



Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Bulldog #17-21H-891
Company:	Axia Energy	TVD Reference:	WELL @ 7007.0ft (Original Well Elev)
Project:	Moffat County, CO	MD Reference:	WELL @ 7007.0ft (Original Well Elev)
Site:	SEC 17-T8N-R91W	North Reference:	True
Well:	Bulldog #17-21H-891	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot Hole		
Design:	Plan #1		

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

Site		SEC 17-T8N-R91W			
Site Position:		Northing:	1,489,855.99 ft	Latitude:	40.658607
From:	Lat/Long	Easting:	2,409,819.60 ft	Longitude:	-107.627397
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.37 °

Well	Bulldog #17-21H-891					
Well Position	+N/-S	0.0 ft	Northing:	1,489,855.98 ft	Latitude:	40.658607
	+E/-W	0.0 ft	Easting:	2,409,819.60 ft	Longitude:	-107.627397
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	6,975.0 ft

Wellbore	Pilot Hole				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	7/23/2013	10.05	66.70	52,699

Design	Plan #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.0	0.0	0.0	243.94

Plan Sections										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Dogleg Rate	Build Rate	Turn Rate	TFO	Target
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(°/100ft)	(°/100ft)	(°/100ft)	(°)	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,345.6	10.37	243.94	2,343.8	-13.7	-28.0	3.00	3.00	0.00	243.94	
9,068.9	10.37	243.94	8,957.2	-545.3	-1,115.1	0.00	0.00	0.00	0.00	
9,414.6	0.00	0.00	9,301.0	-559.0	-1,143.2	3.00	-3.00	0.00	180.00	17-21H-891 VT
14,101.6	0.00	0.00	13,988.0	-559.0	-1,143.2	0.00	0.00	0.00	0.00	

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Well:	Bulldog #17-21H-891	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot Hole		
Design:	Plan #1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	KOP @ 2000' MD
2,100.0	3.00	243.94	2,100.0	-1.1	-2.4	2.6	3.00	3.00	
2,200.0	6.00	243.94	2,199.6	-4.6	-9.4	10.5	3.00	3.00	
2,300.0	9.00	243.94	2,298.8	-10.3	-21.1	23.5	3.00	3.00	
2,345.6	10.37	243.94	2,343.8	-13.7	-28.0	31.2	3.00	3.00	EOB; 10.37°
2,400.0	10.37	243.94	2,397.2	-18.0	-36.8	41.0	0.00	0.00	
2,500.0	10.37	243.94	2,495.6	-25.9	-53.0	59.0	0.00	0.00	
2,600.0	10.37	243.94	2,594.0	-33.8	-69.1	77.0	0.00	0.00	
2,700.0	10.37	243.94	2,692.3	-41.7	-85.3	95.0	0.00	0.00	
2,800.0	10.37	243.94	2,790.7	-49.6	-101.5	113.0	0.00	0.00	
2,900.0	10.37	243.94	2,889.1	-57.5	-117.7	131.0	0.00	0.00	
3,000.0	10.37	243.94	2,987.4	-65.4	-133.8	149.0	0.00	0.00	
3,100.0	10.37	243.94	3,085.8	-73.3	-150.0	167.0	0.00	0.00	
3,200.0	10.37	243.94	3,184.2	-81.3	-166.2	185.0	0.00	0.00	
3,300.0	10.37	243.94	3,282.5	-89.2	-182.3	203.0	0.00	0.00	
3,400.0	10.37	243.94	3,380.9	-97.1	-198.5	221.0	0.00	0.00	
3,500.0	10.37	243.94	3,479.3	-105.0	-214.7	239.0	0.00	0.00	
3,600.0	10.37	243.94	3,577.6	-112.9	-230.8	257.0	0.00	0.00	
3,700.0	10.37	243.94	3,676.0	-120.8	-247.0	275.0	0.00	0.00	
3,800.0	10.37	243.94	3,774.4	-128.7	-263.2	293.0	0.00	0.00	
3,900.0	10.37	243.94	3,872.7	-136.6	-279.4	311.0	0.00	0.00	
4,000.0	10.37	243.94	3,971.1	-144.5	-295.5	329.0	0.00	0.00	
4,100.0	10.37	243.94	4,069.5	-152.4	-311.7	347.0	0.00	0.00	
4,200.0	10.37	243.94	4,167.8	-160.3	-327.9	365.0	0.00	0.00	
4,300.0	10.37	243.94	4,266.2	-168.2	-344.0	383.0	0.00	0.00	
4,364.9	10.37	243.94	4,330.0	-173.4	-354.5	394.6	0.00	0.00	Lewis
4,400.0	10.37	243.94	4,364.6	-176.1	-360.2	401.0	0.00	0.00	
4,500.0	10.37	243.94	4,462.9	-184.0	-376.4	419.0	0.00	0.00	
4,600.0	10.37	243.94	4,561.3	-191.9	-392.5	437.0	0.00	0.00	
4,700.0	10.37	243.94	4,659.7	-199.9	-408.7	455.0	0.00	0.00	
4,800.0	10.37	243.94	4,758.0	-207.8	-424.9	473.0	0.00	0.00	
4,900.0	10.37	243.94	4,856.4	-215.7	-441.0	491.0	0.00	0.00	

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Well:	Bulldog #17-21H-891	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot Hole		
Design:	Plan #1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
5,000.0	10.37	243.94	4,954.8	-223.6	-457.2	509.0	0.00	0.00	
5,100.0	10.37	243.94	5,053.1	-231.5	-473.4	527.0	0.00	0.00	
5,200.0	10.37	243.94	5,151.5	-239.4	-489.6	545.0	0.00	0.00	
5,300.0	10.37	243.94	5,249.9	-247.3	-505.7	562.9	0.00	0.00	
5,400.0	10.37	243.94	5,348.2	-255.2	-521.9	580.9	0.00	0.00	
5,500.0	10.37	243.94	5,446.6	-263.1	-538.1	598.9	0.00	0.00	
5,600.0	10.37	243.94	5,545.0	-271.0	-554.2	616.9	0.00	0.00	
5,700.0	10.37	243.94	5,643.3	-278.9	-570.4	634.9	0.00	0.00	
5,800.0	10.37	243.94	5,741.7	-286.8	-586.6	652.9	0.00	0.00	
5,900.0	10.37	243.94	5,840.1	-294.7	-602.7	670.9	0.00	0.00	
6,000.0	10.37	243.94	5,938.4	-302.6	-618.9	688.9	0.00	0.00	
6,100.0	10.37	243.94	6,036.8	-310.6	-635.1	706.9	0.00	0.00	
6,200.0	10.37	243.94	6,135.2	-318.5	-651.2	724.9	0.00	0.00	
6,216.1	10.37	243.94	6,151.0	-319.7	-653.9	727.8	0.00	0.00	Mesaverde
6,300.0	10.37	243.94	6,233.5	-326.4	-667.4	742.9	0.00	0.00	
6,400.0	10.37	243.94	6,331.9	-334.3	-683.6	760.9	0.00	0.00	
6,500.0	10.37	243.94	6,430.3	-342.2	-699.8	778.9	0.00	0.00	
6,600.0	10.37	243.94	6,528.6	-350.1	-715.9	796.9	0.00	0.00	
6,700.0	10.37	243.94	6,627.0	-358.0	-732.1	814.9	0.00	0.00	
6,800.0	10.37	243.94	6,725.4	-365.9	-748.3	832.9	0.00	0.00	
6,900.0	10.37	243.94	6,823.7	-373.8	-764.4	850.9	0.00	0.00	
7,000.0	10.37	243.94	6,922.1	-381.7	-780.6	868.9	0.00	0.00	
7,100.0	10.37	243.94	7,020.5	-389.6	-796.8	886.9	0.00	0.00	
7,200.0	10.37	243.94	7,118.8	-397.5	-812.9	904.9	0.00	0.00	
7,300.0	10.37	243.94	7,217.2	-405.4	-829.1	922.9	0.00	0.00	
7,400.0	10.37	243.94	7,315.6	-413.3	-845.3	940.9	0.00	0.00	
7,500.0	10.37	243.94	7,413.9	-421.2	-861.5	958.9	0.00	0.00	
7,600.0	10.37	243.94	7,512.3	-429.2	-877.6	976.9	0.00	0.00	
7,700.0	10.37	243.94	7,610.7	-437.1	-893.8	994.9	0.00	0.00	
7,800.0	10.37	243.94	7,709.0	-445.0	-910.0	1,012.9	0.00	0.00	
7,900.0	10.37	243.94	7,807.4	-452.9	-926.1	1,030.9	0.00	0.00	
8,000.0	10.37	243.94	7,905.8	-460.8	-942.3	1,048.9	0.00	0.00	
8,100.0	10.37	243.94	8,004.1	-468.7	-958.5	1,066.9	0.00	0.00	
8,200.0	10.37	243.94	8,102.5	-476.6	-974.6	1,084.9	0.00	0.00	
8,300.0	10.37	243.94	8,200.9	-484.5	-990.8	1,102.9	0.00	0.00	
8,400.0	10.37	243.94	8,299.2	-492.4	-1,007.0	1,120.9	0.00	0.00	
8,500.0	10.37	243.94	8,397.6	-500.3	-1,023.1	1,138.9	0.00	0.00	
8,600.0	10.37	243.94	8,496.0	-508.2	-1,039.3	1,156.9	0.00	0.00	
8,700.0	10.37	243.94	8,594.3	-516.1	-1,055.5	1,174.9	0.00	0.00	
8,800.0	10.37	243.94	8,692.7	-524.0	-1,071.7	1,192.9	0.00	0.00	
8,900.0	10.37	243.94	8,791.1	-531.9	-1,087.8	1,210.9	0.00	0.00	
9,000.0	10.37	243.94	8,889.4	-539.8	-1,104.0	1,228.9	0.00	0.00	
9,068.9	10.37	243.94	8,957.2	-545.3	-1,115.1	1,241.3	0.00	0.00	Start 3° Drop
9,100.0	9.44	243.94	8,987.8	-547.6	-1,119.9	1,246.7	3.00	-3.00	
9,200.0	6.44	243.94	9,086.9	-553.7	-1,132.3	1,260.5	3.00	-3.00	
9,300.0	3.44	243.94	9,186.5	-557.5	-1,140.1	1,269.1	3.00	-3.00	
9,400.0	0.44	243.94	9,286.4	-559.0	-1,143.1	1,272.5	3.00	-3.00	
9,414.6	0.00	0.00	9,301.0	-559.0	-1,143.2	1,272.5	3.00	-3.00	EOD; Vertical - Mancos
9,500.0	0.00	0.00	9,386.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
9,600.0	0.00	0.00	9,486.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
9,700.0	0.00	0.00	9,586.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
9,754.6	0.00	0.00	9,641.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Morapos

Cathedral Energy Services

Planning Report

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Company:	Axia Energy	TVD Reference:	WELL @ 7007.0ft (Original Well Elev)
Project:	Moffat County, CO	MD Reference:	WELL @ 7007.0ft (Original Well Elev)
Site:	SEC 17-T8N-R91W	North Reference:	True
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Wellbore:	Pilot Hole		
Design:	Plan #1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
9,800.0	0.00	0.00	9,686.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
9,900.0	0.00	0.00	9,786.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,000.0	0.00	0.00	9,886.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,089.6	0.00	0.00	9,976.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Mancos Marker
10,100.0	0.00	0.00	9,986.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,200.0	0.00	0.00	10,086.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,300.0	0.00	0.00	10,186.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,400.0	0.00	0.00	10,286.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,500.0	0.00	0.00	10,386.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,600.0	0.00	0.00	10,486.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,700.0	0.00	0.00	10,586.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,800.0	0.00	0.00	10,686.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
10,900.0	0.00	0.00	10,786.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,000.0	0.00	0.00	10,886.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,100.0	0.00	0.00	10,986.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,200.0	0.00	0.00	11,086.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,300.0	0.00	0.00	11,186.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,400.0	0.00	0.00	11,286.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,500.0	0.00	0.00	11,386.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,600.0	0.00	0.00	11,486.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,700.0	0.00	0.00	11,586.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,800.0	0.00	0.00	11,686.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
11,900.0	0.00	0.00	11,786.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,000.0	0.00	0.00	11,886.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,100.0	0.00	0.00	11,986.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,200.0	0.00	0.00	12,086.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,300.0	0.00	0.00	12,186.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,326.6	0.00	0.00	12,213.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Niobrara
12,400.0	0.00	0.00	12,286.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,500.0	0.00	0.00	12,386.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,600.0	0.00	0.00	12,486.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,700.0	0.00	0.00	12,586.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,776.6	0.00	0.00	12,663.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Tow Creek #2
12,800.0	0.00	0.00	12,686.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,836.6	0.00	0.00	12,723.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Wolf Mountain
12,900.0	0.00	0.00	12,786.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
12,991.6	0.00	0.00	12,878.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Top Target
13,000.0	0.00	0.00	12,886.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,100.0	0.00	0.00	12,986.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,171.6	0.00	0.00	13,058.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Base Target
13,200.0	0.00	0.00	13,086.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,296.6	0.00	0.00	13,183.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Middle Marker
13,300.0	0.00	0.00	13,186.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,400.0	0.00	0.00	13,286.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,500.0	0.00	0.00	13,386.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,600.0	0.00	0.00	13,486.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,700.0	0.00	0.00	13,586.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,800.0	0.00	0.00	13,686.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
13,826.6	0.00	0.00	13,713.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Carlile (Base Niobrara)
13,900.0	0.00	0.00	13,786.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
14,000.0	0.00	0.00	13,886.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
14,001.6	0.00	0.00	13,888.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Frontier

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well Bulldog #17-21H-891
Company:	Axia Energy	TVD Reference:	WELL @ 7007.0ft (Original Well Elev)
Project:	Moffat County, CO	MD Reference:	WELL @ 7007.0ft (Original Well Elev)
Site:	SEC 17-T8N-R91W	North Reference:	True
Well:	Bulldog #17-21H-891	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot Hole		
Design:	Plan #1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
14,100.0	0.00	0.00	13,986.4	-559.0	-1,143.2	1,272.5	0.00	0.00	
14,101.6	0.00	0.00	13,988.0	-559.0	-1,143.2	1,272.5	0.00	0.00	Pilot Hole TD @ 14101' MD

Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
17-21H-891 VT	0.00	0.00	9,301.0	-559.0	-1,143.2	1,489,324.57	2,408,663.36	40.657073	-107.631517
- plan hits target center									
- Point									

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,364.9	4,330.0	Lewis			
6,216.1	6,151.0	Mesaverde			
9,414.6	9,301.0	Mancos			
9,754.6	9,641.0	Morapos			
10,089.6	9,976.0	Mancos Marker			
12,326.6	12,213.0	Niobrara			
12,776.6	12,663.0	Tow Creek #2			
12,836.6	12,723.0	Wolf Mountain			
12,991.6	12,878.0	Top Target			
13,171.6	13,058.0	Base Target			
13,296.6	13,183.0	Middle Marker			
13,826.6	13,713.0	Carlile (Base Niobrara)			
14,001.6	13,888.0	Frontier			

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
2,000.0	2,000.0	0.0	0.0	KOP @ 2000' MD
2,345.6	2,343.8	-13.7	-28.0	EOB; 10.37°
9,068.9	8,957.2	-545.3	-1,115.1	Start 3° Drop
9,414.6	9,301.0	-559.0	-1,143.2	EOD; Vertical
14,101.6	13,988.0	-559.0	-1,143.2	Pilot Hole TD @ 14101' MD