



Project: Niobrara CON'83
County: Weld
Site: Timbro Ranch 3&34 Pad
Well: 1-34-10-59
Wellbore: 1-34-10-59 OH
Design: 1-34-10-59 OH



TITAN
Directional Drilling

CASING DETAILS

TVD	MD	Name	Size
1795.18	1799.00	9 5/8"	9.62
6173.33	6339.00	7"	7.00

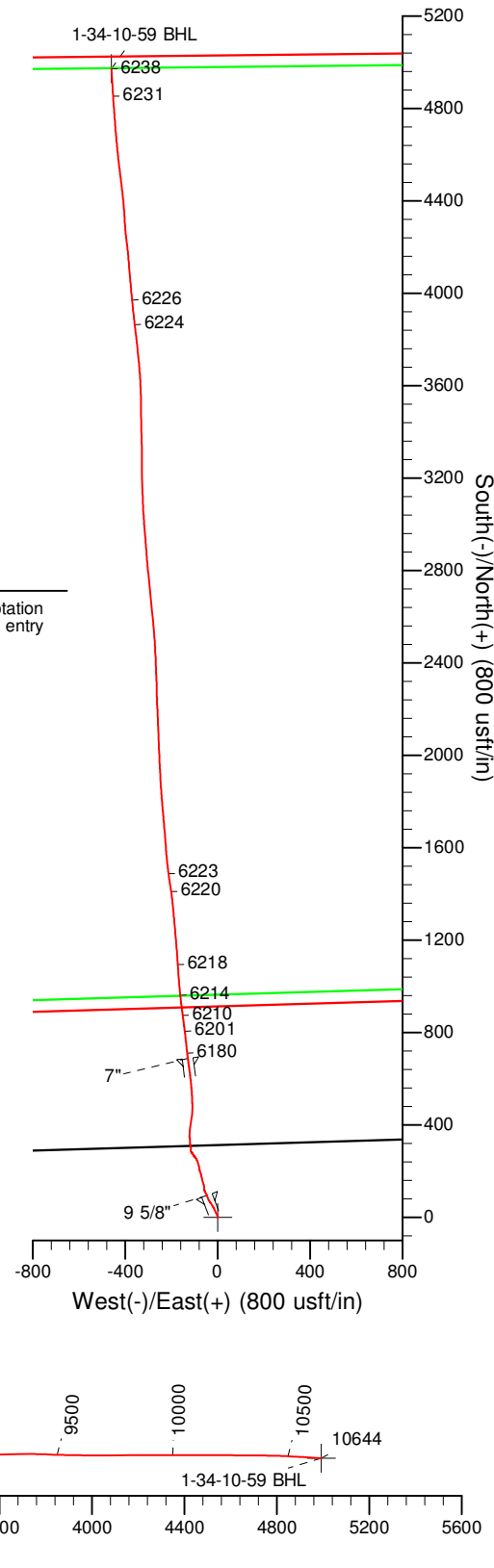
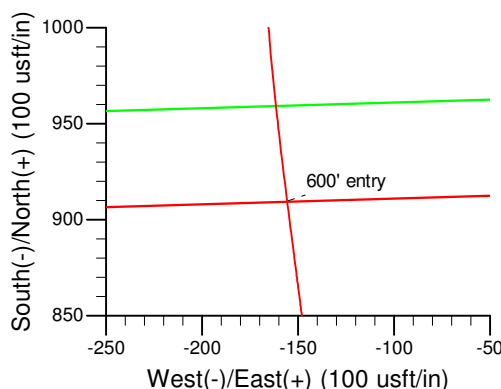


Azimuths to Grid North
True North: -0.99°
Magnetic North: 6.99°

Magnetic Field
Strength: 53043.6snT
Dip Angle: 67.36°
Date: 12/08/2014
Model: IGRF2010

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	Annotation
6212.06	6566.00	87.32	352.89	909.61	-155.65	600' entry



LOCATION CALLS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
1-34-10-59 SHL	0.00	0.00	0.00	1532959.63	3425521.39	40° 47' 10.45 N	103° 57' 47.95 W
1-34-10-59 BHL	6238.38	4973.16	-460.15	1537932.79	3425061.24	40° 47' 59.67 N	103° 57' 52.82 W

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 1-34-10-59 - Slot 1-34
Project:	Niobrara CON'83	TVD Reference:	WELL @ 5082.00usft (Original Well Elev)
Site:	Timbro Ranch 3&34 Pad	MD Reference:	WELL @ 5082.00usft (Original Well Elev)
Well:	1-34-10-59	North Reference:	Grid
Wellbore:	1-34-10-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	1-34-10-59 OH	Database:	EDM 5000.1 Single User Db

Project	Niobrara CON'83,		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site	Timbro Ranch 3&34 Pad, Centered on 2-34-10-59		
Site Position:		Northing:	1,532,965.70 usft
From:	Map	Easting:	3,425,550.75 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	40° 47' 10.51 N
		Longitude:	103° 57' 47.57 W
		Grid Convergence:	0.99 °

Well	1-34-10-59 - Slot 1-34		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	5,082.00 usft
		Latitude:	40° 47' 10.45 N
		Longitude:	103° 57' 47.95 W
		Ground Level:	5,065.00 usft

Wellbore	1-34-10-59 OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	12/08/14	7.98
			Dip Angle
			(°)
			67.36
			Field Strength
			(nT)
			53,044

Design	1-34-10-59 OH		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			356.43

Survey Program	Date	12/29/14		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
141.00	10,579.00	Survey #1 (1-34-10-59 OH)	MWD	MWD - Standard
10,644.00	10,644.00	Projection (1-34-10-59 OH)	ZERO-ERROR	Zero Error

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100ft)	(°/100ft)	(°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
141.00	0.40	163.90	141.00	-0.47	0.14	-0.48	0.28	0.28	0.00	
234.00	1.60	44.00	233.99	0.15	1.13	0.08	1.97	1.29	-128.92	
325.00	1.90	332.40	324.95	2.40	1.31	2.31	2.27	0.33	-78.68	
417.00	3.60	335.30	416.85	6.38	-0.60	6.40	1.85	1.85	3.15	
507.00	4.00	334.10	506.65	11.77	-3.15	11.94	0.45	0.44	-1.33	
598.00	4.30	334.30	597.41	17.70	-6.02	18.04	0.33	0.33	0.22	
689.00	4.40	334.40	688.15	23.92	-9.01	24.43	0.11	0.11	0.11	
780.00	4.30	333.50	778.88	30.12	-12.04	30.81	0.13	-0.11	-0.99	
871.00	4.20	336.20	869.63	36.22	-14.90	37.08	0.25	-0.11	2.97	

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 1-34-10-59 - Slot 1-34
Project:	Niobrara CON'83	TVD Reference:	WELL @ 5082.00usft (Original Well Elev)
Site:	Timbro Ranch 3&34 Pad	MD Reference:	WELL @ 5082.00usft (Original Well Elev)
Well:	1-34-10-59	North Reference:	Grid
Wellbore:	1-34-10-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	1-34-10-59 OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
962.00	4.00	334.50	960.40	42.14	-17.62	43.15	0.26	-0.22	-1.87
1,053.00	3.90	328.20	1,051.19	47.63	-20.61	48.82	0.49	-0.11	-6.92
1,143.00	3.50	327.20	1,141.00	52.54	-23.71	53.92	0.45	-0.44	-1.11
1,234.00	3.50	327.00	1,231.83	57.21	-26.73	58.76	0.01	0.00	-0.22
1,324.00	3.60	324.70	1,321.66	61.82	-29.86	63.55	0.19	0.11	-2.56
1,416.00	4.70	324.80	1,413.41	67.25	-33.70	69.22	1.20	1.20	0.11
1,508.00	5.10	330.50	1,505.08	73.89	-37.89	76.11	0.68	0.43	6.20
1,592.00	4.70	336.60	1,588.77	80.30	-41.09	82.70	0.78	-0.48	7.26
1,678.00	4.30	342.20	1,674.51	86.60	-43.48	89.14	0.69	-0.47	6.51
1,762.00	4.20	341.80	1,758.27	92.52	-45.40	95.17	0.12	-0.12	-0.48
1,799.00	4.20	339.08	1,795.18	95.07	-46.31	97.77	0.54	-0.01	-7.35
9 5/8"									
1,830.00	4.20	336.80	1,826.09	97.18	-47.16	99.93	0.54	0.01	-7.35
1,915.00	4.10	329.70	1,910.87	102.66	-49.92	105.57	0.62	-0.12	-8.35
2,000.00	3.80	332.40	1,995.67	107.78	-52.76	110.86	0.42	-0.35	3.18
2,085.00	3.30	340.10	2,080.50	112.58	-54.90	115.78	0.81	-0.59	9.06
2,170.00	3.60	334.60	2,165.35	117.29	-56.87	120.60	0.53	0.35	-6.47
2,255.00	3.60	2.90	2,250.19	122.37	-57.88	125.73	2.07	0.00	33.29
2,341.00	3.30	356.40	2,336.03	127.53	-57.90	130.89	0.57	-0.35	-7.56
2,426.00	3.20	350.60	2,420.90	132.31	-58.44	135.70	0.40	-0.12	-6.82
2,510.00	3.70	346.80	2,504.75	137.27	-59.44	140.70	0.65	0.60	-4.52
2,594.00	3.90	343.30	2,588.56	142.64	-60.88	146.16	0.36	0.24	-4.17
2,679.00	3.80	342.70	2,673.37	148.10	-62.55	151.71	0.13	-0.12	-0.71
2,764.00	3.90	344.90	2,758.18	153.58	-64.14	157.28	0.21	0.12	2.59
2,850.00	4.00	346.30	2,843.97	159.32	-65.62	163.09	0.16	0.12	1.63
2,935.00	4.40	344.60	2,928.74	165.34	-67.18	169.20	0.49	0.47	-2.00
3,020.00	4.40	346.90	3,013.49	171.66	-68.79	175.61	0.21	0.00	2.71
3,104.00	4.20	349.10	3,097.26	177.82	-70.10	181.84	0.31	-0.24	2.62
3,189.00	3.60	350.30	3,182.06	183.51	-71.14	187.58	0.71	-0.71	1.41
3,273.00	2.70	342.00	3,265.93	187.99	-72.19	192.12	1.20	-1.07	-9.88
3,358.00	3.10	337.00	3,350.82	192.01	-73.71	196.22	0.56	0.47	-5.88
3,442.00	3.20	336.70	3,434.70	196.25	-75.53	200.57	0.12	0.12	-0.36
3,527.00	3.50	347.80	3,519.55	200.97	-77.01	205.37	0.84	0.35	13.06
3,612.00	4.90	347.60	3,604.32	207.05	-78.34	211.52	1.65	1.65	-0.24
3,697.00	6.10	349.80	3,688.93	215.04	-79.92	219.60	1.43	1.41	2.59
3,782.00	5.60	348.90	3,773.49	223.55	-81.52	228.20	0.60	-0.59	-1.06
3,866.00	5.40	341.60	3,857.10	231.33	-83.55	236.08	0.87	-0.24	-8.69
3,951.00	5.50	340.80	3,941.72	238.97	-86.16	243.87	0.15	0.12	-0.94
4,035.00	5.00	338.60	4,025.36	246.18	-88.82	251.23	0.64	-0.60	-2.62
4,120.00	4.10	329.50	4,110.10	252.24	-91.71	257.47	1.35	-1.06	-10.71
4,205.00	4.90	327.20	4,194.83	257.91	-95.22	263.34	0.96	0.94	-2.71
4,291.00	4.60	318.60	4,280.54	263.59	-99.49	269.27	0.90	-0.35	-10.00
4,376.00	3.60	315.70	4,365.32	268.06	-103.61	273.99	1.20	-1.18	-3.41

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 1-34-10-59 - Slot 1-34
Project:	Niobrara CON'83	TVD Reference:	WELL @ 5082.00usft (Original Well Elev)
Site:	Timbro Ranch 3&34 Pad	MD Reference:	WELL @ 5082.00usft (Original Well Elev)
Well:	1-34-10-59	North Reference:	Grid
Wellbore:	1-34-10-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	1-34-10-59 OH	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,461.00	3.50	337.30	4,450.16	272.36	-106.47	278.46	1.57	-0.12	25.41	
4,546.00	3.30	327.20	4,535.01	276.81	-108.80	283.05	0.74	-0.24	-11.88	
4,632.00	3.10	307.90	4,620.88	280.32	-111.98	286.75	1.27	-0.23	-22.44	
4,717.00	3.80	327.50	4,705.73	284.11	-115.30	290.73	1.60	0.82	23.06	
4,802.00	3.90	357.50	4,790.55	289.37	-116.94	296.09	2.35	0.12	35.29	
4,887.00	3.60	15.80	4,875.37	294.83	-116.34	301.50	1.44	-0.35	21.53	
4,972.00	4.00	356.80	4,960.18	300.35	-115.78	306.98	1.55	0.47	-22.35	
5,057.00	3.90	339.70	5,044.98	306.03	-116.95	312.71	1.39	-0.12	-20.12	
5,142.00	2.90	346.60	5,129.83	310.83	-118.45	317.60	1.27	-1.18	8.12	
5,227.00	4.20	355.50	5,214.67	316.02	-119.19	322.83	1.66	1.53	10.47	
5,312.00	3.20	1.00	5,299.49	321.50	-119.40	328.31	1.25	-1.18	6.47	
5,397.00	4.40	355.20	5,384.30	327.12	-119.63	333.93	1.48	1.41	-6.82	
5,482.00	3.60	358.60	5,469.10	333.04	-119.96	339.86	0.98	-0.94	4.00	
5,567.00	3.20	352.40	5,553.95	338.06	-120.34	344.89	0.64	-0.47	-7.29	
5,651.00	2.20	5.10	5,637.85	341.99	-120.51	348.83	1.38	-1.19	15.12	
5,694.00	1.50	321.10	5,680.83	343.25	-120.79	350.10	3.56	-1.63	-102.33	
5,737.00	5.90	350.80	5,723.73	345.87	-121.50	352.76	10.83	10.23	69.07	
5,779.00	10.60	1.70	5,765.29	351.86	-121.73	358.76	11.74	11.19	25.95	
5,822.00	13.50	0.20	5,807.34	360.84	-121.59	367.71	6.78	6.74	-3.49	
5,864.00	17.10	4.40	5,847.85	371.90	-121.10	378.72	8.96	8.57	10.00	
5,905.00	20.80	8.70	5,886.62	385.11	-119.54	391.81	9.64	9.02	10.49	
5,948.00	25.60	9.30	5,926.13	401.84	-116.88	408.33	11.18	11.16	1.40	
5,990.00	30.60	8.30	5,963.17	421.38	-113.87	427.65	11.96	11.90	-2.38	
6,033.00	35.60	5.60	5,999.18	444.68	-111.07	450.74	12.12	11.63	-6.28	
6,075.00	40.20	1.40	6,032.32	470.42	-109.54	476.33	12.55	10.95	-10.00	
6,118.00	45.80	357.80	6,063.76	499.72	-109.79	505.59	14.22	13.02	-8.37	
6,160.00	51.70	356.30	6,091.44	531.24	-111.44	537.15	14.30	14.05	-3.57	
6,203.00	56.90	355.00	6,116.52	566.04	-114.10	572.05	12.34	12.09	-3.02	
6,245.00	61.70	353.70	6,137.96	601.97	-117.66	608.13	11.73	11.43	-3.10	
6,288.00	67.40	352.10	6,156.43	640.48	-122.47	646.86	13.67	13.26	-3.72	
6,308.00	70.40	351.80	6,163.63	658.95	-125.08	665.46	15.07	15.00	-1.50	
6,339.00	73.13	352.70	6,173.33	688.13	-129.05	694.83	9.23	8.81	2.92	
7"										
6,367.00	75.60	353.50	6,180.88	714.89	-132.29	721.74	9.23	8.82	2.84	
6,412.00	77.50	354.10	6,191.34	758.40	-137.01	765.46	4.42	4.22	1.33	
6,457.00	79.50	353.10	6,200.31	802.22	-141.93	809.50	4.95	4.44	-2.22	
6,503.00	83.20	352.50	6,207.23	847.33	-147.63	854.88	8.15	8.04	-1.30	
6,546.00	86.70	352.70	6,211.02	889.80	-153.15	897.61	8.15	8.14	0.47	
6,566.00	87.32	352.89	6,212.06	909.61	-155.65	917.54	3.24	3.10	0.95	
600' entry										
6,588.00	88.00	353.10	6,212.96	931.43	-158.33	939.48	3.24	3.10	0.95	
6,673.00	88.20	355.60	6,215.78	1,015.96	-166.69	1,024.37	2.95	0.24	2.94	
6,757.00	88.60	356.00	6,218.12	1,099.71	-172.84	1,108.33	0.67	0.48	0.48	
6,842.00	90.40	355.40	6,218.86	1,184.46	-179.22	1,193.32	2.23	2.12	-0.71	

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 1-34-10-59 - Slot 1-34
Project:	Niobrara CON'83	TVD Reference:	WELL @ 5082.00usft (Original Well Elev)
Site:	Timbro Ranch 3&34 Pad	MD Reference:	WELL @ 5082.00usft (Original Well Elev)
Well:	1-34-10-59	North Reference:	Grid
Wellbore:	1-34-10-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	1-34-10-59 OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,927.00	90.10	354.80	6,218.49	1,269.15	-186.48	1,278.30	0.79	-0.35	-0.71
7,012.00	89.50	354.50	6,218.79	1,353.78	-194.40	1,363.25	0.79	-0.71	-0.35
7,097.00	87.40	350.90	6,221.09	1,438.04	-205.19	1,448.02	4.90	-2.47	-4.24
7,182.00	88.90	353.50	6,223.83	1,522.20	-216.72	1,532.74	3.53	1.76	3.06
7,267.00	91.70	355.70	6,223.39	1,606.81	-224.72	1,617.68	4.19	3.29	2.59
7,351.00	92.40	355.40	6,220.38	1,690.50	-231.23	1,701.62	0.91	0.83	-0.36
7,436.00	90.40	354.70	6,218.31	1,775.15	-238.57	1,786.56	2.49	-2.35	-0.82
7,521.00	89.10	356.40	6,218.68	1,859.89	-245.16	1,871.55	2.52	-1.53	2.00
7,606.00	89.70	357.10	6,219.57	1,944.75	-249.98	1,956.54	1.08	0.71	0.82
7,690.00	90.40	357.70	6,219.50	2,028.66	-253.79	2,040.53	1.10	0.83	0.71
7,775.00	90.50	358.00	6,218.83	2,113.60	-256.98	2,125.50	0.37	0.12	0.35
7,860.00	89.70	356.90	6,218.68	2,198.51	-260.76	2,210.48	1.60	-0.94	-1.29
7,945.00	90.50	358.90	6,218.53	2,283.45	-263.87	2,295.45	2.53	0.94	2.35
8,030.00	89.10	357.70	6,218.83	2,368.41	-266.40	2,380.40	2.17	-1.65	-1.41
8,114.00	90.20	357.30	6,219.34	2,452.32	-270.06	2,464.38	1.39	1.31	-0.48
8,199.00	88.30	355.10	6,220.45	2,537.12	-275.69	2,549.36	3.42	-2.24	-2.59
8,283.00	89.10	354.20	6,222.36	2,620.73	-283.52	2,633.30	1.43	0.95	-1.07
8,368.00	91.60	354.20	6,221.84	2,705.29	-292.11	2,718.23	2.94	2.94	0.00
8,453.00	91.70	354.30	6,219.39	2,789.83	-300.62	2,803.13	0.17	0.12	0.12
8,538.00	90.60	356.00	6,217.69	2,874.50	-307.81	2,888.09	2.38	-1.29	2.00
8,623.00	89.70	354.90	6,217.46	2,959.23	-314.55	2,973.07	1.67	-1.06	-1.29
8,709.00	90.50	356.60	6,217.31	3,044.99	-320.92	3,059.06	2.18	0.93	1.98
8,794.00	89.50	358.10	6,217.31	3,129.89	-324.85	3,144.05	2.12	-1.18	1.76
8,879.00	89.60	358.20	6,217.98	3,214.85	-327.60	3,229.01	0.17	0.12	0.12
8,964.00	89.30	0.30	6,218.80	3,299.83	-328.71	3,313.90	2.50	-0.35	2.47
9,049.00	88.60	358.80	6,220.36	3,384.81	-329.38	3,398.75	1.95	-0.82	-1.76
9,134.00	88.40	358.50	6,222.58	3,469.76	-331.38	3,483.66	0.42	-0.24	-0.35
9,220.00	91.60	359.70	6,222.58	3,555.74	-332.73	3,569.55	3.97	3.72	1.40
9,305.00	91.80	355.90	6,220.06	3,640.62	-335.99	3,654.48	4.47	0.24	-4.47
9,390.00	88.80	354.10	6,219.61	3,725.28	-343.40	3,739.44	4.12	-3.53	-2.12
9,475.00	87.80	353.50	6,222.13	3,809.75	-352.57	3,824.31	1.37	-1.18	-0.71
9,560.00	88.70	353.70	6,224.73	3,894.18	-362.04	3,909.16	1.08	1.06	0.24
9,645.00	89.50	354.30	6,226.07	3,978.70	-370.93	3,994.08	1.18	0.94	0.71
9,730.00	90.40	355.40	6,226.14	4,063.35	-378.56	4,079.04	1.67	1.06	1.29
9,815.00	90.60	354.90	6,225.40	4,148.05	-385.74	4,164.02	0.63	0.24	-0.59
9,900.00	90.00	352.80	6,224.95	4,232.55	-394.85	4,248.92	2.57	-0.71	-2.47
9,985.00	90.30	357.10	6,224.73	4,317.20	-402.33	4,333.87	5.07	0.35	5.06
10,070.00	89.80	354.40	6,224.66	4,401.96	-408.63	4,418.86	3.23	-0.59	-3.18
10,154.00	90.40	352.70	6,224.51	4,485.42	-418.06	4,502.75	2.15	0.71	-2.02
10,239.00	88.70	353.40	6,225.18	4,569.79	-428.35	4,587.60	2.16	-2.00	0.82
10,324.00	90.20	354.70	6,225.99	4,654.33	-437.16	4,672.52	2.34	1.76	1.53
10,409.00	89.20	355.70	6,226.44	4,739.02	-444.27	4,757.49	1.66	-1.18	1.18
10,494.00	86.90	356.10	6,229.33	4,823.75	-450.34	4,842.43	2.75	-2.71	0.47

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 1-34-10-59 - Slot 1-34
Project:	Niobrara CON'83	TVD Reference:	WELL @ 5082.00usft (Original Well Elev)
Site:	Timbro Ranch 3&34 Pad	MD Reference:	WELL @ 5082.00usft (Original Well Elev)
Well:	1-34-10-59	North Reference:	Grid
Wellbore:	1-34-10-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	1-34-10-59 OH	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
10,579.00	86.40	356.30	6,234.30	4,908.42	-455.97	4,927.29	0.63	-0.59	0.24	
10,644.00	86.40	356.30	6,238.38	4,973.16	-460.15	4,992.16	0.00	0.00	0.00	

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (in)	Hole Diameter (in)
1,799.00	1,795.18	9 5/8"		9.63	12.25
6,339.00	6,173.33	7"		7.00	8.75

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
6,566.00	6,212.06	909.61	-155.65	600' entry	