08	29.371		
1,000.00	970.52	940.17	950.71	4.20	2.67	-169.35	-6.01	-5.50	193.90	188.26	5.65	34.343		
1,100.00	1,062.14	1,021.46	1,029.78	4.94	3.05	-170.27	3.98	-21.53	243.98	237.75	6.23	39.149		
1,200.00	1,152.59	1,097.98	1,103.76	5.73	3.44	-170.41	14.19	-38.20	299.13	292.30	6.82	43.831		
1,300.00	1,241.70	1,170.21	1,173.24	6.57	3.83	-170.00	24.68	-54.92	359.14	351.73	7.41	48.488		
1,400.00	1,329.31	1,239.35	1,239.54	7.47	4.21	-169.22	35.51	-71.27	423.59	415.61	7.97	53.124		
1,500.00	1,415.24	1,305.77	1,303.10	8.43	4.59	-168.20	46.45	-87.13	491.86	483.33	8.52	57.707		
1,600.00	1,499.92	1,370.98	1,365.38	9.43	4.97	-170.19	57.46	-103.04	562.85	553.80	9.06	62.155		
1,700.00	1,584.55	1,438.47	1,429.70	10.44	5.37	-172.67	68.86	-119.98	634.75	625.15	9.60	66.129		
1,800.00	1,669.18	1,507.56	1,495.49	11.47	5.78	-174.78	80.13	-137.85	706.96	696.81	10.15	69.623		
1,900.00	1,753.82	1,578.07	1,562.56	12.51	6.19	-176.61	91.14	-156.57	779.31	768.58	10.72	72.664		
2,000.00	1,838.45	1,641.42	1,622.84	13.56	6.55	-177.98	101.01	-173.40	851.94	840.66	11.29	75.489		
2,100.00	1,923.08	1,705.14	1,683.50	14.61	6.92	-179.11	111.51	-189.84	925.13	913.27	11.86	78.028		
2,200.00	2,007.71	1,770.79	1,745.99	15.67	7.31	179.90	122.50	-206.71	998.61	986.16	12.44	80.262		



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-08B - Existing - Existing												Offset Site Error:	0.00 usft
Survey Program: 128-MWD												Offset Well Error:	0.00 usft
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
0.00	0.00	0.00	18.00	0.00	0.00	130.91	-72.26	83.40	111.81				
100.00	100.00	82.09	100.09	0.09	0.09	130.92	-72.26	83.36	110.32	110.14	0.18	612.774	
200.00	199.95	181.72	199.72	0.31	0.25	-60.27	-72.27	83.32	108.97	108.38	0.59	185.007	
300.00	299.63	281.22	299.22	0.56	0.46	-64.20	-72.23	83.74	105.62	104.57	1.06	100.001	
400.00	398.77	379.27	397.26	0.85	0.67	-71.37	-71.96	85.00	101.59	100.03	1.56	65.225	
488.79	486.11	465.23	483.15	1.19	0.86	-81.55	-70.07	87.72	99.63	97.58	2.06	48.460 CC	
500.00	497.08	475.67	493.58	1.23	0.89	-83.05	-69.69	88.19	99.69	97.57	2.12	47.002 ES	
600.00	594.31	567.64	585.24	1.70	1.11	-97.52	-65.77	94.45	106.16	103.34	2.82	37.693	
700.00	690.18	657.69	674.69	2.25	1.35	-111.69	-60.38	103.27	124.59	120.96	3.64	34.271 SF	
800.00	784.50	743.16	759.21	2.87	1.61	-121.12	-53.01	113.55	155.25	150.83	4.42	35.137	
900.00	877.92	825.32	840.02	3.51	1.91	-123.84	-43.89	125.23	193.53	188.48	5.05	38.318	
1,000.00	970.52	904.47	917.39	4.20	2.20	-124.84	-33.39	138.18	237.00	231.32	5.68	41.713	
1,100.00	1,062.14	989.46	1,000.15	4.94	2.54	-125.41	-21.33	153.29	283.72	277.37	6.35	44.669	
1,200.00	1,152.59	1,068.02	1,076.63	5.73	2.87	-125.12	-10.25	167.43	331.99	324.94	7.05	47.083	
1,300.00	1,241.70	1,143.95	1,150.22	6.57	3.21	-124.69	2.19	181.40	383.43	375.63	7.80	49.162	
1,400.00	1,329.31	1,220.82	1,224.59	7.47	3.57	-124.33	15.50	195.57	437.01	428.41	8.61	50.778	
1,500.00	1,415.24	1,294.28	1,295.50	8.43	3.93	-123.79	28.73	209.49	492.77	483.29	9.48	51.984	
1,600.00	1,499.92	1,370.26	1,368.68	9.43	4.32	-126.32	42.67	224.44	550.47	540.14	10.33	53.306	
1,700.00	1,584.55	1,450.90	1,446.29	10.44	4.73	-129.28	57.15	240.88	609.29	598.15	11.14	54.689	
1,800.00	1,669.18	1,531.81	1,524.17	11.47	5.13	-131.66	70.87	257.95	668.37	656.41	11.96	55.899	
1,900.00	1,753.82	1,611.16	1,600.60	12.51	5.52	-133.63	84.21	274.60	727.95	715.18	12.77	57.003	
2,000.00	1,838.45	1,692.72	1,679.28	13.56	5.91	-135.38	97.62	291.36	787.64	774.06	13.58	57.984	
2,100.00	1,923.08	1,766.85	1,750.74	14.61	6.28	-136.74	109.80	306.92	847.80	833.39	14.41	58.823	
2,200.00	2,007.71	1,831.84	1,813.18	15.67	6.63	-137.75	120.96	321.03	908.96	893.71	15.25	59.590	
2,300.00	2,092.34	1,897.02	1,875.58	16.73	7.00	-138.66	133.09	335.46	971.51	955.41	16.10	60.343	

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



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-10B - Existing - Existing													Offset Site Error:	0.00 usft
Survey Program: 130-MWD													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance										Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	18.00	0.00	0.00	133.38	-86.83	91.90	127.70					
100.00	100.00	82.74	100.74	0.09	0.09	133.22	-86.42	91.95	126.19	126.01	0.18	695.302		
200.00	199.95	183.37	201.36	0.31	0.26	-58.37	-84.98	92.05	123.89	123.28	0.61	202.547		
300.00	299.63	283.67	301.64	0.56	0.47	-61.81	-83.97	91.09	118.59	117.49	1.09	108.477		
400.00	398.77	381.86	399.81	0.85	0.68	-66.93	-84.62	89.11	111.64	110.05	1.60	69.938		
500.00	497.08	480.85	498.74	1.23	0.90	-74.41	-86.95	86.33	104.22	102.06	2.16	48.226		
600.00	594.31	578.30	596.06	1.70	1.12	-84.67	-90.79	83.09	98.11	95.30	2.81	34.873		
670.05	661.62	645.75	663.39	2.08	1.27	-93.56	-94.24	81.19	96.51	93.16	3.34	28.879 CC, ES		
700.00	690.18	674.86	692.44	2.25	1.34	-97.76	-95.90	80.46	96.80	93.22	3.57	27.085		
800.00	784.50	772.07	789.42	2.87	1.57	-110.37	-102.08	77.67	102.12	97.74	4.38	23.303		
900.00	877.92	868.85	885.85	3.51	1.82	-118.58	-109.30	73.92	111.26	106.22	5.04	22.078 SF		
1,000.00	970.52	963.47	980.09	4.20	2.05	-125.88	-117.06	70.58	124.72	119.12	5.60	22.256		
1,100.00	1,062.14	1,056.28	1,072.57	4.94	2.27	-132.15	-124.45	68.19	143.58	137.48	6.10	23.522		
1,200.00	1,152.59	1,147.80	1,163.87	5.73	2.47	-137.51	-130.67	66.27	168.25	161.67	6.58	25.571		
1,300.00	1,241.70	1,239.72	1,255.57	6.57	2.68	-142.03	-136.62	64.26	197.78	190.73	7.05	28.036		
1,400.00	1,329.31	1,330.46	1,346.07	7.47	2.90	-145.74	-142.78	61.82	231.42	223.88	7.55	30.665		
1,500.00	1,415.24	1,417.95	1,433.34	8.43	3.11	-148.49	-148.66	59.77	269.53	261.46	8.06	33.431		
1,600.00	1,499.92	1,503.62	1,518.81	9.43	3.30	-152.98	-154.06	57.86	311.59	303.05	8.54	36.491		
1,700.00	1,584.55	1,589.03	1,604.05	10.44	3.50	-157.07	-159.05	55.87	355.93	346.92	9.01	39.492		
1,800.00	1,669.18	1,678.67	1,693.50	11.47	3.71	-160.46	-164.44	53.65	401.39	391.89	9.50	42.237		
1,900.00	1,753.82	1,765.04	1,779.68	12.51	3.91	-163.07	-169.91	51.60	447.44	437.43	10.01	44.702		
2,000.00	1,838.45	1,852.33	1,866.79	13.56	4.12	-165.18	-175.29	49.91	494.19	483.66	10.53	46.931		
2,100.00	1,923.08	1,936.61	1,950.90	14.61	4.31	-166.86	-180.37	48.37	541.48	530.42	11.06	48.958		
2,200.00	2,007.71	2,021.23	2,035.37	15.67	4.51	-168.29	-184.97	46.64	589.64	578.04	11.60	50.833		
2,300.00	2,092.34	2,108.06	2,122.06	16.73	4.71	-169.56	-189.62	44.73	638.16	626.01	12.15	52.523		
2,400.00	2,176.98	2,195.15	2,208.99	17.80	4.91	-170.68	-194.44	42.63	686.80	674.09	12.71	54.045		
2,500.00	2,261.61	2,281.73	2,295.42	18.87	5.12	-171.63	-199.18	40.57	735.64	722.37	13.27	55.436		
2,600.00	2,346.24	2,369.42	2,382.95	19.94	5.32	-172.48	-204.09	38.57	784.50	770.67	13.84	56.690		
2,700.00	2,430.87	2,453.85	2,467.22	21.01	5.52	-173.20	-208.70	36.68	833.59	819.18	14.41	57.862		
2,800.00	2,515.51	2,541.08	2,554.31	22.08	5.72	-173.85	-213.35	34.79	882.84	867.86	14.98	58.926		
2,900.00	2,600.14	2,628.59	2,641.68	23.16	5.92	-174.43	-218.06	33.00	932.10	916.54	15.56	59.896		
3,000.00	2,684.77	2,711.60	2,724.54	24.24	6.11	-174.93	-222.49	31.13	981.52	965.38	16.14	60.819		



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-12E - Slot B-5 - Design #3													Offset Site Error:	0.00 usft
Survey Program: 0-MWD													Offset Well Error:	0.00 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	
0.00	0.00	0.00	0.00	0.00	0.00	-3.65	22.22	-1.42	22.26					
100.00	100.00	100.00	100.00	0.09	0.09	-3.65	22.22	-1.42	22.26	22.09	0.18	126.983 CC, ES		
200.00	199.95	199.95	199.95	0.31	0.31	167.76	22.22	-1.42	24.81	24.08	0.74	33.670		
300.00	299.63	299.63	299.63	0.56	0.54	170.66	22.22	-1.42	32.52	31.19	1.33	24.381		
400.00	398.77	398.77	398.77	0.85	0.76	173.28	22.22	-1.42	45.45	43.52	1.94	23.481 SF		
500.00	497.08	496.92	496.90	1.23	0.97	176.66	22.16	0.22	63.70	61.17	2.53	25.187		
600.00	594.31	593.55	593.40	1.70	1.17	-179.17	21.99	5.12	87.63	84.51	3.12	28.065		
700.00	690.18	688.11	687.63	2.25	1.40	-175.31	21.71	13.05	117.50	113.77	3.73	31.510		
800.00	784.50	782.26	781.14	2.87	1.64	-169.66	20.79	23.88	152.60	148.30	4.30	35.495		
900.00	877.92	876.24	874.11	3.51	1.92	-161.08	18.38	37.37	189.19	184.39	4.81	39.359		
1,000.00	970.52	970.25	966.64	4.20	2.24	-154.08	14.46	53.51	226.16	220.75	5.41	41.839		
1,100.00	1,062.14	1,063.79	1,058.18	4.94	2.59	-148.32	9.20	71.97	263.38	257.28	6.11	43.124		
1,200.00	1,152.59	1,156.34	1,148.66	5.73	2.97	-143.96	3.74	90.69	301.14	294.24	6.90	43.648		
1,300.00	1,241.70	1,248.44	1,238.69	6.57	3.36	-140.74	-1.70	109.32	339.55	331.80	7.76	43.777		
1,400.00	1,329.31	1,339.92	1,328.11	7.47	3.76	-138.40	-7.11	127.82	378.75	370.08	8.67	43.688		
1,500.00	1,415.24	1,430.59	1,416.75	8.43	4.16	-136.71	-12.46	146.16	418.90	409.27	9.63	43.496		
1,600.00	1,499.92	1,520.62	1,504.76	9.43	4.56	-137.98	-17.78	164.37	459.99	449.43	10.56	43.551		
1,700.00	1,584.55	1,610.62	1,592.74	10.44	4.96	-139.70	-23.09	182.57	501.51	490.04	11.47	43.707		
1,800.00	1,669.18	1,700.62	1,680.72	11.47	5.36	-141.16	-28.41	200.77	543.36	530.97	12.39	43.856		
1,900.00	1,753.82	1,790.62	1,768.70	12.51	5.77	-142.41	-33.72	218.98	585.46	572.15	13.31	44.000		
2,000.00	1,838.45	1,880.62	1,856.68	13.56	6.18	-143.50	-39.04	237.18	627.76	613.54	14.22	44.138		
2,100.00	1,923.08	1,970.62	1,944.66	14.61	6.59	-144.45	-44.35	255.38	670.23	655.09	15.14	44.269		
2,200.00	2,007.71	2,060.62	2,032.64	15.67	7.00	-145.29	-49.67	273.59	712.83	696.78	16.06	44.392		
2,300.00	2,092.34	2,150.62	2,120.62	16.73	7.41	-146.04	-54.98	291.79	755.55	738.57	16.98	44.507		
2,400.00	2,176.98	2,240.62	2,208.60	17.80	7.82	-146.70	-60.30	310.00	798.36	780.46	17.89	44.615		
2,500.00	2,261.61	2,330.62	2,296.58	18.87	8.24	-147.30	-65.61	328.20	841.25	822.43	18.81	44.715		
2,600.00	2,346.24	2,420.62	2,384.56	19.94	8.65	-147.84	-70.93	346.40	884.21	864.47	19.73	44.809		
2,700.00	2,430.87	2,510.62	2,472.54	21.01	9.06	-148.33	-76.24	364.61	927.22	906.57	20.65	44.897		
2,800.00	2,515.51	2,600.62	2,560.52	22.08	9.48	-148.78	-81.56	382.81	970.29	948.72	21.57	44.980		



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-13E - Slot B-4 - Design #3														Offset Site Error:	0.00 usft
Survey Program: 0-MWD														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
							+N/-S (usft)	+E/-W (usft)							
0.00	0.00	0.00	0.00	0.00	0.00	59.85	5.10	8.78	10.15						
100.00	100.00	100.00	100.00	0.09	0.09	59.85	5.10	8.78	10.15	9.98	0.18	57.909	CC, ES		
200.00	199.95	199.95	199.95	0.31	0.31	-139.70	5.10	8.78	12.01	11.32	0.69	17.413			
300.00	299.63	299.63	299.63	0.56	0.54	-155.36	5.10	8.78	18.70	17.40	1.30	14.400	SF		
400.00	398.77	398.37	398.35	0.85	0.75	-162.40	4.95	10.46	31.65	29.74	1.91	16.594			
500.00	497.08	495.96	495.81	1.23	0.96	-163.11	4.52	15.45	50.97	48.46	2.51	20.300			
600.00	594.31	591.87	591.36	1.70	1.19	-162.06	3.80	23.58	76.38	73.25	3.13	24.396			
700.00	690.18	687.90	686.75	2.25	1.44	-160.58	1.95	34.49	106.87	103.10	3.77	28.348			
800.00	784.50	783.15	781.02	2.87	1.73	-156.83	-2.18	47.48	140.86	136.47	4.38	32.133			
900.00	877.92	878.64	875.06	3.51	2.06	-149.73	-8.61	62.66	175.05	170.09	4.97	35.240			
1,000.00	970.52	974.76	969.18	4.20	2.43	-143.84	-17.40	80.09	208.38	202.70	5.68	36.702			
1,100.00	1,062.14	1,069.56	1,061.59	4.94	2.84	-139.17	-27.57	98.67	241.09	234.59	6.50	37.091			
1,200.00	1,152.59	1,163.83	1,153.46	5.73	3.27	-135.85	-37.71	117.18	273.85	266.45	7.40	37.015			
1,300.00	1,241.70	1,257.72	1,244.97	6.57	3.70	-133.58	-47.81	135.62	306.84	298.49	8.35	36.749			
1,400.00	1,329.31	1,351.06	1,335.94	7.47	4.13	-132.10	-57.85	153.94	340.34	331.00	9.35	36.419			
1,500.00	1,415.24	1,443.68	1,426.20	8.43	4.57	-131.23	-67.81	172.13	374.64	364.27	10.37	36.134			
1,600.00	1,499.92	1,535.68	1,515.87	9.43	5.01	-133.13	-77.71	190.19	409.88	398.52	11.35	36.100			
1,700.00	1,584.55	1,627.66	1,605.52	10.44	5.44	-135.37	-87.61	208.25	445.79	433.48	12.31	36.208			
1,800.00	1,669.18	1,719.65	1,695.17	11.47	5.88	-137.27	-97.50	226.31	482.22	468.96	13.26	36.363			
1,900.00	1,753.82	1,811.63	1,784.82	12.51	6.33	-138.92	-107.40	244.37	519.06	504.86	14.20	36.543			
2,000.00	1,838.45	1,903.61	1,874.47	13.56	6.77	-140.35	-117.29	262.43	556.23	541.09	15.14	36.735			
2,100.00	1,923.08	1,995.60	1,964.11	14.61	7.21	-141.60	-127.19	280.49	593.66	577.58	16.07	36.931			
2,200.00	2,007.71	2,087.58	2,053.76	15.67	7.66	-142.71	-137.08	298.55	631.31	614.31	17.00	37.126			
2,300.00	2,092.34	2,179.56	2,143.41	16.73	8.10	-143.69	-146.98	316.61	669.14	651.21	17.93	37.317			
2,400.00	2,176.98	2,271.55	2,233.06	17.80	8.55	-144.57	-156.87	334.67	707.13	688.27	18.86	37.501			
2,500.00	2,261.61	2,363.53	2,322.71	18.87	9.00	-145.36	-166.77	352.73	745.24	725.46	19.78	37.678			
2,600.00	2,346.24	2,455.51	2,412.36	19.94	9.44	-146.07	-176.66	370.79	783.47	762.77	20.70	37.848			
2,700.00	2,430.87	2,547.50	2,502.00	21.01	9.89	-146.72	-186.56	388.85	821.79	800.16	21.62	38.009			
2,800.00	2,515.51	2,639.48	2,591.65	22.08	10.34	-147.31	-196.45	406.91	860.19	837.65	22.54	38.163			
2,900.00	2,600.14	2,731.46	2,681.30	23.16	10.79	-147.85	-206.35	424.97	898.66	875.20	23.46	38.309			
3,000.00	2,684.77	2,823.44	2,770.95	24.24	11.23	-148.34	-216.24	443.03	937.20	912.82	24.38	38.448			
3,100.00	2,769.40	2,915.43	2,860.60	25.31	11.68	-148.80	-226.14	461.09	975.79	950.49	25.29	38.579			

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



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-13M - Slot A-5 - Design #2													Offset Site Error:	0.00 usft
Survey Program: 0-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	-30.25	17.48	-10.20	20.24					
100.00	100.00	100.00	100.00	0.09	0.09	-30.25	17.48	-10.20	20.24	20.06	0.18	115.436 CC, ES		
200.00	199.95	199.95	199.95	0.31	0.31	144.06	17.48	-10.20	22.30	21.60	0.70	31.886		
300.00	299.63	299.63	299.63	0.56	0.54	153.09	17.48	-10.20	29.02	27.73	1.29	22.481		
400.00	398.77	398.77	398.77	0.85	0.76	161.23	17.48	-10.20	41.10	39.19	1.91	21.530 SF		
500.00	497.08	497.08	497.08	1.23	0.98	166.84	17.48	-10.20	58.66	56.13	2.52	23.248		
600.00	594.31	594.31	594.31	1.70	1.20	170.46	17.48	-10.20	81.58	78.45	3.13	26.068		
700.00	690.18	691.99	691.98	2.25	1.40	172.15	16.78	-11.49	108.95	105.24	3.71	29.332		
800.00	784.50	789.39	789.25	2.87	1.60	174.43	14.50	-15.70	139.50	135.25	4.25	32.841		
900.00	877.92	886.74	886.26	3.51	1.81	178.98	10.65	-22.80	171.19	166.46	4.72	36.256		
1,000.00	970.52	983.66	982.51	4.20	2.05	-178.48	5.26	-32.75	203.84	198.60	5.24	38.879		
1,100.00	1,062.14	1,079.51	1,077.28	4.94	2.32	-177.27	-1.59	-45.40	238.17	232.35	5.82	40.927		
1,200.00	1,152.59	1,173.57	1,169.75	5.73	2.62	-176.94	-9.78	-60.51	274.92	268.47	6.45	42.635		
1,300.00	1,241.70	1,262.98	1,257.40	6.57	2.95	-176.79	-18.20	-76.04	315.16	308.05	7.11	44.307		
1,400.00	1,329.31	1,350.46	1,343.15	7.47	3.29	-176.61	-26.44	-91.24	359.40	351.62	7.78	46.170		
1,500.00	1,415.24	1,435.83	1,426.84	8.43	3.62	-176.39	-34.47	-106.07	407.56	399.12	8.45	48.250		
1,600.00	1,499.92	1,519.65	1,509.01	9.43	3.96	-178.52	-42.37	-120.64	458.66	449.52	9.15	50.151		
1,700.00	1,584.55	1,603.42	1,591.12	10.44	4.30	179.17	-50.25	-135.19	510.55	500.67	9.87	51.724		
1,800.00	1,669.18	1,687.19	1,673.23	11.47	4.65	177.27	-58.14	-149.74	562.95	552.33	10.62	53.013		
1,900.00	1,753.82	1,770.95	1,755.35	12.51	5.00	175.68	-66.03	-164.30	615.73	604.35	11.38	54.084		
2,000.00	1,838.45	1,854.72	1,837.46	13.56	5.35	174.34	-73.91	-178.85	668.82	656.65	12.16	54.980		
2,100.00	1,923.08	1,938.48	1,919.57	14.61	5.71	173.19	-81.80	-193.40	722.13	709.17	12.96	55.734		
2,200.00	2,007.71	2,022.25	2,001.69	15.67	6.07	172.20	-89.69	-207.96	775.62	761.86	13.76	56.373		
2,300.00	2,092.34	2,106.01	2,083.80	16.73	6.43	171.34	-97.57	-222.51	829.26	814.69	14.57	56.919		
2,400.00	2,176.98	2,189.78	2,165.92	17.80	6.79	170.58	-105.46	-237.07	883.02	867.64	15.39	57.388		
2,500.00	2,261.61	2,273.54	2,248.03	18.87	7.15	169.90	-113.35	-251.62	936.88	920.67	16.21	57.793		
2,600.00	2,346.24	2,357.31	2,330.14	19.94	7.51	169.30	-121.23	-266.17	990.83	973.79	17.04	58.146		

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



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-14E - Slot B-3 - Design #3													Offset Site Error:	0.00 usft
Survey Program: 0-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	102.35	-2.91	13.31	13.63					
100.00	100.00	100.00	100.00	0.09	0.09	102.35	-2.91	13.31	13.63	13.45	0.18	77.718		
146.18	146.17	146.17	146.17	0.19	0.19	-90.00	-2.91	13.31	13.61	13.24	0.38	36.249 CC		
200.00	199.95	199.95	199.95	0.31	0.31	-98.59	-2.91	13.31	13.77	13.16	0.61	22.496 ES		
300.00	299.63	299.12	299.10	0.56	0.52	-122.58	-3.21	15.00	18.26	17.10	1.16	15.799 SF		
400.00	398.77	397.51	397.36	0.85	0.74	-137.71	-4.10	20.01	30.76	28.95	1.81	17.026		
500.00	497.08	494.63	494.11	1.23	0.98	-144.06	-5.54	28.22	50.31	47.84	2.47	20.395		
600.00	594.31	591.88	590.70	1.70	1.25	-146.52	-8.53	39.03	75.05	71.92	3.13	23.944		
700.00	690.18	688.55	686.39	2.25	1.55	-147.29	-14.22	51.57	103.29	99.46	3.83	26.949		
800.00	784.50	784.58	780.99	2.87	1.89	-145.20	-22.55	65.77	134.64	130.10	4.54	29.673		
900.00	877.92	881.10	875.52	3.51	2.28	-139.33	-33.61	81.79	165.49	160.26	5.24	31.592		
1,000.00	970.52	978.48	970.23	4.20	2.72	-134.31	-47.47	99.69	194.73	188.65	6.08	32.014		
1,100.00	1,062.14	1,074.51	1,063.20	4.94	3.19	-130.40	-62.67	118.34	222.76	215.72	7.04	31.637		
1,200.00	1,152.59	1,170.30	1,155.92	5.73	3.68	-127.80	-77.85	136.94	250.29	242.23	8.06	31.042		
1,300.00	1,241.70	1,265.81	1,248.39	6.57	4.17	-126.22	-92.98	155.49	277.63	268.50	9.13	30.398		
1,400.00	1,329.31	1,360.86	1,340.41	7.47	4.67	-125.45	-108.04	173.95	305.12	294.90	10.22	29.847		
1,500.00	1,415.24	1,455.28	1,431.82	8.43	5.16	-125.30	-123.00	192.29	333.15	321.82	11.33	29.401		
1,600.00	1,499.92	1,549.16	1,522.70	9.43	5.66	-127.77	-137.87	210.52	362.08	349.69	12.39	29.224		
1,700.00	1,584.55	1,643.02	1,613.56	10.44	6.15	-130.49	-152.74	228.75	391.91	378.50	13.41	29.228		
1,800.00	1,669.18	1,736.87	1,704.42	11.47	6.65	-132.84	-167.61	246.97	422.45	408.04	14.41	29.321		
1,900.00	1,753.82	1,830.73	1,795.28	12.51	7.15	-134.87	-182.48	265.20	453.57	438.17	15.39	29.469		
2,000.00	1,838.45	1,924.59	1,886.14	13.56	7.65	-136.64	-197.34	283.43	485.14	468.78	16.36	29.651		
2,100.00	1,923.08	2,018.44	1,977.00	14.61	8.15	-138.20	-212.21	301.66	517.09	499.77	17.32	29.852		
2,200.00	2,007.71	2,112.30	2,067.86	15.67	8.65	-139.58	-227.08	319.88	549.35	531.07	18.27	30.062		
2,300.00	2,092.34	2,206.15	2,158.72	16.73	9.16	-140.81	-241.95	338.11	581.86	562.64	19.22	30.276		
2,400.00	2,176.98	2,300.01	2,249.58	17.80	9.66	-141.91	-256.82	356.34	614.60	594.44	20.16	30.488		
2,500.00	2,261.61	2,393.87	2,340.45	18.87	10.16	-142.90	-271.69	374.57	647.52	626.42	21.09	30.697		
2,600.00	2,346.24	2,487.72	2,431.31	19.94	10.66	-143.80	-286.56	392.80	680.59	658.57	22.03	30.900		
2,700.00	2,430.87	2,581.58	2,522.17	21.01	11.17	-144.61	-301.43	411.02	713.80	690.85	22.95	31.096		
2,800.00	2,515.51	2,675.44	2,613.03	22.08	11.67	-145.35	-316.30	429.25	747.13	723.25	23.88	31.285		
2,900.00	2,600.14	2,769.29	2,703.89	23.16	12.18	-146.03	-331.16	447.48	780.57	755.76	24.81	31.467		
3,000.00	2,684.77	2,863.15	2,794.75	24.24	12.68	-146.65	-346.03	465.71	814.09	788.36	25.73	31.641		
3,100.00	2,769.40	2,957.01	2,885.61	25.31	13.19	-147.23	-360.90	483.93	847.69	821.04	26.65	31.808		
3,200.00	2,854.04	3,050.86	2,976.47	26.39	13.69	-147.76	-375.77	502.16	881.36	853.79	27.57	31.968		
3,300.00	2,938.67	3,144.72	3,067.33	27.47	14.20	-148.25	-390.64	520.39	915.10	886.61	28.49	32.120		
3,400.00	3,023.30	3,238.58	3,158.19	28.55	14.70	-148.70	-405.51	538.62	948.89	919.48	29.41	32.266		
3,500.00	3,107.93	3,332.43	3,249.06	29.63	15.21	-149.13	-420.38	556.84	982.73	952.40	30.33	32.406		

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



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-16B - Existing - Existing													Offset Site Error:	0.00 usft
Survey Program: 128-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	18.00	0.00	0.00	134.24	-97.76	100.39	141.28					
100.00	100.00	81.77	99.77	0.09	0.09	134.11	-97.58	100.66	140.19	140.01	0.18	778.915		
200.00	199.95	181.28	199.27	0.31	0.25	-57.21	-97.08	101.55	139.06	138.46	0.59	234.389		
300.00	299.63	280.00	297.99	0.56	0.46	-60.34	-97.11	102.63	135.82	134.75	1.07	126.614		
392.08	390.94	365.90	383.83	0.83	0.66	-64.68	-98.65	105.01	133.38	131.84	1.54	86.733		
400.00	398.77	371.00	388.93	0.85	0.67	-64.97	-98.82	105.23	133.31	131.74	1.57	84.730 CC, ES		
500.00	497.08	466.95	484.58	1.23	0.91	-71.07	-104.31	110.38	134.12	131.97	2.15	62.387		
600.00	594.31	561.92	578.85	1.70	1.18	-77.57	-113.70	116.81	138.25	135.42	2.83	48.859		
700.00	690.18	654.57	670.29	2.25	1.48	-84.22	-126.07	125.03	146.65	143.01	3.65	40.233		
800.00	784.50	748.16	762.04	2.87	1.85	-88.88	-141.22	135.53	159.75	155.14	4.60	34.707		
900.00	877.92	842.31	853.78	3.51	2.27	-89.09	-158.53	147.71	174.04	168.43	5.62	30.991		
1,000.00	970.52	936.79	945.10	4.20	2.74	-88.90	-178.35	161.67	188.24	181.51	6.73	27.979		
1,100.00	1,062.14	1,032.83	1,037.56	4.94	3.22	-89.11	-199.36	176.91	201.43	193.52	7.91	25.453		
1,200.00	1,152.59	1,128.58	1,129.35	5.73	3.74	-89.74	-221.10	193.34	213.89	204.71	9.18	23.299		
1,300.00	1,241.70	1,227.75	1,223.81	6.57	4.32	-90.73	-245.83	210.67	224.46	213.90	10.55	21.270		
1,400.00	1,329.31	1,323.58	1,314.77	7.47	4.89	-92.17	-270.40	228.11	234.07	222.11	11.96	19.577		
1,500.00	1,415.24	1,421.53	1,407.44	8.43	5.50	-94.31	-296.41	246.34	242.75	229.33	13.42	18.090		
1,600.00	1,499.92	1,516.82	1,497.29	9.43	6.12	-98.56	-322.18	264.80	252.07	237.18	14.89	16.928		
1,700.00	1,584.55	1,614.91	1,589.57	10.44	6.77	-103.02	-348.94	284.54	263.56	247.23	16.33	16.140		
1,800.00	1,669.18	1,717.02	1,685.47	11.47	7.43	-107.20	-378.03	304.16	275.06	257.35	17.71	15.535		
1,900.00	1,753.82	1,815.76	1,777.85	12.51	8.10	-110.74	-407.38	322.97	286.82	267.77	19.05	15.056		
2,000.00	1,838.45	1,912.98	1,868.28	13.56	8.78	-113.66	-437.20	342.57	299.57	279.19	20.37	14.703		
2,100.00	1,923.08	2,010.53	1,959.25	14.61	9.43	-116.46	-466.57	362.01	313.35	291.74	21.61	14.499		
2,200.00	2,007.71	2,107.28	2,048.99	15.67	10.11	-118.76	-496.47	382.35	327.78	304.92	22.87	14.333		
2,300.00	2,092.34	2,202.13	2,136.88	16.73	10.77	-120.73	-525.38	403.20	343.56	319.46	24.10	14.253		
2,400.00	2,176.98	2,299.63	2,227.70	17.80	11.40	-122.76	-554.04	424.12	360.41	335.17	25.24	14.280		
2,500.00	2,261.61	2,398.74	2,320.32	18.87	12.04	-124.80	-582.97	444.28	377.33	351.01	26.32	14.338		
2,600.00	2,346.24	2,499.41	2,414.18	19.94	12.74	-126.62	-612.90	465.01	394.29	366.86	27.43	14.375		
2,700.00	2,430.87	2,598.48	2,506.33	21.01	13.45	-128.23	-643.12	485.23	410.82	382.28	28.54	14.397		
2,800.00	2,515.51	2,699.42	2,600.01	22.08	14.18	-129.67	-674.29	506.28	427.47	397.82	29.66	14.414		
2,900.00	2,600.14	2,797.14	2,690.56	23.16	14.87	-130.95	-705.00	526.43	443.74	413.00	30.74	14.437		
3,000.00	2,684.77	2,892.19	2,778.71	24.24	15.53	-132.09	-734.45	546.36	460.76	428.96	31.80	14.489		
3,100.00	2,769.40	2,993.33	2,872.08	25.31	16.29	-133.03	-766.07	568.97	478.15	445.17	32.98	14.500		
3,200.00	2,854.04	3,085.76	2,957.24	26.39	16.97	-133.79	-795.22	589.94	495.51	461.38	34.12	14.521		
3,300.00	2,938.67	3,190.16	3,053.93	27.47	17.70	-134.72	-827.24	612.85	513.57	478.35	35.22	14.581		
3,400.00	3,023.30	3,300.00	3,155.41	28.55	18.49	-135.72	-862.78	635.29	529.64	493.35	36.29	14.594		
3,500.00	3,107.93	3,390.61	3,239.09	29.63	19.14	-136.52	-892.36	653.57	545.48	508.18	37.30	14.625		
3,600.00	3,192.56	3,493.99	3,334.53	30.71	19.89	-137.34	-925.89	674.85	561.74	523.39	38.35	14.647		
3,700.00	3,277.20	3,586.00	3,419.32	31.80	20.57	-137.98	-955.93	694.18	578.01	538.62	39.40	14.671		
3,800.00	3,361.83	3,677.93	3,504.28	32.88	21.22	-138.58	-985.03	713.84	595.44	555.02	40.42	14.731		
3,900.00	3,446.46	3,777.00	3,595.94	33.96	21.92	-139.20	-1,015.98	735.17	613.36	571.89	41.47	14.790		
4,000.00	3,531.09	3,872.00	3,683.87	35.04	22.60	-139.76	-1,045.55	755.64	631.47	588.97	42.51	14.856		
4,100.00	3,615.73	3,968.95	3,773.76	36.13	23.27	-140.30	-1,075.19	776.63	650.21	606.68	43.52	14.939		
4,200.00	3,700.36	4,076.69	3,873.65	37.21	24.02	-140.94	-1,108.80	798.98	668.18	623.65	44.53	15.006		
4,300.00	3,784.99	4,169.13	3,959.52	38.30	24.66	-141.52	-1,137.59	817.47	686.14	640.68	45.45	15.095		
4,400.00	3,869.62	4,266.49	4,049.96	39.38	25.35	-142.05	-1,167.56	837.57	704.65	658.22	46.43	15.178		
4,500.00	3,954.26	4,368.35	4,144.20	40.46	26.11	-142.50	-1,199.41	859.43	722.87	675.39	47.48	15.225		
4,600.00	4,038.89	4,463.65	4,232.34	41.55	26.80	-142.89	-1,229.25	880.01	741.10	692.59	48.51	15.277		
4,700.00	4,123.52	4,555.17	4,317.14	42.63	27.44	-143.26	-1,257.36	899.85	759.99	710.48	49.51	15.349		
4,800.00	4,208.15	4,645.14	4,400.82	43.72	28.06	-143.61	-1,284.00	919.42	780.02	729.52	50.50	15.446		
4,900.00	4,292.79	4,749.89	4,498.34	44.80	28.78	-144.05	-1,315.28	941.40	799.71	748.23	51.48	15.534		
5,000.00	4,377.42	4,836.23	4,579.00	45.89	29.37	-144.43	-1,340.37	959.27	820.19	767.80	52.39	15.655		

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



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-16B - Existing - Existing													Offset Site Error:	0.00 usft
Survey Program: 128-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,100.00	4,462.50	4,946.69	4,682.17	46.89	30.12	-145.05	-1,372.83	981.73	839.68	786.42	53.26	15.767		
5,200.00	4,549.63	5,053.33	4,781.61	47.67	30.86	-145.54	-1,405.08	1,002.79	854.98	800.89	54.09	15.808		
5,300.00	4,638.82	5,157.10	4,877.86	48.39	31.59	-145.72	-1,437.68	1,023.75	865.57	810.50	55.06	15.720		
5,400.00	4,729.90	5,250.37	4,964.64	49.04	32.25	-145.74	-1,466.55	1,042.07	872.98	816.96	56.03	15.581		
5,500.00	4,822.70	5,352.33	5,059.49	49.64	32.97	-145.51	-1,497.69	1,062.81	877.33	820.15	57.18	15.343		
5,600.00	4,917.02	5,450.01	5,149.97	50.17	33.67	-145.02	-1,528.17	1,083.41	877.55	819.09	58.46	15.012		
5,700.00	5,012.71	5,539.73	5,233.32	50.64	34.30	-144.38	-1,555.32	1,102.55	875.29	815.55	59.74	14.652		
5,800.00	5,109.57	5,631.75	5,319.23	51.05	34.92	-143.58	-1,582.20	1,121.64	870.60	809.51	61.09	14.251		
5,900.00	5,207.42	5,717.52	5,399.77	51.39	35.47	-142.71	-1,606.38	1,138.54	863.47	801.09	62.38	13.842		
6,000.00	5,306.08	5,795.01	5,473.34	51.66	35.93	-141.87	-1,626.24	1,152.53	855.30	791.77	63.53	13.464		
6,100.00	5,405.35	5,871.00	5,546.35	51.87	36.34	-141.02	-1,643.53	1,164.59	846.34	781.76	64.58	13.106		
6,200.00	5,505.05	5,952.11	5,625.03	52.02	36.72	-140.10	-1,659.65	1,175.82	836.55	770.94	65.61	12.751		
6,300.00	5,604.99	6,035.52	5,706.51	52.10	37.07	-139.06	-1,674.13	1,186.34	825.75	759.08	66.67	12.386		
6,400.00	5,704.99	6,123.07	5,792.36	52.15	37.41	17.88	-1,687.73	1,196.69	814.40	746.56	67.84	12.005		
6,500.00	5,804.99	6,210.51	5,878.53	52.19	37.71	18.75	-1,699.75	1,205.51	804.42	735.53	68.89	11.677		
6,600.00	5,904.99	6,303.50	5,970.49	52.24	38.00	19.56	-1,710.86	1,213.60	795.92	726.04	69.88	11.390		
6,700.00	6,004.99	6,399.19	6,065.23	52.28	38.28	20.36	-1,721.79	1,221.37	787.90	717.05	70.85	11.120		
6,800.00	6,104.99	6,488.75	6,154.04	52.32	38.53	21.07	-1,731.13	1,228.23	780.82	709.10	71.72	10.887		
6,900.00	6,204.99	6,576.41	6,241.22	52.37	38.74	21.65	-1,738.41	1,233.83	775.39	702.94	72.44	10.703		
7,000.00	6,304.99	6,664.94	6,329.50	52.42	38.90	22.06	-1,743.70	1,237.63	771.44	698.44	72.99	10.569		
7,100.00	6,404.99	6,753.33	6,417.81	52.46	39.03	22.28	-1,746.79	1,239.65	769.05	695.69	73.36	10.483		
7,200.00	6,504.99	6,847.94	6,512.41	52.51	39.12	22.38	-1,748.22	1,240.39	767.94	694.35	73.60	10.434		
7,300.00	6,604.99	6,949.91	6,614.36	52.56	39.21	22.42	-1,749.70	1,240.42	766.61	692.82	73.79	10.389		
7,400.00	6,704.99	7,044.95	6,709.41	52.61	39.29	22.37	-1,750.09	1,239.50	765.86	691.96	73.89	10.364		
7,500.00	6,804.99	7,147.44	6,811.88	52.66	39.37	22.42	-1,751.04	1,239.86	765.13	691.04	74.10	10.326		
7,600.00	6,904.99	7,251.03	6,915.46	52.71	39.48	22.51	-1,752.56	1,240.51	764.02	689.67	74.34	10.277		
7,700.00	7,004.99	7,358.13	7,022.53	52.77	39.59	22.60	-1,754.79	1,240.97	762.27	687.66	74.60	10.218		
7,800.00	7,104.99	7,451.05	7,115.43	52.82	39.68	22.63	-1,756.83	1,240.54	760.08	685.30	74.79	10.163		
7,900.00	7,204.99	7,545.58	7,209.95	52.87	39.75	22.55	-1,757.06	1,239.30	759.34	684.47	74.87	10.142		
8,000.00	7,304.99	7,651.29	7,315.64	52.93	39.81	22.39	-1,757.15	1,236.92	758.41	683.53	74.88	10.128		
8,100.00	7,404.99	7,765.43	7,429.71	52.99	39.89	22.16	-1,758.37	1,233.16	756.18	681.33	74.85	10.103		
8,200.00	7,504.99	7,867.51	7,531.68	53.04	39.97	21.95	-1,760.62	1,229.23	752.69	677.87	74.82	10.060		
8,300.00	7,604.99	7,966.59	7,630.66	53.10	40.04	21.73	-1,762.76	1,225.28	749.20	674.42	74.78	10.018		
8,328.01	7,633.00	7,994.45	7,658.50	53.12	40.06	21.67	-1,763.33	1,224.15	748.25	673.48	74.77	10.007 SF		



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-20E - Slot A-3 - Design #3												Offset Site Error:	0.00 usft
Survey Program: 0-MWD												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.00	0.00	0.00	0.00	0.00	0.00	149.00	-8.01	4.81	9.35				
100.00	100.00	100.00	100.00	0.09	0.09	149.00	-8.01	4.81	9.35	9.17	0.18	53.319	
200.00	199.95	199.95	199.95	0.31	0.31	-54.15	-8.01	4.81	7.57	6.91	0.66	11.508	
272.04	271.81	271.80	271.79	0.49	0.46	-88.08	-8.91	4.74	6.21	5.28	0.93	6.684 CC, ES	
300.00	299.63	299.69	299.67	0.56	0.51	-104.92	-9.74	4.66	6.50	5.43	1.07	6.061	
400.00	398.77	399.55	399.39	0.85	0.73	-144.70	-14.93	4.21	11.69	9.91	1.78	6.567	
500.00	497.08	499.56	499.01	1.23	0.97	-158.55	-23.60	3.45	20.60	18.18	2.42	8.502	
600.00	594.31	599.74	598.44	1.70	1.25	-164.24	-35.75	2.39	31.74	28.70	3.04	10.441	
700.00	690.18	700.12	697.59	2.25	1.59	-167.06	-51.39	1.02	44.79	41.13	3.66	12.237	
800.00	784.50	800.20	795.82	2.87	1.97	-165.34	-70.46	0.77	59.89	55.64	4.25	14.094	
900.00	877.92	900.75	893.74	3.51	2.41	-159.49	-93.14	3.05	74.37	69.58	4.79	15.514	
1,000.00	970.52	1,001.87	991.25	4.20	2.91	-154.67	-119.45	7.91	87.24	81.82	5.42	16.086	
1,100.00	1,062.14	1,103.53	1,088.11	4.94	3.49	-150.74	-149.39	15.37	98.48	92.33	6.15	16.026	
1,200.00	1,152.59	1,205.69	1,184.06	5.73	4.15	-147.62	-182.95	25.45	108.07	101.11	6.96	15.524	
1,300.00	1,241.70	1,308.30	1,278.86	6.57	4.89	-145.22	-220.08	38.17	116.01	108.15	7.86	14.754	
1,400.00	1,329.31	1,411.31	1,372.23	7.47	5.72	-143.48	-260.75	53.53	122.31	113.46	8.85	13.821	
1,500.00	1,415.24	1,514.66	1,463.94	8.43	6.63	-142.37	-304.88	71.52	126.98	117.07	9.91	12.819	
1,600.00	1,499.92	1,618.33	1,553.73	9.43	7.63	-143.07	-352.40	92.11	129.66	118.63	11.04	11.748	
1,700.00	1,584.55	1,719.78	1,639.75	10.44	8.68	-143.08	-401.41	114.25	130.03	117.68	12.35	10.528	
1,800.00	1,669.18	1,819.78	1,724.38	11.47	9.72	-142.98	-449.93	136.25	130.19	116.48	13.71	9.495	
1,900.00	1,753.82	1,919.78	1,809.00	12.51	10.77	-142.88	-498.46	158.24	130.35	115.24	15.10	8.631	
2,000.00	1,838.45	2,019.78	1,893.62	13.56	11.83	-142.77	-546.98	180.24	130.50	113.99	16.52	7.901	
2,100.00	1,923.08	2,119.78	1,978.25	14.61	12.90	-142.67	-595.51	202.24	130.66	112.71	17.95	7.278	
2,200.00	2,007.71	2,219.78	2,062.87	15.67	13.97	-142.57	-644.04	224.24	130.82	111.42	19.40	6.742	
2,300.00	2,092.34	2,319.78	2,147.50	16.73	15.04	-142.47	-692.56	246.23	130.98	110.11	20.87	6.277	
2,400.00	2,176.98	2,419.78	2,232.12	17.80	16.11	-142.37	-741.09	268.23	131.14	108.80	22.34	5.869	
2,500.00	2,261.61	2,519.77	2,316.75	18.87	17.19	-142.27	-789.61	290.23	131.30	107.47	23.83	5.510	
2,600.00	2,346.24	2,619.77	2,401.37	19.94	18.27	-142.17	-838.14	312.23	131.46	106.14	25.33	5.190	
2,700.00	2,430.87	2,719.77	2,485.99	21.01	19.35	-142.07	-886.67	334.22	131.63	104.79	26.83	4.905	
2,800.00	2,515.51	2,819.77	2,570.62	22.08	20.43	-141.97	-935.19	356.22	131.79	103.44	28.35	4.649	
2,900.00	2,600.14	2,919.77	2,655.24	23.16	21.51	-141.87	-983.72	378.22	131.95	102.08	29.87	4.418	
3,000.00	2,684.77	3,019.77	2,739.87	24.24	22.59	-141.77	-1,032.24	400.22	132.11	100.72	31.40	4.208	
3,100.00	2,769.40	3,119.77	2,824.49	25.31	23.67	-141.67	-1,080.77	422.21	132.28	99.35	32.93	4.017	
3,200.00	2,854.04	3,219.77	2,909.12	26.39	24.76	-141.57	-1,129.30	444.21	132.44	97.97	34.47	3.842	
3,300.00	2,938.67	3,319.77	2,993.74	27.47	25.84	-141.47	-1,177.82	466.21	132.60	96.59	36.02	3.682	
3,400.00	3,023.30	3,419.77	3,078.36	28.55	26.93	-141.37	-1,226.35	488.21	132.77	95.20	37.57	3.534	
3,500.00	3,107.93	3,519.77	3,162.99	29.63	28.01	-141.27	-1,274.88	510.20	132.93	93.81	39.13	3.397	
3,600.00	3,192.56	3,619.77	3,247.61	30.71	29.10	-141.17	-1,323.40	532.20	133.10	92.41	40.69	3.271	
3,700.00	3,277.20	3,719.77	3,332.24	31.80	30.18	-141.08	-1,371.93	554.20	133.26	91.00	42.26	3.154	
3,800.00	3,361.83	3,819.77	3,416.86	32.88	31.27	-140.98	-1,420.45	576.20	133.43	89.60	43.83	3.044	
3,900.00	3,446.46	3,919.77	3,501.48	33.96	32.36	-140.88	-1,468.98	598.19	133.60	88.18	45.41	2.942	
4,000.00	3,531.09	4,019.77	3,586.11	35.04	33.44	-140.78	-1,517.51	620.19	133.76	86.77	46.99	2.846	
4,100.00	3,615.73	4,119.77	3,670.73	36.13	34.53	-140.69	-1,566.03	642.19	133.93	85.35	48.58	2.757	
4,200.00	3,700.36	4,219.77	3,755.36	37.21	35.62	-140.59	-1,614.56	664.18	134.10	83.92	50.18	2.673	
4,300.00	3,784.99	4,319.77	3,839.98	38.30	36.70	-140.49	-1,663.08	686.18	134.26	82.49	51.77	2.593	
4,400.00	3,869.62	4,419.77	3,924.61	39.38	37.79	-140.40	-1,711.61	708.18	134.43	81.06	53.38	2.519	
4,500.00	3,954.26	4,519.77	4,009.23	40.46	38.88	-140.30	-1,760.14	730.18	134.60	79.62	54.98	2.448	
4,600.00	4,038.89	4,619.77	4,093.85	41.55	39.97	-140.21	-1,808.66	752.17	134.77	78.17	56.59	2.381	
4,700.00	4,123.52	4,719.77	4,178.48	42.63	41.05	-140.11	-1,857.19	774.17	134.94	76.73	58.21	2.318	
4,800.00	4,208.15	4,819.77	4,263.10	43.72	42.14	-140.02	-1,905.71	796.17	135.11	75.28	59.83	2.258	
4,900.00	4,292.79	4,919.79	4,346.27	44.80	43.12	-140.04	-1,952.95	817.58	135.61	74.33	61.29	2.213 SF	
5,000.00	4,377.42	5,013.31	4,429.08	45.89	43.88	-140.97	-1,996.33	837.25	138.86	77.06	61.79	2.247	

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



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Offset Design Bruton 30-10 Pad - Bruton 30-20E - Slot A-3 - Design #3												Offset Site Error:	0.00 usft
Survey Program: 0-MWD												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
5,100.00	4,462.50	5,108.44	4,513.43	46.89	44.58	-142.69	-2,036.36	855.39	144.74	83.31	61.43	2.356	
5,200.00	4,549.63	5,203.26	4,599.26	47.67	45.22	-144.33	-2,073.05	872.03	150.81	89.92	60.89	2.477	
5,300.00	4,638.82	5,300.00	4,688.47	48.39	45.82	-145.83	-2,107.13	887.47	156.81	96.46	60.34	2.599	
5,400.00	4,729.90	5,392.11	4,774.80	49.04	46.34	-147.12	-2,136.35	900.72	162.65	102.81	59.84	2.718	
5,500.00	4,822.70	5,486.16	4,864.21	49.64	46.81	-148.31	-2,162.91	912.76	168.36	109.05	59.31	2.839	
5,600.00	4,917.02	5,579.98	4,954.51	50.17	47.22	-149.38	-2,186.06	923.25	173.90	115.14	58.76	2.960	
5,700.00	5,012.71	5,673.57	5,045.56	50.64	47.57	-150.35	-2,205.77	932.19	179.25	121.07	58.18	3.081	
5,800.00	5,109.57	5,766.95	5,137.20	51.05	47.87	-151.22	-2,222.05	939.57	184.38	126.82	57.56	3.203	
5,900.00	5,207.42	5,860.13	5,229.30	51.39	48.11	-152.01	-2,234.89	945.39	189.29	132.39	56.90	3.327	
6,000.00	5,306.08	5,953.12	5,321.71	51.66	48.30	-152.73	-2,244.30	949.65	193.95	137.76	56.20	3.451	
6,100.00	5,405.35	6,045.93	5,414.29	51.87	48.43	-153.38	-2,250.27	952.36	198.36	142.92	55.44	3.578	
6,200.00	5,505.05	6,138.58	5,506.89	52.02	48.51	-153.96	-2,252.83	953.52	202.50	147.86	54.63	3.707	
6,300.00	5,604.99	6,236.69	5,604.99	52.10	48.56	-154.37	-2,252.94	953.57	205.33	151.43	53.90	3.809	
6,400.00	5,704.99	6,336.69	5,704.99	52.15	48.61	1.53	-2,252.94	953.57	205.45	151.54	53.92	3.811	
6,500.00	5,804.99	6,436.69	5,804.99	52.19	48.65	1.53	-2,252.94	953.57	205.45	151.37	54.08	3.799	
6,600.00	5,904.99	6,536.69	5,904.99	52.24	48.70	1.53	-2,252.94	953.57	205.45	151.20	54.25	3.787	
6,700.00	6,004.99	6,636.69	6,004.99	52.28	48.75	1.53	-2,252.94	953.57	205.45	151.03	54.42	3.776	
6,800.00	6,104.99	6,736.69	6,104.99	52.32	48.80	1.53	-2,252.94	953.57	205.45	150.86	54.59	3.764	
6,900.00	6,204.99	6,836.69	6,204.99	52.37	48.85	1.53	-2,252.94	953.57	205.45	150.68	54.77	3.751	
7,000.00	6,304.99	6,936.69	6,304.99	52.42	48.90	1.53	-2,252.94	953.57	205.45	150.50	54.95	3.739	
7,100.00	6,404.99	7,036.69	6,404.99	52.46	48.95	1.53	-2,252.94	953.57	205.45	150.32	55.13	3.727	
7,200.00	6,504.99	7,136.69	6,504.99	52.51	49.00	1.53	-2,252.94	953.57	205.45	150.14	55.32	3.714	
7,300.00	6,604.99	7,236.69	6,604.99	52.56	49.05	1.53	-2,252.94	953.57	205.45	149.95	55.50	3.702	
7,400.00	6,704.99	7,336.69	6,704.99	52.61	49.11	1.53	-2,252.94	953.57	205.45	149.75	55.70	3.689	
7,500.00	6,804.99	7,436.69	6,804.99	52.66	49.16	1.53	-2,252.94	953.57	205.45	149.56	55.89	3.676	
7,600.00	6,904.99	7,536.69	6,904.99	52.71	49.22	1.53	-2,252.94	953.57	205.45	149.36	56.09	3.663	
7,700.00	7,004.99	7,636.69	7,004.99	52.77	49.28	1.53	-2,252.94	953.57	205.45	149.16	56.29	3.650	
7,800.00	7,104.99	7,736.69	7,104.99	52.82	49.33	1.53	-2,252.94	953.57	205.45	148.96	56.49	3.637	
7,900.00	7,204.99	7,836.69	7,204.99	52.87	49.39	1.53	-2,252.94	953.57	205.45	148.75	56.70	3.623	
8,000.00	7,304.99	7,936.69	7,304.99	52.93	49.45	1.53	-2,252.94	953.57	205.45	148.54	56.91	3.610	
8,100.00	7,404.99	8,036.69	7,404.99	52.99	49.51	1.53	-2,252.94	953.57	205.45	148.33	57.12	3.597	
8,200.00	7,504.99	8,136.69	7,504.99	53.04	49.58	1.53	-2,252.94	953.57	205.45	148.12	57.34	3.583	
8,300.00	7,604.99	8,236.69	7,604.99	53.10	49.64	1.53	-2,252.94	953.57	205.45	147.90	57.55	3.570	
8,328.01	7,633.00	8,264.69	7,633.00	53.12	49.66	1.53	-2,252.94	953.57	205.45	147.84	57.61	3.566	



Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Reference Depths are relative to Well @ 7665.00usft

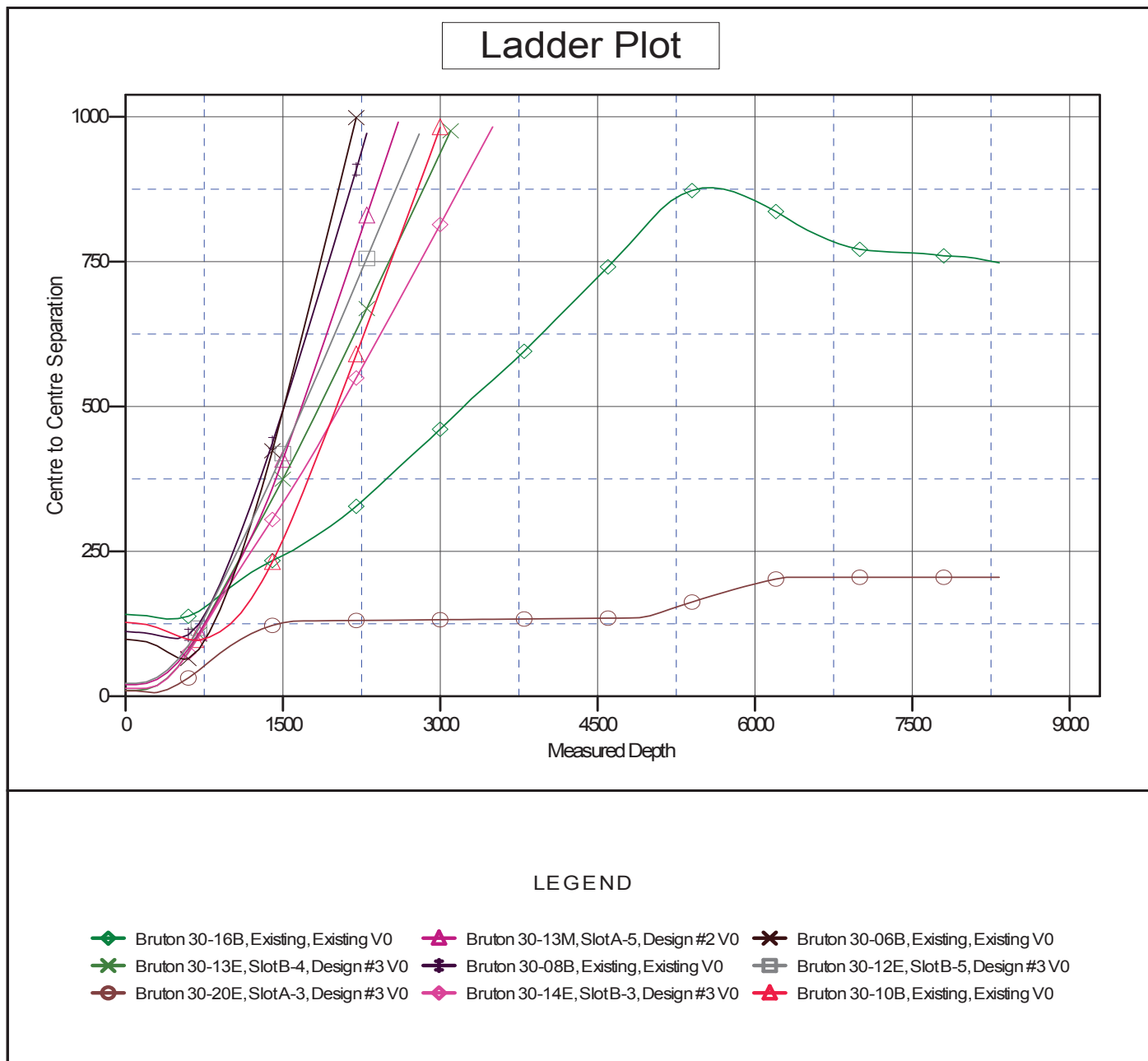
Offset Depths are relative to Offset Datum

Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Bruton 30-21E

Coordinate System is US State Plane 1983, Colorado Central Zone

Grid Convergence at Surface is: -1.46°





Archer

Anticollision Report

Company:	Piceance Energy, LLC	Local Co-ordinate Reference:	Well Bruton 30-21E
Project:	Mesa County, CO	TVD Reference:	Well @ 7665.00usft
Reference Site:	Bruton 30-10 Pad	MD Reference:	Well @ 7665.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Bruton 30-21E	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Slot A-4	Database:	EDMDBBW
Reference Design:	Design #2	Offset TVD Reference:	Reference Datum

Reference Depths are relative to Well @ 7665.00usft

Offset Depths are relative to Offset Datum

Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Bruton 30-21E

Coordinate System is US State Plane 1983, Colorado Central Zone

Grid Convergence at Surface is: -1.46°

