





# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Coachman Energy Operating Company, LLC	<b>Local Co-ordinate Reference:</b>	Well Coachman Energy Federal 14/15-5-21
<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 14/15-5-21	<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 14/15-5-21					
Well Position	+N/-S	0.0 usft	Northing:	1,072,664.46 usft	Latitude:	39.514415
	+E/-W	0.0 usft	Easting:	2,420,956.07 usft	Longitude:	-107.552451
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	11/5/2014	9.71	65.74	51,966

<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	3.18	

<b>Survey Program</b>	<b>Date</b>	12/2/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
149.0	8,020.0	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	0.50	194.60	149.0	-0.6	-0.2	-0.6	0.34	0.34		
180.0	0.50	124.40	180.0	-0.8	-0.1	-0.8	1.85	0.00		
211.0	0.60	76.30	211.0	-0.9	0.2	-0.9	1.48	0.32		
243.0	1.50	51.60	243.0	-0.6	0.7	-0.5	3.09	2.81		
274.0	2.30	28.70	274.0	0.2	1.3	0.3	3.51	2.58		
306.0	3.00	33.10	305.9	1.5	2.1	1.6	2.28	2.19		
400.0	4.90	31.20	399.7	7.0	5.5	7.3	2.03	2.02		
494.0	6.20	35.70	493.3	14.5	10.5	15.1	1.46	1.38		
588.0	7.30	26.50	586.6	24.0	16.1	24.9	1.64	1.17		
683.0	7.90	18.10	680.8	35.6	20.9	36.7	1.33	0.63		
777.0	8.70	15.90	773.8	48.6	24.8	49.9	0.92	0.85		
871.0	9.80	6.40	866.6	63.4	27.7	64.8	2.00	1.17		

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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 14/15-5-21	<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
965.0	11.90	2.50	958.9	81.0	29.0	82.5	2.37	2.23	
1,060.0	13.70	358.60	1,051.5	102.0	29.1	103.5	2.10	1.89	
1,153.0	14.80	1.70	1,141.7	124.9	29.2	126.4	1.44	1.18	
1,246.0	15.00	2.30	1,231.5	148.8	30.1	150.3	0.27	0.22	
1,338.0	16.10	359.60	1,320.2	173.5	30.4	174.9	1.43	1.20	
1,432.0	16.00	359.60	1,410.5	199.5	30.3	200.8	0.11	-0.11	
1,495.0	16.10	358.10	1,471.1	216.9	29.9	218.2	0.68	0.16	
1,565.0	17.10	0.80	1,538.1	236.9	29.7	238.2	1.80	1.43	
1,660.0	15.80	2.10	1,629.2	263.8	30.4	265.0	1.42	-1.37	
1,754.0	15.40	1.50	1,719.8	289.0	31.2	290.3	0.46	-0.43	
1,848.0	15.60	1.50	1,810.4	314.1	31.9	315.4	0.21	0.21	
1,943.0	15.40	1.30	1,901.9	339.5	32.5	340.8	0.22	-0.21	
2,036.0	15.70	1.50	1,991.5	364.4	33.1	365.7	0.33	0.32	
2,131.0	15.50	1.50	2,083.0	390.0	33.8	391.3	0.21	-0.21	
2,225.0	15.10	0.10	2,173.7	414.8	34.1	416.0	0.58	-0.43	
2,319.0	16.50	3.00	2,264.1	440.4	34.8	441.6	1.71	1.49	
2,414.0	16.60	2.60	2,355.2	467.4	36.1	468.7	0.16	0.11	
2,507.0	16.60	0.80	2,444.3	493.9	36.9	495.2	0.55	0.00	
2,603.0	15.40	2.20	2,536.6	520.4	37.6	521.7	1.31	-1.25	
2,697.0	15.30	1.30	2,627.2	545.3	38.4	546.6	0.27	-0.11	
2,792.0	15.40	1.40	2,718.9	570.4	39.0	571.7	0.11	0.11	
2,886.0	15.50	1.50	2,809.5	595.4	39.6	596.7	0.11	0.11	
2,981.0	14.40	1.10	2,901.2	619.9	40.2	621.2	1.16	-1.16	
3,076.0	14.00	359.90	2,993.3	643.2	40.4	644.5	0.52	-0.42	
3,171.0	14.10	0.80	3,085.5	666.3	40.5	667.5	0.25	0.11	
3,266.0	15.30	2.40	3,177.4	690.4	41.2	691.6	1.33	1.26	
3,360.0	15.10	2.20	3,268.1	715.0	42.2	716.3	0.22	-0.21	
3,455.0	15.60	1.50	3,359.7	740.2	43.0	741.4	0.56	0.53	
3,550.0	15.70	1.70	3,451.2	765.8	43.7	767.0	0.12	0.11	
3,645.0	14.70	1.50	3,542.9	790.7	44.4	791.9	1.05	-1.05	
3,740.0	12.70	5.50	3,635.2	813.1	45.7	814.4	2.33	-2.11	
3,835.0	9.90	2.70	3,728.3	831.7	47.1	833.0	3.00	-2.95	
3,930.0	8.40	0.70	3,822.1	846.8	47.6	848.1	1.61	-1.58	
4,024.0	5.10	0.60	3,915.4	857.8	47.7	859.1	3.51	-3.51	
4,120.0	3.90	357.10	4,011.1	865.4	47.6	866.7	1.28	-1.25	
4,214.0	0.80	355.60	4,105.0	869.2	47.4	870.5	3.30	-3.30	
4,309.0	1.10	21.00	4,200.0	870.7	47.6	872.0	0.54	0.32	
4,405.0	1.20	68.30	4,296.0	871.9	48.9	873.3	0.97	0.10	
4,500.0	0.60	172.00	4,391.0	871.8	49.9	873.2	1.54	-0.63	
4,594.0	0.60	184.50	4,485.0	870.8	49.9	872.3	0.14	0.00	
4,690.0	0.40	208.00	4,581.0	870.0	49.7	871.5	0.29	-0.21	
4,784.0	0.04	99.70	4,675.0	869.7	49.6	871.2	0.44	-0.38	
4,878.0	0.30	317.20	4,769.0	869.9	49.5	871.3	0.35	0.28	
4,972.0	0.30	336.80	4,863.0	870.3	49.2	871.7	0.11	0.00	
5,067.0	0.60	48.70	4,958.0	870.9	49.5	872.3	0.61	0.32	
5,161.0	0.70	52.60	5,052.0	871.6	50.3	873.0	0.12	0.11	
5,256.0	1.50	40.90	5,147.0	872.9	51.6	874.4	0.87	0.84	
5,351.0	1.00	109.40	5,241.9	873.5	53.2	875.1	1.54	-0.53	
5,445.0	0.80	121.10	5,335.9	872.9	54.5	874.6	0.29	-0.21	
5,538.0	0.40	302.20	5,428.9	872.7	54.8	874.4	1.29	-0.43	
5,632.0	0.80	267.50	5,522.9	872.9	53.9	874.5	0.56	0.43	
5,726.0	0.90	217.50	5,616.9	872.3	52.8	873.9	0.77	0.11	
5,820.0	0.80	221.10	5,710.9	871.2	51.9	872.7	0.12	-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 14/15-5-21	<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
5,915.0	0.60	232.50	5,805.9	870.4	51.1	871.9	0.26	-0.21	
6,008.0	0.40	263.70	5,898.9	870.1	50.3	871.5	0.36	-0.22	
6,103.0	0.50	2.00	5,993.9	870.4	50.0	871.9	0.72	0.11	
6,198.0	1.10	27.10	6,088.9	871.7	50.5	873.1	0.72	0.63	
6,291.0	1.50	49.00	6,181.9	873.3	51.8	874.8	0.68	0.43	
6,387.0	1.60	25.40	6,277.8	875.3	53.3	876.9	0.67	0.10	
6,481.0	1.60	44.60	6,371.8	877.4	54.8	879.1	0.57	0.00	
6,575.0	0.70	7.90	6,465.8	878.9	55.8	880.7	1.19	-0.96	
6,669.0	1.00	349.60	6,559.8	880.3	55.7	882.0	0.43	0.32	
6,762.0	1.10	345.50	6,652.7	882.0	55.4	883.7	0.13	0.11	
6,855.0	1.10	328.00	6,745.7	883.6	54.7	885.2	0.36	0.00	
6,949.0	1.00	349.70	6,839.7	885.1	54.0	886.8	0.43	-0.11	
7,041.0	1.20	341.40	6,931.7	886.8	53.6	888.5	0.28	0.22	
7,135.0	1.80	351.30	7,025.7	889.2	53.0	890.8	0.69	0.64	
7,230.0	0.70	318.50	7,120.6	891.2	52.4	892.7	1.34	-1.16	
7,323.0	1.10	259.40	7,213.6	891.4	51.2	892.9	1.03	0.43	
7,417.0	1.60	286.80	7,307.6	891.6	49.0	893.0	0.85	0.53	
7,510.0	1.80	282.90	7,400.6	892.3	46.4	893.5	0.25	0.22	
7,603.0	2.10	278.40	7,493.5	892.9	43.3	893.9	0.36	0.32	
7,697.0	2.80	273.60	7,587.4	893.3	39.3	894.1	0.78	0.74	
7,792.0	2.90	269.70	7,682.3	893.4	34.5	894.0	0.23	0.11	
7,885.0	2.70	281.10	7,775.2	893.8	30.0	894.1	0.63	-0.22	
7,965.0	2.50	295.60	7,855.1	895.0	26.6	895.1	0.86	-0.25	Last CES Survey @ 7,965' MD
8,020.0	2.50	295.60	7,910.1	896.0	24.5	896.0	0.00	0.00	PTB @ 8,020'

### 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									
Dejour Federal 14/15-5-:	0.00	0.00	13,003.0	864.4	48.0	1,073,527.56	2,421,024.02	39.516788	-107.552281
- actual wellpath misses target center by 5093.1usft at 8020.0usft MD (7910.1 TVD, 896.0 N, 24.5 E)									
- Circle (radius 100.0)									
Coachman Federal 14/1	0.00	0.00	7,870.0	864.4	48.0	1,073,527.56	2,421,024.02	39.516788	-107.552281
- actual wellpath misses target center by 40.1usft at 7965.0usft MD (7855.1 TVD, 895.0 N, 26.6 E)									
- Circle (radius 100.0)									
Coachman Federal 14/1	0.00	0.00	7,502.0	864.4	48.0	1,073,527.56	2,421,024.02	39.516788	-107.552281
- actual wellpath misses target center by 28.9usft at 7611.2usft MD (7501.7 TVD, 892.9 N, 43.0 E)									
- Circle (radius 100.0)									

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,965.0	7,855.1	895.0	26.6	Last CES Survey @ 7,965' MD
8,020.0	7,910.1	896.0	24.5	PTB @ 8,020'

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

# **Coachman Energy Operating Company, LLC**

**Garfield County, CO**

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

**Coachman Energy Federal 14/15-5-21**

**DD**

**Design: FINAL**

## **Survey Report - Geographic**

**02 December, 2014**

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<b>Well:</b>	Coachman Energy Federal 14/15-5-21	<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 14/15-5-21					
Well Position	+N-S	0.0 usft	Northing:	1,072,664.47 usft	Latitude:	39.514415
	+E-W	0.0 usft	Easting:	2,420,956.07 usft	Longitude:	-107.552451
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	11/5/2014	9.71	65.74	51,966

<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	3.18	

<b>Survey Program</b>	<b>Date</b>	12/2/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
149.0	8,020.0	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	1,072,664.47	2,420,956.07	39.514415	-107.552451
149.0	0.50	194.60	149.0	-0.6	-0.2	1,072,663.84	2,420,955.89	39.514413	-107.552452
180.0	0.50	124.40	180.0	-0.8	-0.1	1,072,663.63	2,420,955.97	39.514413	-107.552452
211.0	0.60	76.30	211.0	-0.9	0.2	1,072,663.59	2,420,956.23	39.514413	-107.552451
243.0	1.50	51.60	243.0	-0.6	0.7	1,072,663.88	2,420,956.73	39.514413	-107.552449
274.0	2.30	28.70	274.0	0.2	1.3	1,072,664.66	2,420,957.37	39.514416	-107.552447
306.0	3.00	33.10	305.9	1.5	2.1	1,072,665.91	2,420,958.16	39.514419	-107.552444
400.0	4.90	31.20	399.7	7.0	5.5	1,072,671.32	2,420,961.71	39.514434	-107.552432
494.0	6.20	35.70	493.3	14.5	10.5	1,072,678.76	2,420,966.93	39.514455	-107.552414
588.0	7.30	26.50	586.6	24.0	16.1	1,072,688.09	2,420,972.77	39.514481	-107.552394
683.0	7.90	18.10	680.8	35.6	20.9	1,072,699.59	2,420,977.76	39.514513	-107.552377
777.0	8.70	15.90	773.8	48.6	24.8	1,072,712.47	2,420,982.01	39.514548	-107.552363

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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 14/15-5-21	<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
871.0	9.80	6.40	866.6	63.4	27.7	1,072,727.19	2,420,985.20	39.514589	-107.552353
965.0	11.90	2.50	958.9	81.0	29.0	1,072,744.79	2,420,986.92	39.514637	-107.552349
1,060.0	13.70	358.60	1,051.5	102.0	29.1	1,072,765.81	2,420,987.56	39.514695	-107.552348
1,153.0	14.80	1.70	1,141.7	124.9	29.2	1,072,788.69	2,420,988.17	39.514758	-107.552348
1,246.0	15.00	2.30	1,231.5	148.8	30.1	1,072,812.56	2,420,989.56	39.514824	-107.552345
1,338.0	16.10	359.60	1,320.2	173.5	30.4	1,072,837.20	2,420,990.52	39.514891	-107.552343
1,432.0	16.00	359.60	1,410.5	199.5	30.3	1,072,863.18	2,420,990.94	39.514963	-107.552344
1,495.0	16.10	358.10	1,471.1	216.9	29.9	1,072,880.60	2,420,990.99	39.515010	-107.552345
1,565.0	17.10	0.80	1,538.1	236.9	29.7	1,072,900.59	2,420,991.28	39.515065	-107.552346
1,660.0	15.80	2.10	1,629.2	263.8	30.4	1,072,927.46	2,420,992.57	39.515139	-107.552344
1,754.0	15.40	1.50	1,719.8	289.0	31.2	1,072,952.70	2,420,993.95	39.515208	-107.552341
1,848.0	15.60	1.50	1,810.4	314.1	31.9	1,072,977.79	2,420,995.19	39.515277	-107.552338
1,943.0	15.40	1.30	1,901.9	339.5	32.5	1,073,003.15	2,420,996.39	39.515347	-107.552336
2,036.0	15.70	1.50	1,991.5	364.4	33.1	1,073,028.05	2,420,997.58	39.515416	-107.552334
2,131.0	15.50	1.50	2,083.0	390.0	33.8	1,073,053.57	2,420,998.84	39.515486	-107.552332
2,225.0	15.10	0.10	2,173.7	414.8	34.1	1,073,078.35	2,420,999.76	39.515554	-107.552330
2,319.0	16.50	3.00	2,264.1	440.4	34.8	1,073,103.91	2,421,001.07	39.515624	-107.552328
2,414.0	16.60	2.60	2,355.2	467.4	36.1	1,073,130.90	2,421,003.02	39.515698	-107.552323
2,507.0	16.60	0.80	2,444.3	493.9	36.9	1,073,157.43	2,421,004.42	39.515771	-107.552320
2,603.0	15.40	2.20	2,536.6	520.4	37.6	1,073,183.85	2,421,005.72	39.515844	-107.552318
2,697.0	15.30	1.30	2,627.2	545.3	38.4	1,073,208.70	2,421,007.05	39.515912	-107.552315
2,792.0	15.40	1.40	2,718.9	570.4	39.0	1,073,233.82	2,421,008.23	39.515981	-107.552313
2,886.0	15.50	1.50	2,809.5	595.4	39.6	1,073,258.83	2,421,009.44	39.516050	-107.552311
2,981.0	14.40	1.10	2,901.2	619.9	40.2	1,073,283.31	2,421,010.57	39.516117	-107.552309
3,076.0	14.00	359.90	2,993.3	643.2	40.4	1,073,306.61	2,421,011.31	39.516181	-107.552308
3,171.0	14.10	0.80	3,085.5	666.3	40.5	1,073,329.66	2,421,011.99	39.516244	-107.552308
3,266.0	15.30	2.40	3,177.4	690.4	41.2	1,073,353.73	2,421,013.23	39.516310	-107.552305
3,360.0	15.10	2.20	3,268.1	715.0	42.2	1,073,378.33	2,421,014.79	39.516378	-107.552302
3,455.0	15.60	1.50	3,359.7	740.2	43.0	1,073,403.44	2,421,016.18	39.516447	-107.552299
3,550.0	15.70	1.70	3,451.2	765.8	43.7	1,073,429.03	2,421,017.49	39.516517	-107.552296
3,645.0	14.70	1.50	3,542.9	790.7	44.4	1,073,453.90	2,421,018.76	39.516586	-107.552294
3,740.0	12.70	5.50	3,635.2	813.1	45.7	1,073,476.31	2,421,020.60	39.516647	-107.552289
3,835.0	9.90	2.70	3,728.3	831.7	47.1	1,073,494.83	2,421,022.41	39.516698	-107.552284
3,930.0	8.40	0.70	3,822.1	846.8	47.6	1,073,509.92	2,421,023.23	39.516740	-107.552283
4,024.0	5.10	0.60	3,915.4	857.8	47.7	1,073,520.96	2,421,023.61	39.516770	-107.552282
4,120.0	3.90	357.10	4,011.1	865.4	47.6	1,073,528.48	2,421,023.67	39.516791	-107.552283
4,214.0	0.80	355.60	4,105.0	869.2	47.4	1,073,532.34	2,421,023.55	39.516801	-107.552283
4,309.0	1.10	21.00	4,200.0	870.7	47.6	1,073,533.84	2,421,023.86	39.516805	-107.552282
4,405.0	1.20	68.30	4,296.0	871.9	48.9	1,073,535.04	2,421,025.15	39.516809	-107.552278
4,500.0	0.60	172.00	4,391.0	871.8	49.9	1,073,534.90	2,421,026.14	39.516808	-107.552274
4,594.0	0.60	184.50	4,485.0	870.8	49.9	1,073,533.92	2,421,026.15	39.516806	-107.552274
4,690.0	0.40	208.00	4,581.0	870.0	49.7	1,073,533.13	2,421,025.93	39.516803	-107.552275
4,784.0	0.04	99.70	4,675.0	869.7	49.6	1,073,532.83	2,421,025.80	39.516803	-107.552275
4,878.0	0.30	317.20	4,769.0	869.9	49.5	1,073,533.01	2,421,025.67	39.516803	-107.552276
4,972.0	0.30	336.80	4,863.0	870.3	49.2	1,073,533.42	2,421,025.42	39.516804	-107.552277
5,067.0	0.60	48.70	4,958.0	870.9	49.5	1,073,533.97	2,421,025.71	39.516806	-107.552276
5,161.0	0.70	52.60	5,052.0	871.6	50.3	1,073,534.63	2,421,026.55	39.516808	-107.552273
5,256.0	1.50	40.90	5,147.0	872.9	51.6	1,073,535.89	2,421,027.85	39.516811	-107.552268
5,351.0	1.00	109.40	5,241.9	873.5	53.2	1,073,536.52	2,421,029.46	39.516813	-107.552263
5,445.0	0.80	121.10	5,335.9	872.9	54.5	1,073,535.88	2,421,030.78	39.516811	-107.552258
5,538.0	0.40	302.20	5,428.9	872.7	54.8	1,073,535.71	2,421,031.06	39.516811	-107.552257
5,632.0	0.80	267.50	5,522.9	872.9	53.9	1,073,535.88	2,421,030.13	39.516811	-107.552260
5,726.0	0.90	217.50	5,616.9	872.3	52.8	1,073,535.29	2,421,029.01	39.516810	-107.552264
5,820.0	0.80	221.10	5,710.9	871.2	51.9	1,073,534.23	2,421,028.11	39.516807	-107.552267
5,915.0	0.60	232.50	5,805.9	870.4	51.1	1,073,533.44	2,421,027.26	39.516804	-107.552270



# Cathedral Energy Services

## Survey Report - Geographic

<b>Company:</b>	Coachman Energy Operating Company, LLC	<b>Local Co-ordinate Reference:</b>	Well Coachman Energy Federal 14/15-5-21
<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 14/15-5-21	<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
6,008.0	0.40	263.70	5,898.9	870.1	50.3	1,073,533.13	2,421,026.54	39.516804	-107.552273
6,103.0	0.50	2.00	5,993.9	870.4	50.0	1,073,533.51	2,421,026.24	39.516805	-107.552274
6,198.0	1.10	27.10	6,088.9	871.7	50.5	1,073,534.73	2,421,026.69	39.516808	-107.552272
6,291.0	1.50	49.00	6,181.9	873.3	51.8	1,073,536.29	2,421,028.06	39.516812	-107.552268
6,387.0	1.60	25.40	6,277.8	875.3	53.3	1,073,538.29	2,421,029.63	39.516818	-107.552262
6,481.0	1.60	44.60	6,371.8	877.4	54.8	1,073,540.38	2,421,031.16	39.516824	-107.552257
6,575.0	0.70	7.90	6,465.8	878.9	55.8	1,073,541.86	2,421,032.19	39.516828	-107.552254
6,669.0	1.00	349.60	6,559.8	880.3	55.7	1,073,543.23	2,421,032.16	39.516832	-107.552254
6,762.0	1.10	345.50	6,652.7	882.0	55.4	1,073,544.90	2,421,031.82	39.516836	-107.552255
6,855.0	1.10	328.00	6,745.7	883.6	54.7	1,073,546.54	2,421,031.17	39.516841	-107.552258
6,949.0	1.00	349.70	6,839.7	885.1	54.0	1,073,548.13	2,421,030.58	39.516845	-107.552260
7,041.0	1.20	341.40	6,931.7	886.8	53.6	1,073,549.84	2,421,030.17	39.516850	-107.552261
7,135.0	1.80	351.30	7,025.7	889.2	53.0	1,073,552.24	2,421,029.68	39.516856	-107.552263
7,230.0	0.70	318.50	7,120.6	891.2	52.4	1,073,554.17	2,421,029.12	39.516861	-107.552265
7,323.0	1.10	259.40	7,213.6	891.4	51.2	1,073,554.46	2,421,027.87	39.516862	-107.552270
7,417.0	1.60	286.80	7,307.6	891.6	49.0	1,073,554.72	2,421,025.73	39.516863	-107.552277
7,510.0	1.80	282.90	7,400.6	892.3	46.4	1,073,555.48	2,421,023.08	39.516865	-107.552287
7,603.0	2.10	278.40	7,493.5	892.9	43.3	1,073,556.13	2,421,019.99	39.516866	-107.552298
7,697.0	2.80	273.60	7,587.4	893.3	39.3	1,073,556.62	2,421,016.00	39.516867	-107.552312
7,792.0	2.90	269.70	7,682.3	893.4	34.5	1,073,556.86	2,421,011.29	39.516868	-107.552329
7,885.0	2.70	281.10	7,775.2	893.8	30.0	1,073,557.37	2,421,006.80	39.516869	-107.552345
7,965.0	2.50	295.60	7,855.1	895.0	26.6	1,073,558.57	2,421,003.40	39.516872	-107.552357
<b>Last CES Survey @ 7,965' MD</b>									
8,020.0	2.50	295.60	7,910.1	896.0	24.5	1,073,559.65	2,421,001.26	39.516875	-107.552365
<b>PTB @ 8,020'</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	7,870.0	864.4	48.0	1,073,527.56	2,421,024.03	39.516788	-107.552281
- actual wellpath misses target center by 40.1usft at 7965.0usft MD (7855.1 TVD, 895.0 N, 26.6 E)									
- Circle (radius 100.0)									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
7,965.0	7,855.1	895.0	26.6	Last CES Survey @ 7,965' MD	
8,020.0	7,910.1	896.0	24.5	PTB @ 8,020'	

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