



TITAN
Directional Drilling

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 6-25-9-60
Project:	Niobrara CON'83	TVD Reference:	GL+KB @ 4904.00usft (Xtreme 17)
Site:	Shull 25-9-60 Pad	MD Reference:	GL+KB @ 4904.00usft (Xtreme 17)
Well:	6-25-9-60	North Reference:	Grid
Wellbore:	6-25-9-60 OH	Survey Calculation Method:	Minimum Curvature
Design:	6-25-9-60 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	Shull 25-9-60 Pad, Centered on 6-25-9-60		
Site Position:		Northing:	1,506,554.60 usft
From:	Map	Easting:	3,405,828.40 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	40° 42' 52.87 N
		Longitude:	104° 2' 9.59 W
		Grid Convergence:	0.95 °

Well	6-25-9-60		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft		Wellhead Elevation:
			Latitude:
			Longitude:
			Ground Level:

Wellbore	6-25-9-60 OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	12/30/14	8.01
			Dip Angle
			(°)
			Field Strength
			(nT)
			52,995

Design	6-25-9-60 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
			(°)
			358.82

Survey Program	Date	01/20/15		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
143.00	10,569.00	Survey #1 (6-25-9-60 OH)	MWD	MWD - Standard
10,676.00	10,676.00	Survey #2 (6-25-9-60 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
143.00	0.20	200.90	143.00	-0.23	-0.09	-0.23	0.14	0.14	0.00
234.00	2.00	151.10	233.98	-1.77	0.62	-1.78	2.06	1.98	-54.73
326.00	3.30	125.10	325.88	-4.70	3.56	-4.77	1.89	1.41	-28.26
417.00	5.90	121.90	416.58	-8.68	9.68	-8.88	2.87	2.86	-3.52
508.00	6.90	120.40	507.01	-13.92	18.36	-14.29	1.11	1.10	-1.65
599.00	6.90	120.00	597.35	-19.42	27.81	-19.98	0.05	0.00	-0.44
690.00	6.60	120.40	687.72	-24.79	37.06	-25.55	0.33	-0.33	0.44
781.00	6.10	120.60	778.17	-29.90	45.73	-30.84	0.55	-0.55	0.22
872.00	5.30	121.60	868.71	-34.57	53.47	-35.66	0.89	-0.88	1.10

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Wellbore:	6-25-9-60 OH	Survey Calculation Method:	Minimum Curvature
Design:	6-25-9-60 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	7.00	121.60	959.19	-39.67	61.77	-40.94	1.87	1.87	0.00
1,054.00	7.90	125.40	1,049.42	-46.20	71.60	-47.67	1.13	0.99	4.18
1,146.00	7.60	123.20	1,140.58	-53.20	81.84	-54.87	0.46	-0.33	-2.39
1,238.00	6.60	137.40	1,231.88	-60.42	90.51	-62.27	2.19	-1.09	15.43
1,330.00	6.00	143.50	1,323.32	-68.18	96.95	-70.16	0.98	-0.65	6.63
1,418.00	5.70	125.60	1,410.87	-74.42	103.24	-76.53	2.09	-0.34	-20.34
1,452.00	5.70	124.76	1,444.70	-76.36	106.00	-78.53	0.25	0.00	-2.47
9 5/8									
1,499.00	5.70	123.60	1,491.47	-78.99	109.86	-81.23	0.25	0.00	-2.47
1,584.00	5.20	121.40	1,576.09	-83.33	116.66	-85.72	0.64	-0.59	-2.59
1,669.00	6.50	119.40	1,660.64	-87.70	124.14	-90.24	1.55	1.53	-2.35
1,754.00	6.00	119.40	1,745.14	-92.24	132.20	-94.95	0.59	-0.59	0.00
1,839.00	5.00	119.40	1,829.75	-96.24	139.30	-99.09	1.18	-1.18	0.00
1,925.00	5.50	117.10	1,915.39	-99.96	146.24	-102.95	0.63	0.58	-2.67
2,009.00	6.30	117.00	1,998.94	-103.88	153.93	-107.03	0.95	0.95	-0.12
2,094.00	5.90	115.20	2,083.46	-107.86	162.04	-111.18	0.52	-0.47	-2.12
2,179.00	7.20	112.70	2,167.90	-111.78	170.90	-115.27	1.57	1.53	-2.94
2,263.00	7.00	111.90	2,251.26	-115.72	180.51	-119.41	0.27	-0.24	-0.95
2,348.00	6.10	112.60	2,335.70	-119.38	189.48	-123.26	1.06	-1.06	0.82
2,433.00	5.60	106.90	2,420.26	-122.33	197.62	-126.37	0.90	-0.59	-6.71
2,518.00	7.10	109.50	2,504.74	-125.29	206.54	-129.51	1.80	1.76	3.06
2,602.00	6.20	112.60	2,588.17	-128.76	215.62	-133.18	1.15	-1.07	3.69
2,687.00	6.20	111.90	2,672.67	-132.24	224.12	-136.83	0.09	0.00	-0.82
2,772.00	5.90	109.30	2,757.20	-135.39	232.50	-140.16	0.48	-0.35	-3.06
2,857.00	5.80	112.00	2,841.76	-138.45	240.61	-143.37	0.34	-0.12	3.18
2,941.00	5.50	112.10	2,925.35	-141.55	248.27	-146.64	0.36	-0.36	0.12
3,025.00	7.20	108.50	3,008.83	-144.74	256.99	-150.00	2.08	2.02	-4.29
3,110.00	6.80	111.40	3,093.20	-148.26	266.73	-153.73	0.63	-0.47	3.41
3,194.00	5.70	105.80	3,176.70	-151.21	275.37	-156.85	1.50	-1.31	-6.67
3,279.00	4.30	96.70	3,261.37	-152.73	282.60	-158.52	1.89	-1.65	-10.71
3,363.00	5.30	98.70	3,345.08	-153.69	289.56	-159.62	1.21	1.19	2.38
3,448.00	5.50	100.80	3,429.70	-155.05	297.45	-161.14	0.33	0.24	2.47
3,534.00	5.60	101.00	3,515.30	-156.62	305.61	-162.88	0.12	0.12	0.23
3,619.00	6.10	97.80	3,599.85	-158.02	314.16	-164.46	0.70	0.59	-3.76
3,704.00	6.50	97.20	3,684.34	-159.24	323.41	-165.87	0.48	0.47	-0.71
3,789.00	7.10	95.60	3,768.74	-160.35	333.41	-167.19	0.74	0.71	-1.88
3,874.00	7.50	106.60	3,853.06	-162.45	343.95	-169.50	1.71	0.47	12.94
3,958.00	7.40	105.00	3,936.35	-165.42	354.43	-172.69	0.27	-0.12	-1.90
4,043.00	7.00	103.60	4,020.68	-168.05	364.75	-175.53	0.51	-0.47	-1.65
4,128.00	7.00	105.20	4,105.05	-170.63	374.79	-178.31	0.23	0.00	1.88
4,212.00	7.10	101.50	4,188.41	-173.01	384.81	-180.90	0.55	0.12	-4.40
4,297.00	7.60	99.40	4,272.71	-174.97	395.51	-183.08	0.67	0.59	-2.47
4,382.00	8.70	106.60	4,356.85	-177.73	407.21	-186.08	1.76	1.29	8.47

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Wellbore:	6-25-9-60 OH	Survey Calculation Method:	Minimum Curvature
Design:	6-25-9-60 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)
4,466.00	9.90	98.60	4,439.75	-180.62	420.44	-189.24	2.10	1.43	-9.52
4,551.00	9.60	106.70	4,523.53	-183.75	434.46	-192.66	1.65	-0.35	9.53
4,635.00	7.30	118.10	4,606.62	-188.28	445.87	-197.42	3.37	-2.74	13.57
4,720.00	6.60	114.00	4,690.99	-192.81	455.10	-202.14	1.01	-0.82	-4.82
4,805.00	6.40	108.80	4,775.45	-196.32	464.05	-205.84	0.73	-0.24	-6.12
4,890.00	4.90	105.00	4,860.03	-198.79	472.04	-208.47	1.82	-1.76	-4.47
4,976.00	3.30	92.90	4,945.81	-199.86	478.06	-209.67	2.11	-1.86	-14.07
5,060.00	4.30	113.60	5,029.63	-201.25	483.36	-211.16	2.00	1.19	24.64
5,145.00	6.10	130.90	5,114.28	-205.48	489.70	-215.53	2.79	2.12	20.35
5,230.00	5.50	125.50	5,198.85	-210.80	496.43	-220.99	0.95	-0.71	-6.35
5,315.00	5.60	129.80	5,283.45	-215.82	502.93	-226.14	0.50	0.12	5.06
5,400.00	6.20	121.20	5,368.00	-220.86	510.04	-231.32	1.26	0.71	-10.12
5,443.00	5.90	116.40	5,410.76	-223.04	514.01	-233.58	1.37	-0.70	-11.16
5,484.00	5.50	110.30	5,451.56	-224.66	517.74	-235.28	1.77	-0.98	-14.88
5,527.00	4.60	56.20	5,494.41	-224.42	521.10	-235.10	10.83	-2.09	-125.81
5,569.00	6.20	5.00	5,536.25	-221.22	522.70	-231.94	11.62	3.81	-121.90
5,611.00	9.90	1.10	5,577.83	-215.35	522.97	-226.08	8.90	8.81	-9.29
5,653.00	12.30	0.70	5,619.04	-207.26	523.09	-218.00	5.72	5.71	-0.95
5,696.00	15.10	16.00	5,660.82	-197.29	524.69	-208.06	10.60	6.51	35.58
5,738.00	19.40	22.40	5,700.93	-185.58	528.86	-196.44	11.18	10.24	15.24
5,780.00	22.50	30.80	5,740.16	-172.22	535.64	-183.22	10.26	7.38	20.00
5,823.00	27.80	28.30	5,779.07	-156.31	544.61	-167.50	12.57	12.33	-5.81
5,865.00	33.00	22.40	5,815.29	-137.10	553.62	-148.47	14.26	12.38	-14.05
5,908.00	37.40	16.00	5,850.43	-113.70	561.69	-125.25	13.34	10.23	-14.88
5,951.00	42.80	10.60	5,883.32	-86.76	567.98	-98.44	14.93	12.56	-12.56
5,993.00	48.20	7.20	5,912.75	-57.18	572.57	-68.96	14.09	12.86	-8.10
6,035.00	54.10	5.20	5,939.09	-24.67	576.08	-36.54	14.53	14.05	-4.76
6,078.00	59.00	2.90	5,962.78	11.10	578.59	-0.82	12.24	11.40	-5.35
6,118.00	62.62	1.18	5,982.29	45.99	579.83	34.04	9.79	9.05	-4.29
300' entry									
6,120.00	62.80	1.10	5,983.21	47.77	579.86	35.81	9.79	9.07	-4.14
6,163.00	66.10	0.60	6,001.75	86.56	580.44	74.58	7.75	7.67	-1.16
6,205.00	68.80	1.40	6,017.86	125.33	581.12	113.33	6.66	6.43	1.90
6,248.00	70.90	1.40	6,032.67	165.69	582.10	153.66	4.88	4.88	0.00
6,296.00	75.20	359.50	6,046.66	211.59	582.45	199.54	9.73	8.96	-3.96
6,329.00	79.02	358.97	6,054.02	243.75	582.02	231.70	11.69	11.59	-1.61
7"									
6,359.00	82.50	358.50	6,058.83	273.35	581.37	261.31	11.69	11.59	-1.57
6,405.00	88.10	357.90	6,062.60	319.15	579.93	307.13	12.24	12.17	-1.30
6,451.00	89.10	357.10	6,063.72	365.09	577.92	353.11	2.78	2.17	-1.74
6,496.00	88.90	356.50	6,064.51	410.02	575.41	398.07	1.41	-0.44	-1.33
6,582.00	91.30	358.50	6,064.36	495.92	571.66	484.04	3.63	2.79	2.33
6,667.00	89.80	354.50	6,063.54	580.74	566.47	568.95	5.03	-1.76	-4.71
6,751.00	90.60	357.40	6,063.25	664.52	560.54	652.83	3.58	0.95	3.45

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Survey Report

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Project:	Niobrara CON'83	TVD Reference:	GL+KB @ 4904.00usft (Xtreme 17)
Site:	Shull 25-9-60 Pad	MD Reference:	GL+KB @ 4904.00usft (Xtreme 17)
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Wellbore:	6-25-9-60 OH	Survey Calculation Method:	Minimum Curvature
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Survey									
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6,836.00	90.20	0.20	6,062.66	749.49	558.76	737.82	3.33	-0.47	3.29
6,921.00	89.90	358.90	6,062.58	834.49	558.09	822.81	1.57	-0.35	-1.53
7,006.00	90.60	0.00	6,062.21	919.48	557.28	907.80	1.53	0.82	1.29
7,091.00	88.60	359.10	6,062.81	1,004.47	556.61	992.79	2.58	-2.35	-1.06
7,176.00	88.40	358.20	6,065.03	1,089.42	554.61	1,077.76	1.08	-0.24	-1.06
7,261.00	90.40	358.10	6,065.92	1,174.36	551.86	1,162.74	2.36	2.35	-0.12
7,347.00	91.30	358.20	6,064.64	1,260.31	549.09	1,248.73	1.05	1.05	0.12
7,432.00	91.00	2.40	6,062.94	1,345.27	549.53	1,333.66	4.95	-0.35	4.94
7,517.00	91.20	6.50	6,061.31	1,429.98	556.13	1,418.22	4.83	0.24	4.82
7,601.00	90.40	3.10	6,060.13	1,513.67	563.15	1,501.74	4.16	-0.95	-4.05
7,686.00	90.20	358.40	6,059.69	1,598.63	564.26	1,586.67	5.53	-0.24	-5.53
7,770.00	91.10	357.70	6,058.73	1,682.58	561.41	1,670.65	1.36	1.07	-0.83
7,855.00	89.20	358.00	6,058.51	1,767.51	558.22	1,755.64	2.26	-2.24	0.35
7,940.00	89.50	357.80	6,059.48	1,852.45	555.10	1,840.62	0.42	0.35	-0.24
8,025.00	90.30	357.80	6,059.62	1,937.39	551.84	1,925.61	0.94	0.94	0.00
8,110.00	88.30	356.70	6,060.66	2,022.28	547.76	2,010.56	2.69	-2.35	-1.29
8,194.00	87.10	356.00	6,064.03	2,106.04	542.42	2,094.41	1.65	-1.43	-0.83
8,279.00	89.90	357.20	6,066.26	2,190.85	537.38	2,179.31	3.58	3.29	1.41
8,364.00	91.80	359.10	6,065.00	2,275.79	534.64	2,264.29	3.16	2.24	2.24
8,449.00	91.70	357.90	6,062.40	2,360.72	532.41	2,349.25	1.42	-0.12	-1.41
8,533.00	91.90	357.10	6,059.76	2,444.59	528.75	2,433.18	0.98	0.24	-0.95
8,619.00	91.30	358.60	6,057.36	2,530.50	525.53	2,519.13	1.88	-0.70	1.74
8,704.00	92.10	358.30	6,054.84	2,615.43	523.23	2,604.09	1.01	0.94	-0.35
8,789.00	90.90	359.20	6,052.62	2,700.38	521.38	2,689.06	1.76	-1.41	1.06
8,874.00	88.20	359.90	6,053.28	2,785.36	520.71	2,774.04	3.28	-3.18	0.82
8,959.00	88.40	359.20	6,055.80	2,870.32	520.04	2,859.00	0.86	0.24	-0.82
9,044.00	89.50	358.50	6,057.36	2,955.29	518.34	2,943.98	1.53	1.29	-0.82
9,129.00	89.70	357.20	6,057.96	3,040.23	515.15	3,028.97	1.55	0.24	-1.53
9,214.00	90.60	356.40	6,057.73	3,125.09	510.40	3,113.91	1.42	1.06	-0.94
9,299.00	89.70	0.60	6,057.51	3,210.04	508.18	3,198.89	5.05	-1.06	4.94
9,384.00	90.10	0.60	6,057.66	3,295.04	509.07	3,283.85	0.47	0.47	0.00
9,468.00	86.60	358.50	6,060.08	3,378.98	508.41	3,367.79	4.86	-4.17	-2.50
9,553.00	88.00	358.80	6,064.08	3,463.86	506.41	3,452.69	1.68	1.65	0.35
9,638.00	88.00	357.80	6,067.05	3,548.77	503.89	3,537.64	1.18	0.00	-1.18
9,724.00	87.70	357.00	6,070.27	3,634.62	499.99	3,623.55	0.99	-0.35	-0.93
9,809.00	88.20	357.30	6,073.31	3,719.46	495.77	3,708.46	0.69	0.59	0.35
9,893.00	87.60	355.80	6,076.39	3,803.25	490.72	3,792.33	1.92	-0.71	-1.79
9,977.00	89.30	358.30	6,078.67	3,887.10	486.40	3,876.25	3.60	2.02	2.98
10,062.00	90.40	1.10	6,078.89	3,972.09	485.95	3,961.23	3.54	1.29	3.29
10,147.00	90.70	1.90	6,078.07	4,057.05	488.18	4,046.13	1.01	0.35	0.94
10,232.00	87.60	0.30	6,079.33	4,142.02	489.81	4,131.04	4.10	-3.65	-1.88
10,315.00	86.80	359.20	6,083.39	4,224.91	489.45	4,213.93	1.64	-0.96	-1.33
10,400.00	89.40	359.70	6,086.21	4,309.86	488.63	4,298.87	3.11	3.06	0.59

Titan Directional Drilling, LLC

Survey Report

Company:	Carrizo Oil & Gas, Inc.	Local Co-ordinate Reference:	Well 6-25-9-60
Project:	Niobrara CON'83	TVD Reference:	GL+KB @ 4904.00usft (Xtreme 17)
Site:	Shull 25-9-60 Pad	MD Reference:	GL+KB @ 4904.00usft (Xtreme 17)
Well:	6-25-9-60	North Reference:	Grid
Wellbore:	6-25-9-60 OH	Survey Calculation Method:	Minimum Curvature
Design:	6-25-9-60 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)	
10,485.00	89.80	0.50	6,086.80	4,394.85	488.78	4,383.85	1.05	0.47	0.94	
10,569.00	89.80	0.40	6,087.09	4,478.85	489.44	4,467.81	0.12	0.00	-0.12	
10,676.00	89.80	0.40	6,087.47	4,585.85	490.19	4,574.77	0.00	0.00	0.00	

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (in)	Hole Diameter (in)
1,452.00	1,444.70	9 5/8		9.62	12.25
6,329.00	6,054.02	7"		7.00	7.50

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
6,118.00	5,982.29	45.99	579.83	300' entry	