





# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Coachman Energy Operating Company, LLC	<b>Local Co-ordinate Reference:</b>	Well Coachman Energy Federal 14/15-8-21
<b>Project:</b>	Garfield County, CO	<b>TVD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Site:</b>	S21 T6S R91W (21B Pad)	<b>MD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Well:</b>	Coachman Energy Federal 14/15-8-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	Garfield County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

Site		S21 T6S R91W (21B Pad)			
Site Position:		Northing:	1,072,631.30 usft	Latitude:	39.514322
From:	Lat/Long	Easting:	2,420,925.95 usft	Longitude:	-107.552555
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.33 °

Well	Coachman Energy Federal 14/15-8-21					
Well Position	+N/-S	0.0 usft	Northing:	1,072,656.55 usft	Latitude:	39.514395
	+E/-W	0.0 usft	Easting:	2,420,983.54 usft	Longitude:	-107.552353
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	6,932.0 usft

<b>Wellbore</b>	DD				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	12/8/2014	9.70	65.74	51,957

<b>Design</b>	FINAL				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	162.68	

<b>Survey Program</b>	<b>Date</b>	12/19/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
149.0	8,033.0	Survey #1 (DD)	ISCWSA MWD	MWD - ISCWSA	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usf)</b>	<b>Build Rate (°/100u)</b>	<b>Formations / Comments</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
149.0	0.20	269.00	149.0	0.0	-0.3	-0.1	0.13	0.13		
211.0	0.40	233.10	211.0	-0.1	-0.5	0.0	0.43	0.32		
273.0	0.30	225.00	273.0	-0.4	-0.8	0.1	0.18	-0.16		
335.0	0.40	242.40	335.0	-0.6	-1.1	0.2	0.23	0.16		
396.0	1.50	166.20	396.0	-1.5	-1.1	1.1	2.39	1.80		
426.0	2.30	160.80	426.0	-2.4	-0.8	2.1	2.73	2.67		
520.0	4.10	156.70	519.8	-7.3	1.1	7.3	1.93	1.91		
614.0	5.30	154.60	613.5	-14.3	4.3	14.9	1.29	1.28		
708.0	6.40	157.80	707.0	-23.1	8.1	24.4	1.22	1.17		
803.0	7.80	159.80	801.3	-34.0	12.4	36.2	1.50	1.47		
897.0	8.40	157.70	894.3	-46.4	17.2	49.4	0.71	0.64		
991.0	9.10	153.50	987.3	-59.4	23.1	63.6	1.01	0.74		

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## Survey Report

<b>Company:</b>	Coachman Energy Operating Company, LLC	<b>Local Co-ordinate Reference:</b>	Well Coachman Energy Federal 14/15-8-21
<b>Project:</b>	Garfield County, CO	<b>TVD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Site:</b>	S21 T6S R91W (21B Pad)	<b>MD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Well:</b>	Coachman Energy Federal 14/15-8-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

### Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
1,087.0	8.70	158.10	1,082.1	-72.9	29.2	78.3	0.85	-0.42	
1,181.0	7.20	159.60	1,175.2	-85.0	33.9	91.3	1.61	-1.60	
1,276.0	6.20	165.00	1,269.5	-95.6	37.3	102.3	1.24	-1.05	
1,371.0	5.00	166.90	1,364.1	-104.5	39.6	111.6	1.28	-1.26	
1,465.0	4.30	171.80	1,457.8	-112.0	41.0	119.1	0.86	-0.74	
1,480.0	4.40	170.60	1,472.7	-113.1	41.2	120.3	0.90	0.67	
1,562.0	4.50	177.80	1,554.5	-119.5	41.8	126.5	0.69	0.12	
1,657.0	3.10	175.90	1,649.3	-125.7	42.1	132.6	1.48	-1.47	
1,752.0	2.00	179.20	1,744.2	-130.0	42.3	136.7	1.17	-1.16	
1,846.0	1.80	173.80	1,838.1	-133.1	42.5	139.7	0.29	-0.21	
1,941.0	0.40	174.20	1,933.1	-134.9	42.7	141.5	1.47	-1.47	
2,034.0	0.20	70.30	2,026.1	-135.2	42.9	141.8	0.53	-0.22	
2,127.0	0.80	80.00	2,119.1	-135.0	43.7	141.9	0.65	0.65	
2,220.0	0.70	80.00	2,212.1	-134.8	44.9	142.0	0.11	-0.11	
2,313.0	0.60	67.20	2,305.1	-134.5	45.9	142.1	0.19	-0.11	
2,408.0	0.60	46.70	2,400.1	-134.0	46.7	141.8	0.22	0.00	
2,502.0	0.70	39.70	2,494.1	-133.2	47.5	141.3	0.14	0.11	
2,597.0	0.80	63.80	2,589.1	-132.4	48.4	140.8	0.35	0.11	
2,691.0	0.10	163.70	2,683.1	-132.2	49.0	140.8	0.88	-0.74	
2,785.0	0.90	206.00	2,777.1	-133.0	48.7	141.4	0.88	0.85	
2,880.0	1.10	213.80	2,872.0	-134.4	47.9	142.6	0.25	0.21	
2,973.0	0.90	218.30	2,965.0	-135.7	46.9	143.5	0.23	-0.22	
3,068.0	0.70	237.60	3,060.0	-136.6	46.0	144.1	0.35	-0.21	
3,162.0	0.60	261.10	3,154.0	-137.0	45.0	144.2	0.30	-0.11	
3,256.0	0.40	279.70	3,248.0	-137.0	44.2	144.0	0.27	-0.21	
3,351.0	0.30	347.20	3,343.0	-136.7	43.8	143.6	0.42	-0.11	
3,445.0	1.00	336.50	3,437.0	-135.7	43.4	142.5	0.75	0.74	
3,540.0	1.00	349.60	3,532.0	-134.1	43.0	140.9	0.24	0.00	
3,635.0	1.10	356.10	3,627.0	-132.4	42.8	139.1	0.16	0.11	
3,729.0	1.40	10.30	3,721.0	-130.4	42.9	137.2	0.46	0.32	
3,823.0	1.50	20.50	3,814.9	-128.1	43.5	135.3	0.29	0.11	
3,918.0	1.00	102.20	3,909.9	-127.1	44.8	134.7	1.77	-0.53	
4,013.0	0.90	77.60	4,004.9	-127.1	46.3	135.2	0.44	-0.11	
4,108.0	0.40	37.10	4,099.9	-126.7	47.2	135.0	0.68	-0.53	
4,203.0	0.90	216.00	4,194.9	-127.0	47.0	135.3	1.37	0.53	
4,297.0	1.10	202.90	4,288.9	-128.5	46.2	136.4	0.32	0.21	
4,392.0	0.20	187.90	4,383.9	-129.5	45.8	137.3	0.96	-0.95	
4,487.0	0.70	92.10	4,478.9	-129.7	46.4	137.6	0.79	0.53	
4,582.0	0.50	121.80	4,573.9	-129.9	47.3	138.1	0.38	-0.21	
4,677.0	0.80	148.60	4,668.9	-130.7	48.0	139.1	0.44	0.32	
4,772.0	1.30	150.10	4,763.8	-132.2	48.9	140.8	0.53	0.53	
4,867.0	1.10	220.60	4,858.8	-133.8	48.9	142.3	1.47	-0.21	
4,961.0	1.00	325.40	4,952.8	-133.8	47.8	142.0	1.77	-0.11	
5,057.0	1.60	348.20	5,048.8	-131.8	47.1	139.9	0.81	0.62	
5,151.0	0.80	70.00	5,142.8	-130.3	47.4	138.5	1.79	-0.85	
5,246.0	1.10	115.00	5,237.8	-130.5	48.9	139.1	0.82	0.32	
5,342.0	1.10	133.40	5,333.7	-131.5	50.4	140.5	0.37	0.00	
5,437.0	1.00	128.10	5,428.7	-132.6	51.7	142.0	0.15	-0.11	
5,531.0	0.80	131.90	5,522.7	-133.6	52.8	143.2	0.22	-0.21	
5,627.0	1.00	95.60	5,618.7	-134.1	54.1	144.1	0.62	0.21	
5,721.0	0.60	96.90	5,712.7	-134.2	55.4	144.7	0.43	-0.43	
5,815.0	0.40	168.60	5,806.7	-134.6	56.0	145.2	0.65	-0.21	
5,909.0	0.30	197.40	5,900.7	-135.2	56.0	145.7	0.21	-0.11	

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<b>Site:</b>	S21 T6S R91W (21B Pad)	<b>MD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Well:</b>	Coachman Energy Federal 14/15-8-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

### Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
6,004.0	0.30	36.10	5,995.7	-135.2	56.1	145.8	0.62	0.00	
6,098.0	0.70	15.90	6,089.7	-134.5	56.4	145.2	0.46	0.43	
6,193.0	0.80	357.80	6,184.7	-133.2	56.5	144.0	0.27	0.11	
6,287.0	1.10	354.90	6,278.7	-131.7	56.4	142.5	0.32	0.32	
6,382.0	1.40	350.80	6,373.6	-129.6	56.1	140.5	0.33	0.32	
6,475.0	0.80	313.60	6,466.6	-128.1	55.5	138.8	0.97	-0.65	
6,569.0	1.10	308.20	6,560.6	-127.1	54.3	137.5	0.33	0.32	
6,663.0	1.10	299.30	6,654.6	-126.1	52.8	136.1	0.18	0.00	
6,757.0	1.40	7.40	6,748.6	-124.5	52.2	134.4	1.51	0.32	
6,833.0	0.80	343.70	6,824.6	-123.1	52.1	133.0	0.97	-0.79	
6,851.0	0.60	348.60	6,842.6	-122.8	52.1	132.8	1.16	-1.11	
6,945.0	0.80	329.90	6,936.6	-121.8	51.6	131.6	0.32	0.21	
7,039.0	1.20	325.30	7,030.5	-120.4	50.8	130.1	0.43	0.43	
7,135.0	1.40	328.20	7,126.5	-118.6	49.6	128.0	0.22	0.21	
7,228.0	1.80	317.50	7,219.5	-116.5	48.0	125.5	0.54	0.43	
7,323.0	1.30	308.40	7,314.4	-114.8	46.1	123.3	0.59	-0.53	
7,417.0	1.40	309.00	7,408.4	-113.4	44.4	121.5	0.11	0.11	
7,511.0	1.60	314.20	7,502.4	-111.8	42.6	119.4	0.26	0.21	
7,605.0	2.00	311.60	7,596.3	-109.7	40.4	116.8	0.43	0.43	
7,698.0	2.60	315.70	7,689.3	-107.2	37.7	113.5	0.67	0.65	
7,791.0	3.00	303.50	7,782.2	-104.3	34.2	109.8	0.77	0.43	
7,885.0	3.30	297.10	7,876.0	-101.7	29.8	106.0	0.49	0.32	
7,978.0	3.20	299.00	7,968.9	-99.2	25.1	102.2	0.16	-0.11	Last CES Survey @ 7,978' MD
8,033.0	3.20	299.00	8,023.8	-97.8	22.4	100.0	0.00	0.00	PTB @ 8,033'

### Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Dejour Federal 14/15-8- - actual wellpath misses target center by 4979.3usft at 8033.0usft MD (8023.8 TVD, -97.8 N, 22.4 E) - Circle (radius 100.0)	0.00	0.00	13,003.0	-114.0	35.6	1,072,541.76	2,421,016.45	39.514082	-107.552227
Coachman Federal 14/1 - actual wellpath misses target center by 6.4usft at 7640.7usft MD (7632.0 TVD, -108.9 N, 39.4 E) - Circle (radius 100.0)	0.00	0.00	7,632.0	-114.0	35.6	1,072,541.76	2,421,016.45	39.514082	-107.552227
Coachman Federal 14/1 - actual wellpath misses target center by 14.7usft at 7908.3usft MD (7899.3 TVD, -101.1 N, 28.6 E) - Circle (radius 100.0)	0.00	0.00	7,900.0	-114.0	35.6	1,072,541.76	2,421,016.45	39.514082	-107.552227

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
7,978.0	7,968.9	-99.2	25.1	Last CES Survey @ 7,978' MD
8,033.0	8,023.8	-97.8	22.4	PTB @ 8,033'

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

# **Coachman Energy Operating Company, LLC**

**Garfield County, CO**

**S21 T6S R91W (21B Pad)**

**Coachman Energy Federal 14/15-8-21**

**DD**

**Design: FINAL**

## **Survey Report - Geographic**

**19 December, 2014**

# Cathedral Energy Services

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<b>Project:</b>	Garfield County, CO	<b>TVD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Site:</b>	S21 T6S R91W (21B Pad)	<b>MD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Well:</b>	Coachman Energy Federal 14/15-8-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	Garfield County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

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Site Position:		Northing:	1,072,631.30 usft	Latitude:	39.514322
From:	Lat/Long	Easting:	2,420,925.95 usft	Longitude:	-107.552555
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.33 °

Well	Coachman Energy Federal 14/15-8-21					
Well Position	+N/-S	0.0 usft	Northing:	1,072,656.55 usft	Latitude:	39.514395
	+E/-W	0.0 usft	Easting:	2,420,983.55 usft	Longitude:	-107.552353
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	6,932.0 usft

<b>Wellbore</b>	DD				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	12/8/2014	9.70	65.74	51,957

<b>Design</b>	FINAL				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	162.68	

<b>Survey Program</b>	<b>Date</b>	12/19/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
149.0	8,033.0	Survey #1 (DD)	ISCWSA MWD	MWD - ISCWSA	

<b>Survey</b>									
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Map Northing (usft)</b>	<b>Map Easting (usft)</b>	<b>Latitude</b>	<b>Longitude</b>
0.0	0.00	0.00	0.0	0.0	0.0	1,072,656.55	2,420,983.55	39.514395	-107.552353
149.0	0.20	269.00	149.0	0.0	-0.3	1,072,656.55	2,420,983.29	39.514395	-107.552354
211.0	0.40	233.10	211.0	-0.1	-0.5	1,072,656.43	2,420,983.00	39.514395	-107.552355
273.0	0.30	225.00	273.0	-0.4	-0.8	1,072,656.19	2,420,982.71	39.514394	-107.552356
335.0	0.40	242.40	335.0	-0.6	-1.1	1,072,655.98	2,420,982.40	39.514393	-107.552357
396.0	1.50	166.20	396.0	-1.5	-1.1	1,072,655.11	2,420,982.38	39.514391	-107.552357
426.0	2.30	160.80	426.0	-2.4	-0.8	1,072,654.15	2,420,982.65	39.514388	-107.552356
520.0	4.10	156.70	519.8	-7.3	1.1	1,072,649.24	2,420,984.48	39.514375	-107.552349
614.0	5.30	154.60	613.5	-14.3	4.3	1,072,642.16	2,420,987.51	39.514356	-107.552338
708.0	6.40	157.80	707.0	-23.1	8.1	1,072,633.30	2,420,991.15	39.514332	-107.552324
803.0	7.80	159.80	801.3	-34.0	12.4	1,072,622.25	2,420,995.12	39.514302	-107.552309
897.0	8.40	157.70	894.3	-46.4	17.2	1,072,609.81	2,420,999.64	39.514268	-107.552292

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<b>Site:</b>	S21 T6S R91W (21B Pad)	<b>MD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Well:</b>	Coachman Energy Federal 14/15-8-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
991.0	9.10	153.50	987.3	-59.4	23.1	1,072,596.67	2,421,005.26	39.514232	-107.552271
1,087.0	8.70	158.10	1,082.1	-72.9	29.2	1,072,583.00	2,421,011.04	39.514195	-107.552250
1,181.0	7.20	159.60	1,175.2	-85.0	33.9	1,072,570.78	2,421,015.47	39.514162	-107.552233
1,276.0	6.20	165.00	1,269.5	-95.6	37.3	1,072,560.16	2,421,018.63	39.514133	-107.552221
1,371.0	5.00	166.90	1,364.1	-104.5	39.6	1,072,551.13	2,421,020.68	39.514108	-107.552213
1,465.0	4.30	171.80	1,457.8	-112.0	41.0	1,072,543.62	2,421,021.94	39.514088	-107.552208
1,480.0	4.40	170.60	1,472.7	-113.1	41.2	1,072,542.49	2,421,022.09	39.514084	-107.552207
1,562.0	4.50	177.80	1,554.5	-119.5	41.8	1,072,536.16	2,421,022.58	39.514067	-107.552205
1,657.0	3.10	175.90	1,649.3	-125.7	42.1	1,072,529.87	2,421,022.76	39.514050	-107.552204
1,752.0	2.00	179.20	1,744.2	-130.0	42.3	1,072,525.64	2,421,022.87	39.514038	-107.552203
1,846.0	1.80	173.80	1,838.1	-133.1	42.5	1,072,522.53	2,421,022.98	39.514030	-107.552203
1,941.0	0.40	174.20	1,933.1	-134.9	42.7	1,072,520.71	2,421,023.13	39.514025	-107.552202
2,034.0	0.20	70.30	2,026.1	-135.2	42.9	1,072,520.44	2,421,023.31	39.514024	-107.552201
2,127.0	0.80	80.00	2,119.1	-135.0	43.7	1,072,520.59	2,421,024.11	39.514024	-107.552198
2,220.0	0.70	80.00	2,212.1	-134.8	44.9	1,072,520.77	2,421,025.31	39.514025	-107.552194
2,313.0	0.60	67.20	2,305.1	-134.5	45.9	1,072,521.04	2,421,026.33	39.514026	-107.552191
2,408.0	0.60	46.70	2,400.1	-134.0	46.7	1,072,521.55	2,421,027.16	39.514027	-107.552188
2,502.0	0.70	39.70	2,494.1	-133.2	47.5	1,072,522.32	2,421,027.90	39.514029	-107.552185
2,597.0	0.80	63.80	2,589.1	-132.4	48.4	1,072,523.03	2,421,028.89	39.514031	-107.552182
2,691.0	0.10	163.70	2,683.1	-132.2	49.0	1,072,523.23	2,421,029.50	39.514032	-107.552180
2,785.0	0.90	206.00	2,777.1	-133.0	48.7	1,072,522.49	2,421,029.18	39.514030	-107.552181
2,880.0	1.10	213.80	2,872.0	-134.4	47.9	1,072,521.09	2,421,028.32	39.514026	-107.552184
2,973.0	0.90	218.30	2,965.0	-135.7	46.9	1,072,519.79	2,421,027.34	39.514022	-107.552187
3,068.0	0.70	237.60	3,060.0	-136.6	46.0	1,072,518.92	2,421,026.36	39.514020	-107.552190
3,162.0	0.60	261.10	3,154.0	-137.0	45.0	1,072,518.56	2,421,025.39	39.514019	-107.552194
3,256.0	0.40	279.70	3,248.0	-137.0	44.2	1,072,518.55	2,421,024.58	39.514019	-107.552197
3,351.0	0.30	347.20	3,343.0	-136.7	43.8	1,072,518.86	2,421,024.20	39.514020	-107.552198
3,445.0	1.00	336.50	3,437.0	-135.7	43.4	1,072,519.86	2,421,023.84	39.514022	-107.552199
3,540.0	1.00	349.60	3,532.0	-134.1	43.0	1,072,521.45	2,421,023.40	39.514027	-107.552201
3,635.0	1.10	356.10	3,627.0	-132.4	42.8	1,072,523.18	2,421,023.23	39.514032	-107.552202
3,729.0	1.40	10.30	3,721.0	-130.4	42.9	1,072,525.20	2,421,023.42	39.514037	-107.552201
3,823.0	1.50	20.50	3,814.9	-128.1	43.5	1,072,527.47	2,421,024.11	39.514043	-107.552199
3,918.0	1.00	102.20	3,909.9	-127.1	44.8	1,072,528.43	2,421,025.37	39.514046	-107.552195
4,013.0	0.90	77.60	4,004.9	-127.1	46.3	1,072,528.38	2,421,026.91	39.514046	-107.552189
4,108.0	0.40	37.10	4,099.9	-126.7	47.2	1,072,528.78	2,421,027.85	39.514047	-107.552186
4,203.0	0.90	216.00	4,194.9	-127.0	47.0	1,072,528.45	2,421,027.60	39.514046	-107.552187
4,297.0	1.10	202.90	4,288.9	-128.5	46.2	1,072,527.04	2,421,026.79	39.514042	-107.552189
4,392.0	0.20	187.90	4,383.9	-129.5	45.8	1,072,526.05	2,421,026.39	39.514040	-107.552191
4,487.0	0.70	92.10	4,478.9	-129.7	46.4	1,072,525.85	2,421,026.94	39.514039	-107.552189
4,582.0	0.50	121.80	4,573.9	-129.9	47.3	1,072,525.59	2,421,027.87	39.514038	-107.552185
4,677.0	0.80	148.60	4,668.9	-130.7	48.0	1,072,524.79	2,421,028.54	39.514036	-107.552183
4,772.0	1.30	150.10	4,763.8	-132.2	48.9	1,072,523.27	2,421,029.39	39.514032	-107.552180
4,867.0	1.10	220.60	4,858.8	-133.8	48.9	1,072,521.64	2,421,029.30	39.514028	-107.552180
4,961.0	1.00	325.40	4,952.8	-133.8	47.8	1,072,521.66	2,421,028.25	39.514028	-107.552184
5,057.0	1.60	348.20	5,048.8	-131.8	47.1	1,072,523.67	2,421,027.54	39.514033	-107.552186
5,151.0	0.80	70.00	5,142.8	-130.3	47.4	1,072,525.17	2,421,027.93	39.514037	-107.552185
5,246.0	1.10	115.00	5,237.8	-130.5	48.9	1,072,524.98	2,421,029.37	39.514037	-107.552180
5,342.0	1.10	133.40	5,333.7	-131.5	50.4	1,072,523.93	2,421,030.85	39.514034	-107.552175
5,437.0	1.00	128.10	5,428.7	-132.6	51.7	1,072,522.76	2,421,032.14	39.514031	-107.552170
5,531.0	0.80	131.90	5,522.7	-133.6	52.8	1,072,521.79	2,421,033.25	39.514028	-107.552166
5,627.0	1.00	95.60	5,618.7	-134.1	54.1	1,072,521.23	2,421,034.57	39.514027	-107.552161
5,721.0	0.60	96.90	5,712.7	-134.2	55.4	1,072,521.06	2,421,035.87	39.514027	-107.552157
5,815.0	0.40	168.60	5,806.7	-134.6	56.0	1,072,520.66	2,421,036.42	39.514025	-107.552155
5,909.0	0.30	197.40	5,900.7	-135.2	56.0	1,072,520.11	2,421,036.40	39.514024	-107.552155
6,004.0	0.30	36.10	5,995.7	-135.2	56.1	1,072,520.07	2,421,036.47	39.514024	-107.552155



# Cathedral Energy Services

## Survey Report - Geographic

<b>Company:</b>	Coachman Energy Operating Company, LLC	<b>Local Co-ordinate Reference:</b>	Well Coachman Energy Federal 14/15-8-21
<b>Project:</b>	Garfield County, CO	<b>TVD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Site:</b>	S21 T6S R91W (21B Pad)	<b>MD Reference:</b>	KB=23' @ 6955.0usft (Frontier # 28)
<b>Well:</b>	Coachman Energy Federal 14/15-8-21	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,098.0	0.70	15.90	6,089.7	-134.5	56.4	1,072,520.81	2,421,036.79	39.514026	-107.552153
6,193.0	0.80	357.80	6,184.7	-133.2	56.5	1,072,522.03	2,421,036.95	39.514029	-107.552153
6,287.0	1.10	354.90	6,278.7	-131.7	56.4	1,072,523.59	2,421,036.88	39.514034	-107.552153
6,382.0	1.40	350.80	6,373.6	-129.6	56.1	1,072,525.65	2,421,036.66	39.514039	-107.552154
6,475.0	0.80	313.60	6,466.6	-128.1	55.5	1,072,527.23	2,421,036.04	39.514043	-107.552157
6,569.0	1.10	308.20	6,560.6	-127.1	54.3	1,072,528.27	2,421,034.88	39.514046	-107.552161
6,663.0	1.10	299.30	6,654.6	-126.1	52.8	1,072,529.30	2,421,033.41	39.514049	-107.552166
6,757.0	1.40	7.40	6,748.6	-124.5	52.2	1,072,530.90	2,421,032.81	39.514053	-107.552168
6,833.0	0.80	343.70	6,824.6	-123.1	52.1	1,072,532.33	2,421,032.81	39.514057	-107.552169
6,851.0	0.60	348.60	6,842.6	-122.8	52.1	1,072,532.54	2,421,032.76	39.514058	-107.552169
6,945.0	0.80	329.90	6,936.6	-121.8	51.6	1,072,533.60	2,421,032.36	39.514061	-107.552170
7,039.0	1.20	325.30	7,030.5	-120.4	50.8	1,072,535.00	2,421,031.51	39.514064	-107.552173
7,135.0	1.40	328.20	7,126.5	-118.6	49.6	1,072,536.85	2,421,030.36	39.514069	-107.552178
7,228.0	1.80	317.50	7,219.5	-116.5	48.0	1,072,538.93	2,421,028.82	39.514075	-107.552183
7,323.0	1.30	308.40	7,314.4	-114.8	46.1	1,072,540.74	2,421,027.01	39.514080	-107.552190
7,417.0	1.40	309.00	7,408.4	-113.4	44.4	1,072,542.16	2,421,025.31	39.514084	-107.552196
7,511.0	1.60	314.20	7,502.4	-111.8	42.6	1,072,543.84	2,421,023.52	39.514088	-107.552202
7,605.0	2.00	311.60	7,596.3	-109.7	40.4	1,072,545.90	2,421,021.40	39.514094	-107.552210
7,698.0	2.60	315.70	7,689.3	-107.2	37.7	1,072,548.55	2,421,018.77	39.514101	-107.552220
7,791.0	3.00	303.50	7,782.2	-104.3	34.2	1,072,551.48	2,421,015.34	39.514109	-107.552232
7,885.0	3.30	297.10	7,876.0	-101.7	29.8	1,072,554.17	2,421,010.94	39.514116	-107.552248
7,978.0	3.20	299.00	7,968.9	-99.2	25.1	1,072,556.76	2,421,006.34	39.514123	-107.552264
<b>Last CES Survey @ 7,978' MD</b>									
8,033.0	3.20	299.00	8,023.8	-97.8	22.4	1,072,558.31	2,421,003.69	39.514127	-107.552274
<b>PTB @ 8,033'</b>									

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									
Coachman Federal 14/1	0.00	0.00	7,900.0	-114.0	35.6	1,072,541.76	2,421,016.45	39.514082	-107.552227
- actual wellpath misses target center by 14.7usft at 7908.3usft MD (7899.3 TVD, -101.1 N, 28.6 E)									
- Circle (radius 100.0)									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
7,978.0	7,968.9	-99.2	25.1	Last CES Survey @ 7,978' MD	
8,033.0	8,023.8	-97.8	22.4	PTB @ 8,033'	

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_