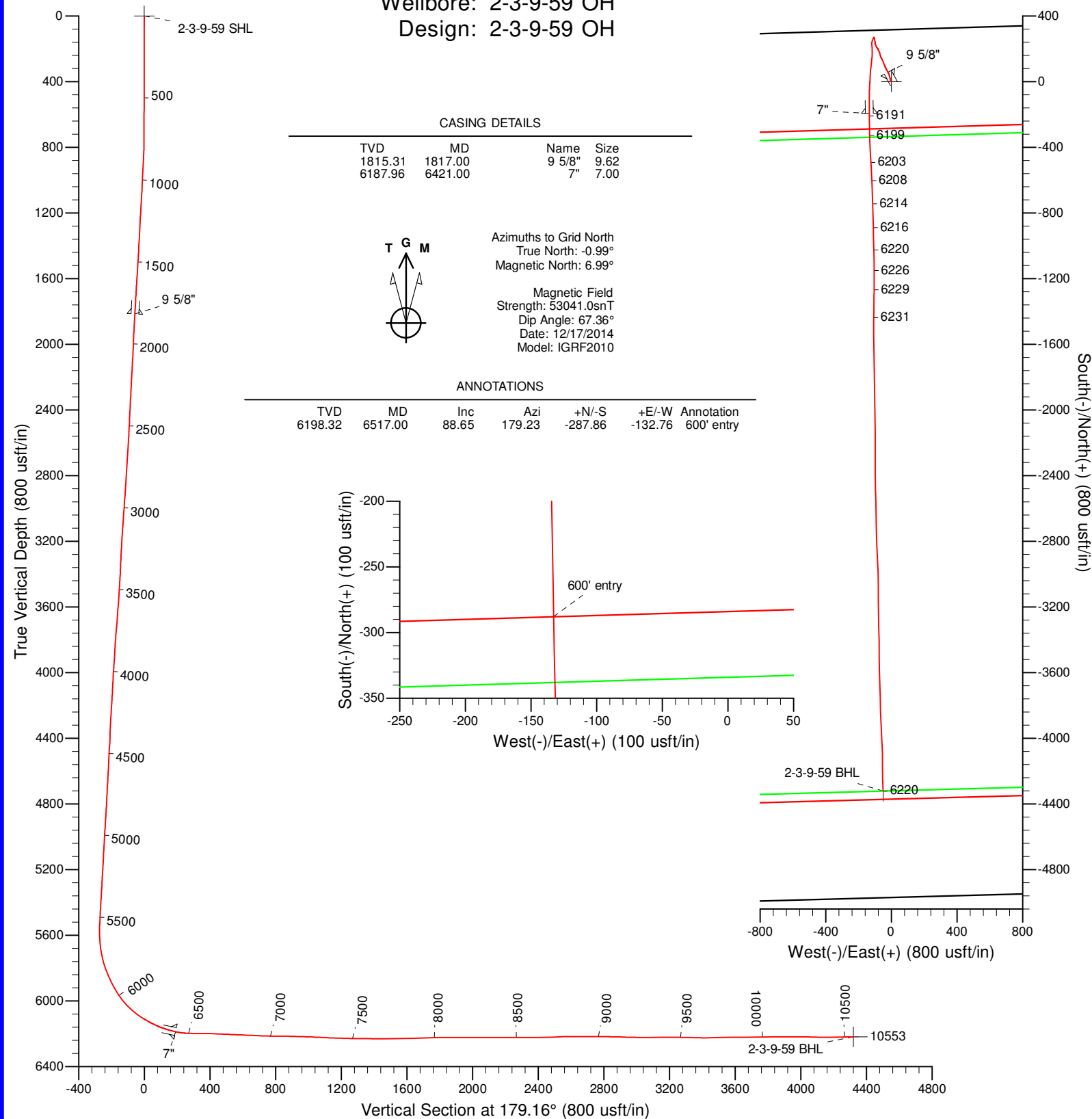




Project: Niobrara CON'83
County: Weld
Site: Timbro Ranch 3&34 Pad
Well: 2-3-9-59
Wellbore: 2-3-9-59 OH
Design: 2-3-9-59 OH



CASING DETAILS

TVD	MD	Name	Size
1815.31	1817.00	9 5/8"	9.62
6187.96	6421.00	7"	7.00



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

Magnetic Field
Strength: 53041.0snT
Dip Angle: 67.36°
Date: 12/17/2014
Model: IGRF2010

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	Annotation
6198.32	6517.00	88.65	179.23	-287.86	-132.76	600' entry

LOCATION CALLS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
2-3-9-59 SHL	0.00	0.00	0.00	1532956.55	3425506.71	40° 47' 10.43 N	103° 57' 48.15 W
2-3-9-59 BHL	6219.66	-4321.43	-49.98	1528635.12	3425456.73	40° 46' 27.74 N	103° 57' 49.77 W

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 2-3-9-59 - Slot 2-3
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:	2-3-9-59	North Reference:	Grid
Wellbore:	2-3-9-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	2-3-9-59 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	2-3-9-59 - Slot 2-3		
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' 10.43 N
		Longitude:	103° 57' 48.15 W
		Ground Level:	5,065.00 usft

Wellbore	2-3-9-59 OH		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2010	12/17/14	7.98
			Dip Angle (°)
			67.36
			Field Strength (nT)
			53,041

Design	2-3-9-59 OH		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.00	0.00	0.00
			Direction (°)
			179.16

Survey Program	Date	12/29/14		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
141.00	10,493.00	Survey #1 (2-3-9-59 OH)	MWD	MWD - Standard
10,553.00	10,553.00	Project (2-3-9-59 OH)	ZERO-ERROR	Zero Error

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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
141.00	0.50	289.90	141.00	0.21	-0.58	-0.22	0.35	0.35	0.00	
235.00	0.40	317.90	235.00	0.59	-1.18	-0.61	0.25	-0.11	29.79	
326.00	0.50	278.20	325.99	0.88	-1.79	-0.91	0.35	0.11	-43.63	
417.00	0.60	271.90	416.99	0.96	-2.66	-1.00	0.13	0.11	-6.92	
508.00	0.30	302.40	507.99	1.10	-3.34	-1.15	0.41	-0.33	33.52	
599.00	0.50	323.00	598.98	1.55	-3.78	-1.60	0.27	0.22	22.64	
690.00	0.40	322.40	689.98	2.11	-4.21	-2.18	0.11	-0.11	-0.66	
781.00	0.30	340.40	780.98	2.59	-4.48	-2.66	0.16	-0.11	19.78	
872.00	2.80	348.20	871.94	4.99	-5.02	-5.06	2.75	2.75	8.57	

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 2-3-9-59 - Slot 2-3
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:	2-3-9-59 OH	North Reference:	Grid
Wellbore:	2-3-9-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	2-3-9-59 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)
963.00	3.10	352.20	962.82	9.60	-5.81	-9.69	0.40	0.33	4.40
1,054.00	2.90	352.70	1,053.69	14.33	-6.43	-14.42	0.22	-0.22	0.55
1,144.00	3.50	346.70	1,143.55	19.26	-7.35	-19.36	0.76	0.67	-6.67
1,234.00	3.30	344.10	1,233.39	24.42	-8.70	-24.55	0.28	-0.22	-2.89
1,325.00	3.10	343.60	1,324.25	29.30	-10.11	-29.45	0.22	-0.22	-0.55
1,417.00	2.90	344.20	1,416.13	33.93	-11.44	-34.09	0.22	-0.22	0.65
1,509.00	3.70	346.00	1,507.97	39.05	-12.80	-39.23	0.88	0.87	1.96
1,594.00	3.90	344.90	1,592.79	44.50	-14.21	-44.70	0.25	0.24	-1.29
1,678.00	3.60	329.20	1,676.61	49.52	-16.31	-49.76	1.27	-0.36	-18.69
1,763.00	3.90	328.40	1,761.43	54.28	-19.19	-54.55	0.36	0.35	-0.94
1,785.00	3.70	328.10	1,783.38	55.52	-19.96	-55.80	0.91	-0.91	-1.36
1,817.00	3.56	331.79	1,815.31	57.27	-20.97	-57.57	0.86	-0.45	11.54
9 5/8"									
1,831.00	3.50	333.50	1,829.29	58.03	-21.37	-58.34	0.86	-0.41	12.19
1,916.00	3.30	337.70	1,914.14	62.62	-23.45	-62.96	0.38	-0.24	4.94
2,001.00	3.00	330.30	1,999.01	66.81	-25.48	-67.18	0.59	-0.35	-8.71
2,085.00	2.90	329.20	2,082.90	70.55	-27.66	-70.95	0.14	-0.12	-1.31
2,169.00	3.70	335.30	2,166.76	74.84	-29.88	-75.27	1.04	0.95	7.26
2,254.00	3.10	336.20	2,251.61	79.43	-31.95	-79.89	0.71	-0.71	1.06
2,339.00	3.20	329.70	2,336.48	83.58	-34.08	-84.07	0.44	0.12	-7.65
2,425.00	3.10	337.70	2,422.35	87.81	-36.17	-88.33	0.52	-0.12	9.30
2,510.00	3.20	327.40	2,507.22	91.93	-38.32	-92.48	0.68	0.12	-12.12
2,595.00	3.80	338.50	2,592.07	96.55	-40.63	-97.14	1.06	0.71	13.06
2,680.00	3.70	338.40	2,676.88	101.72	-42.67	-102.34	0.12	-0.12	-0.12
2,764.00	3.80	338.90	2,760.70	106.84	-44.67	-107.48	0.13	0.12	0.60
2,849.00	4.10	339.70	2,845.50	112.32	-46.74	-112.99	0.36	0.35	0.94
2,934.00	4.10	339.00	2,930.28	118.00	-48.89	-118.71	0.06	0.00	-0.82
3,019.00	4.40	338.00	3,015.05	123.86	-51.20	-124.60	0.36	0.35	-1.18
3,104.00	4.40	336.80	3,099.80	129.88	-53.70	-130.66	0.11	0.00	-1.41
3,189.00	3.90	333.90	3,184.58	135.48	-56.26	-136.29	0.64	-0.59	-3.41
3,274.00	3.30	334.00	3,269.41	140.27	-58.60	-141.11	0.71	-0.71	0.12
3,359.00	2.80	324.00	3,354.29	144.15	-60.90	-145.03	0.86	-0.59	-11.76
3,443.00	3.70	332.20	3,438.15	148.21	-63.37	-149.12	1.20	1.07	9.76
3,528.00	4.10	342.60	3,522.96	153.53	-65.55	-154.48	0.95	0.47	12.24
3,613.00	4.40	345.40	3,607.72	159.59	-67.28	-160.56	0.43	0.35	3.29
3,698.00	4.70	346.80	3,692.46	166.13	-68.90	-167.13	0.38	0.35	1.65
3,782.00	4.40	346.80	3,776.19	172.62	-70.42	-173.63	0.36	-0.36	0.00
3,866.00	3.90	337.40	3,859.97	178.39	-72.26	-179.44	1.00	-0.60	-11.19
3,952.00	3.80	334.20	3,945.78	183.66	-74.62	-184.73	0.28	-0.12	-3.72
4,037.00	3.70	337.80	4,030.59	188.74	-76.88	-189.84	0.30	-0.12	4.24
4,122.00	3.40	331.00	4,115.43	193.48	-79.14	-194.62	0.61	-0.35	-8.00
4,206.00	3.90	339.50	4,199.26	198.33	-81.35	-199.51	0.88	0.60	10.12
4,291.00	3.60	322.70	4,284.08	203.16	-83.98	-204.37	1.33	-0.35	-19.76

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 2-3-9-59 - Slot 2-3
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:	2-3-9-59	North Reference:	Grid
Wellbore:	2-3-9-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	2-3-9-59 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)
4,375.00	3.50	307.20	4,367.92	206.81	-87.62	-208.08	1.15	-0.12	-18.45
4,460.00	3.40	338.70	4,452.78	210.73	-90.60	-212.04	2.21	-0.12	37.06
4,545.00	3.40	329.40	4,537.63	215.25	-92.80	-216.59	0.65	0.00	-10.94
4,630.00	3.30	348.00	4,622.49	219.81	-94.59	-221.17	1.28	-0.12	21.88
4,715.00	3.10	340.60	4,707.35	224.37	-95.86	-225.75	0.54	-0.24	-8.71
4,801.00	3.70	320.10	4,793.20	228.69	-98.42	-230.11	1.56	0.70	-23.84
4,886.00	3.90	12.70	4,878.04	233.62	-99.54	-235.05	3.96	0.24	61.88
4,971.00	3.30	357.90	4,962.88	238.88	-98.99	-240.31	1.30	-0.71	-17.41
5,056.00	3.30	346.20	5,047.74	243.70	-99.67	-245.14	0.79	0.00	-13.76
5,141.00	2.80	346.30	5,132.61	248.10	-100.74	-249.55	0.59	-0.59	0.12
5,226.00	3.70	349.90	5,217.48	252.82	-101.72	-254.28	1.09	1.06	4.24
5,311.00	2.90	356.20	5,302.34	257.66	-102.34	-259.13	1.03	-0.94	7.41
5,397.00	3.80	345.50	5,388.19	262.59	-103.20	-264.08	1.27	1.05	-12.44
5,482.00	2.90	351.60	5,473.04	267.44	-104.22	-268.94	1.14	-1.06	7.18
5,524.00	2.40	349.80	5,515.00	269.36	-104.53	-270.86	1.21	-1.19	-4.29
5,565.00	2.10	350.80	5,555.97	270.95	-104.80	-272.46	0.74	-0.73	2.44
5,608.00	2.20	246.50	5,598.95	271.40	-105.68	-272.92	7.90	0.23	-242.56
5,650.00	5.50	218.10	5,640.85	269.49	-107.66	-271.04	8.84	7.86	-67.62
5,693.00	8.50	207.20	5,683.53	265.04	-110.39	-266.63	7.60	6.98	-25.35
5,736.00	13.40	200.30	5,725.73	257.54	-113.57	-259.17	11.78	11.40	-16.05
5,778.00	16.70	196.10	5,766.29	247.17	-116.94	-248.86	8.27	7.86	-10.00
5,821.00	20.20	185.10	5,807.08	233.83	-119.31	-235.56	11.45	8.14	-25.58
5,863.00	23.90	174.00	5,846.02	218.14	-119.07	-219.86	13.23	8.81	-26.43
5,905.00	26.50	174.30	5,884.02	200.35	-117.24	-202.05	6.20	6.19	0.71
5,948.00	28.90	180.60	5,922.10	180.41	-116.40	-182.09	8.80	5.58	14.65
5,991.00	33.40	184.30	5,958.89	158.20	-117.40	-159.90	11.37	10.47	8.60
6,033.00	38.70	186.40	5,992.84	133.61	-119.73	-135.35	12.96	12.62	5.00
6,076.00	43.00	187.00	6,025.36	105.68	-123.02	-107.47	10.04	10.00	1.40
6,118.00	48.70	185.10	6,054.60	75.72	-126.17	-77.57	13.95	13.57	-4.52
6,161.00	53.70	183.40	6,081.54	42.32	-128.63	-44.20	12.03	11.63	-3.95
6,203.00	57.60	183.20	6,105.23	7.70	-130.63	-9.62	9.29	9.29	-0.48
6,246.00	61.20	183.00	6,127.12	-29.25	-132.63	27.30	8.38	8.37	-0.47
6,289.00	65.10	181.70	6,146.54	-67.57	-134.19	65.60	9.46	9.07	-3.02
6,331.00	69.50	180.30	6,162.74	-106.30	-134.86	104.31	10.92	10.48	-3.33
6,374.00	73.70	179.70	6,176.31	-147.09	-134.86	145.10	9.86	9.77	-1.40
6,389.00	74.60	179.40	6,180.41	-161.52	-134.74	159.53	6.30	6.00	-2.00
6,421.00	78.09	179.11	6,187.96	-192.61	-134.34	190.62	10.93	10.90	-0.91
7"									
6,456.00	81.90	178.80	6,194.04	-227.07	-133.71	225.08	10.93	10.90	-0.88
6,502.00	88.40	179.30	6,197.93	-272.87	-132.95	270.89	14.17	14.13	1.09
6,517.00	88.65	179.23	6,198.32	-287.86	-132.76	285.89	1.73	1.67	-0.48
600' entry									
6,544.00	89.10	179.10	6,198.85	-314.86	-132.37	312.88	1.73	1.67	-0.48
6,587.00	90.10	178.00	6,199.15	-357.84	-131.28	355.88	3.46	2.33	-2.56

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 2-3-9-59 - Slot 2-3
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:	2-3-9-59	North Reference:	Grid
Wellbore:	2-3-9-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	2-3-9-59 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)
6,672.00	87.60	177.10	6,200.85	-442.74	-127.64	440.82	3.13	-2.94	-1.06
6,757.00	87.20	176.40	6,204.71	-527.51	-122.83	525.65	0.95	-0.47	-0.82
6,842.00	87.90	178.20	6,208.34	-612.34	-118.83	610.53	2.27	0.82	2.12
6,927.00	87.00	177.30	6,212.12	-697.18	-115.50	695.42	1.50	-1.06	-1.06
7,011.00	89.50	179.10	6,214.69	-781.09	-112.86	779.36	3.67	2.98	2.14
7,096.00	89.20	178.40	6,215.65	-866.07	-111.01	864.35	0.90	-0.35	-0.82
7,181.00	88.40	177.90	6,217.43	-951.00	-108.26	949.31	1.11	-0.94	-0.59
7,266.00	87.50	178.80	6,220.47	-1,035.91	-105.82	1,034.25	1.50	-1.06	1.06
7,351.00	87.00	179.60	6,224.55	-1,120.81	-104.63	1,119.15	1.11	-0.59	0.94
7,436.00	88.50	180.40	6,227.89	-1,205.74	-104.63	1,204.07	2.00	1.76	0.94
7,521.00	89.80	180.80	6,229.15	-1,290.72	-105.52	1,289.03	1.60	1.53	0.47
7,606.00	88.80	180.70	6,230.19	-1,375.71	-106.64	1,373.99	1.18	-1.18	-0.12
7,690.00	90.00	180.70	6,231.07	-1,459.69	-107.66	1,457.96	1.43	1.43	0.00
7,775.00	91.60	179.30	6,229.88	-1,544.68	-107.66	1,542.94	2.50	1.88	-1.65
7,860.00	90.50	179.20	6,228.32	-1,629.66	-106.55	1,627.92	1.30	-1.29	-0.12
7,945.00	92.50	179.00	6,226.10	-1,714.61	-105.21	1,712.89	2.36	2.35	-0.24
8,029.00	90.70	179.00	6,223.75	-1,798.56	-103.75	1,796.85	2.14	-2.14	0.00
8,114.00	89.60	178.90	6,223.53	-1,883.55	-102.19	1,881.85	1.30	-1.29	-0.12
8,199.00	90.00	179.30	6,223.83	-1,968.54	-100.86	1,966.85	0.67	0.47	0.47
8,284.00	89.80	179.00	6,223.98	-2,053.53	-99.60	2,051.85	0.42	-0.24	-0.35
8,369.00	90.30	180.00	6,223.90	-2,138.52	-98.85	2,136.84	1.32	0.59	1.18
8,453.00	90.40	179.60	6,223.39	-2,222.52	-98.56	2,220.84	0.49	0.12	-0.48
8,538.00	90.20	179.90	6,222.94	-2,307.52	-98.19	2,305.83	0.42	-0.24	0.35
8,622.00	90.00	180.20	6,222.80	-2,391.52	-98.26	2,389.82	0.43	-0.24	0.36
8,707.00	92.30	178.10	6,221.09	-2,476.48	-97.00	2,474.79	3.66	2.71	-2.47
8,792.00	91.40	178.70	6,218.35	-2,561.40	-94.63	2,559.74	1.27	-1.06	0.71
8,877.00	90.60	179.00	6,216.86	-2,646.37	-92.93	2,644.73	1.01	-0.94	0.35
8,963.00	89.30	178.90	6,216.94	-2,732.36	-91.35	2,730.72	1.52	-1.51	-0.12
9,048.00	89.20	177.90	6,218.05	-2,817.31	-88.98	2,815.71	1.18	-0.12	-1.18
9,133.00	88.30	177.10	6,219.91	-2,902.21	-85.27	2,900.65	1.42	-1.06	-0.94
9,218.00	88.60	177.70	6,222.20	-2,987.09	-81.42	2,985.58	0.79	0.35	0.71
9,303.00	91.00	180.20	6,222.50	-3,072.06	-79.86	3,070.56	4.08	2.82	2.94
9,388.00	90.00	179.90	6,221.76	-3,157.06	-79.93	3,155.55	1.23	-1.18	-0.35
9,474.00	89.50	178.90	6,222.14	-3,243.05	-79.03	3,241.55	1.30	-0.58	-1.16
9,559.00	88.50	178.20	6,223.62	-3,328.01	-76.88	3,326.53	1.44	-1.18	-0.82
9,644.00	89.80	179.50	6,224.88	-3,412.98	-75.18	3,411.51	2.16	1.53	1.53
9,729.00	92.20	179.40	6,223.40	-3,497.96	-74.36	3,496.49	2.83	2.82	-0.12
9,814.00	89.80	179.10	6,221.91	-3,582.93	-73.25	3,581.47	2.85	-2.82	-0.35
9,899.00	90.60	177.50	6,221.62	-3,667.89	-70.73	3,666.46	2.10	0.94	-1.88
9,984.00	91.10	178.80	6,220.36	-3,752.83	-67.98	3,751.43	1.64	0.59	1.53
10,069.00	90.50	178.30	6,219.17	-3,837.80	-65.83	3,836.42	0.92	-0.71	-0.59
10,154.00	89.90	177.50	6,218.87	-3,922.74	-62.72	3,921.40	1.18	-0.71	-0.94
10,239.00	89.40	176.10	6,219.39	-4,007.60	-57.97	4,006.32	1.75	-0.59	-1.65

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 2-3-9-59 - Slot 2-3
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:	2-3-9-59	North Reference:	Grid
Wellbore:	2-3-9-59 OH	Survey Calculation Method:	Minimum Curvature
Design:	2-3-9-59 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)	
10,324.00	88.90	179.30	6,220.65	-4,092.51	-54.56	4,091.27	3.81	-0.59	3.76	
10,409.00	90.50	179.90	6,221.10	-4,177.51	-53.97	4,176.27	2.01	1.88	0.71	
10,493.00	90.60	177.80	6,220.29	-4,261.48	-52.28	4,260.26	2.50	0.12	-2.50	
10,553.00	90.60	177.80	6,219.66	-4,321.43	-49.98	4,320.24	0.00	0.00	0.00	

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (in)	Hole Diameter (in)	
1,817.00	1,815.31	9 5/8"	9.62	12.25	
6,421.00	6,187.96	7"	7.00	7.50	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
6,517.00	6,198.32	-287.86	-132.76	600' entry	