



**Scientific  
Drilling**

## Survey Certification

7327 West Barton Road  
Casper, WY 82604  
(307)-472-6621 Fax (307) 472-5439

Operator	Carrizo Oil & Gas
Well Name & No.	Slick Rock 19-14-7-60 OH
County & State	Weld County, CO
SDI Job No.	41HMP1202248
Rig	Xtreme 19
Survey Date	29-Feb-2012

I, Julie Cruse, having personal knowledge of all the facts, hereby  
certify that the attached directional survey run from a measured depth of 0 feet to a  
measured depth of 8688 feet is true and correct as determined from all available records.

Julie Cruse  
Signature

28-Mar-2012  
Date

**Julie Cruse**  
Rockies Region Engineer  
Scientific Drilling - Rocky Mountain District



## **Carrizo Oil & Gas**

**Weld County, CO (NAD83)**

**Slick Rock**

**Slick Rock 19-14-7-60**

**OH**

**Design: OH**

## **Standard Survey Report**

**28 March, 2012**



<b>Company:</b>	Carrizo Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Slick Rock 19-14-7-60
<b>Project:</b>	Weld County, CO (NAD83)	<b>TVD Reference:</b>	GL 5021' & KB 17' @ 5038.00ft (Xtreme 19)
<b>Site:</b>	Slick Rock	<b>MD Reference:</b>	GL 5021' & KB 17' @ 5038.00ft (Xtreme 19)
<b>Well:</b>	Slick Rock 19-14-7-60	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

<b>Project</b>	Weld County, CO (NAD83)		
<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		Slick Rock			
Site Position:		Northing:	1,447,335.74 usft	Latitude:	40° 33' 12.276 N
From:	Lat/Long	Easting:	3,377,221.39 usft	Longitude:	104° 8' 32.820 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.88 °

Well	Slick Rock 19-14-7-60, 17' FSL 1243' FWL Sec 10 T7N R60W					
Well Position	+N/-S	0.00 ft	Northing:	1,447,335.74 usft	Latitude:	40° 33' 12.276 N
	+E/-W	0.00 ft	Easting:	3,377,221.39 usft	Longitude:	104° 8' 32.820 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	5,021.00 ft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	2012/02/24	8.44	67.25	53,202

<b>Design</b>	OH				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	359.05	

<b>Survey Program</b>	<b>Date</b>	2012/03/28			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
1,423.00	5,763.00	Survey #1 - Vertical (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
5,806.00	6,867.00	Survey #2 - Curve (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	
6,909.00	8,688.00	Survey #3 - Lateral (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	

<b>Survey</b>									
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,423.00	0.00	0.00	1,423.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Casing Assumed Vertical</b>									
1,455.00	0.70	140.80	1,455.00	-0.15	0.12	-0.15	2.19	2.19	0.00
<b>First SDI MWD Survey</b>									
1,547.00	0.53	167.26	1,546.99	-1.00	0.57	-1.01	0.35	-0.18	28.76
1,633.00	0.44	157.24	1,632.99	-1.69	0.79	-1.71	0.14	-0.10	-11.65
1,718.00	0.79	123.58	1,717.99	-2.32	1.40	-2.34	0.58	0.41	-39.60

<b>Company:</b>	Carrizo Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Slick Rock 19-14-7-60
<b>Project:</b>	Weld County, CO (NAD83)	<b>TVD Reference:</b>	GL 5021' & KB 17' @ 5038.00ft (Xtreme 19)
<b>Site:</b>	Slick Rock	<b>MD Reference:</b>	GL 5021' & KB 17' @ 5038.00ft (Xtreme 19)
<b>Well:</b>	Slick Rock 19-14-7-60	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
1,803.00	0.88	147.13	1,802.98	-3.19	2.24	-3.23	0.41	0.11	27.71	
1,889.00	0.70	155.13	1,888.97	-4.22	2.82	-4.27	0.24	-0.21	9.30	
1,974.00	0.79	143.00	1,973.96	-5.16	3.40	-5.22	0.21	0.11	-14.27	
2,145.00	0.97	137.11	2,144.94	-7.16	5.09	-7.25	0.12	0.11	-3.44	
2,315.00	1.14	273.69	2,314.93	-8.11	4.38	-8.18	1.15	0.10	80.34	
2,486.00	0.62	266.05	2,485.91	-8.06	1.76	-8.09	0.31	-0.30	-4.47	
2,657.00	1.23	267.80	2,656.89	-8.20	-1.00	-8.18	0.36	0.36	1.02	
2,827.00	1.23	286.35	2,826.85	-7.75	-4.57	-7.68	0.23	0.00	10.91	
2,998.00	1.32	274.48	2,997.81	-7.08	-8.29	-6.95	0.16	0.05	-6.94	
3,169.00	1.58	282.66	3,168.75	-6.41	-12.56	-6.20	0.19	0.15	4.78	
3,339.00	1.93	226.32	3,338.68	-7.88	-16.92	-7.60	0.99	0.21	-33.14	
3,424.00	1.85	216.48	3,423.64	-9.97	-18.77	-9.66	0.39	-0.09	-11.58	
3,509.00	1.93	205.63	3,508.59	-12.36	-20.20	-12.03	0.43	0.09	-12.76	
3,595.00	0.44	81.30	3,594.58	-13.62	-20.50	-13.28	2.57	-1.73	-144.57	
3,680.00	0.26	63.37	3,679.57	-13.48	-20.01	-13.15	0.25	-0.21	-21.09	
3,765.00	0.70	107.40	3,764.57	-13.55	-19.34	-13.23	0.64	0.52	51.80	
3,850.00	0.44	110.57	3,849.57	-13.82	-18.54	-13.51	0.31	-0.31	3.73	
3,936.00	0.88	121.82	3,935.56	-14.29	-17.67	-13.99	0.53	0.51	13.08	
4,021.00	0.88	103.63	4,020.55	-14.78	-16.48	-14.51	0.33	0.00	-21.40	
4,105.00	0.62	133.24	4,104.54	-15.25	-15.52	-14.99	0.55	-0.31	35.25	
4,190.00	0.53	77.70	4,189.54	-15.48	-14.80	-15.23	0.64	-0.11	-65.34	
4,275.00	0.26	132.01	4,274.54	-15.52	-14.27	-15.28	0.51	-0.32	63.89	
4,360.00	0.26	212.08	4,359.54	-15.82	-14.23	-15.58	0.39	0.00	94.20	
4,445.00	0.44	168.49	4,444.54	-16.30	-14.27	-16.06	0.36	0.21	-51.28	
4,530.00	0.35	209.89	4,529.53	-16.84	-14.33	-16.60	0.34	-0.11	48.71	
4,615.00	0.79	214.37	4,614.53	-17.55	-14.79	-17.31	0.52	0.52	5.27	
4,699.00	1.67	241.97	4,698.51	-18.61	-16.20	-18.33	1.23	1.05	32.86	
4,785.00	1.49	234.76	4,784.48	-19.84	-18.22	-19.54	0.31	-0.21	-8.38	
4,870.00	1.06	219.82	4,869.46	-21.08	-19.63	-20.75	0.64	-0.51	-17.58	
4,955.00	0.35	15.21	4,954.45	-21.43	-20.06	-21.10	1.63	-0.84	182.81	
5,040.00	0.18	157.94	5,039.45	-21.31	-19.94	-20.97	0.59	-0.20	167.92	
5,125.00	0.26	65.30	5,124.45	-21.35	-19.72	-21.02	0.38	0.09	-108.99	
5,210.00	0.35	132.10	5,209.45	-21.44	-19.35	-21.12	0.40	0.11	78.59	
5,295.00	0.44	176.14	5,294.45	-21.94	-19.14	-21.62	0.36	0.11	51.81	
5,380.00	0.97	178.42	5,379.44	-22.99	-19.10	-22.67	0.62	0.62	2.68	
5,465.00	0.35	161.37	5,464.44	-23.95	-18.99	-23.64	0.76	-0.73	-20.06	
5,550.00	0.79	194.15	5,549.43	-24.77	-19.05	-24.45	0.62	0.52	38.56	
5,636.00	0.79	184.57	5,635.42	-25.93	-19.24	-25.61	0.15	0.00	-11.14	
5,721.00	1.41	146.60	5,720.41	-27.39	-18.72	-27.08	1.09	0.73	-44.67	
5,763.00	1.39	150.73	5,762.40	-28.27	-18.18	-27.96	0.24	-0.05	9.83	
5,806.00	0.88	113.82	5,805.39	-28.86	-17.63	-28.56	2.01	-1.19	-85.84	
5,849.00	3.17	27.51	5,848.36	-27.93	-16.77	-27.65	7.52	5.33	-200.72	
5,867.00	4.48	22.06	5,866.32	-26.84	-16.28	-26.57	7.54	7.28	-30.28	
5,891.00	5.72	21.62	5,890.23	-24.86	-15.49	-24.60	5.17	5.17	-1.83	

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<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
5,911.00	7.56	15.30	5,910.09	-22.67	-14.77	-22.42	9.89	9.20	-31.60
5,934.00	8.09	9.93	5,932.88	-19.61	-14.09	-19.38	3.92	2.30	-23.35
5,954.00	8.35	4.75	5,952.67	-16.78	-13.73	-16.55	3.92	1.30	-25.90
5,976.00	10.02	6.24	5,974.39	-13.28	-13.39	-13.06	7.67	7.59	6.77
5,990.00	10.99	3.34	5,988.16	-10.74	-13.18	-10.52	7.89	6.93	-20.71
6,042.00	13.89	2.20	6,038.93	0.45	-12.65	0.66	5.60	5.58	-2.19
6,061.00	14.33	2.38	6,057.36	5.08	-12.47	5.28	2.33	2.32	0.95
6,104.00	18.64	358.86	6,098.58	17.27	-12.38	17.47	10.28	10.02	-8.19
6,146.00	26.12	2.81	6,137.39	33.24	-12.06	33.43	18.16	17.81	9.40
6,189.00	32.98	5.36	6,174.78	54.37	-10.50	54.54	16.22	15.95	5.93
6,232.00	39.92	8.00	6,209.35	79.72	-7.49	79.83	16.54	16.14	6.14
6,275.00	45.65	3.26	6,240.90	108.76	-4.69	108.82	15.28	13.33	-11.02
6,317.00	49.42	1.32	6,269.25	139.71	-3.47	139.75	9.60	8.98	-4.62
6,360.00	52.32	359.56	6,296.39	173.06	-3.22	173.09	7.45	6.74	-4.09
6,402.00	56.10	359.65	6,320.95	207.12	-3.46	207.15	9.00	9.00	0.21
6,411.00	56.81	358.77	6,325.92	214.62	-3.56	214.65	11.34	7.89	-9.78
<b>Last Survey in 8 3/4" Hole</b>									
6,483.00	60.59	359.04	6,363.32	276.12	-4.73	276.16	5.26	5.25	0.38
<b>First Survey in 6 1/8" Hole</b>									
6,526.00	63.31	359.56	6,383.54	314.06	-5.19	314.11	6.41	6.33	1.21
6,569.00	65.86	359.91	6,401.99	352.90	-5.37	352.94	5.98	5.93	0.81
6,610.00	68.68	0.62	6,417.83	390.71	-5.19	390.74	7.06	6.88	1.73
6,653.00	71.67	1.32	6,432.41	431.15	-4.51	431.17	7.12	6.95	1.63
6,695.00	73.86	1.58	6,444.85	471.25	-3.49	471.24	5.25	5.21	0.62
6,738.00	75.53	2.46	6,456.20	512.70	-2.03	512.66	4.36	3.88	2.05
6,781.00	78.96	3.25	6,465.70	554.58	0.06	554.50	8.18	7.98	1.84
6,824.00	83.19	3.69	6,472.37	596.97	2.63	596.84	9.89	9.84	1.02
6,867.00	85.74	3.69	6,476.51	639.68	5.39	639.50	5.93	5.93	0.00
6,909.00	89.16	3.08	6,478.38	681.55	7.86	681.33	8.27	8.14	-1.45
6,959.00	91.98	2.81	6,477.89	731.48	10.43	731.21	5.67	5.64	-0.54
7,044.00	93.74	2.73	6,473.64	816.27	14.54	815.92	2.07	2.07	-0.09
7,129.00	93.47	2.46	6,468.30	901.02	18.38	900.59	0.45	-0.32	-0.32
7,214.00	94.00	1.41	6,462.76	985.79	21.24	985.30	1.38	0.62	-1.24
7,300.00	93.47	1.41	6,457.16	1,071.58	23.35	1,071.04	0.62	-0.62	0.00
7,385.00	91.45	0.18	6,453.51	1,156.49	24.53	1,155.92	2.78	-2.38	-1.45
7,469.00	92.15	1.14	6,450.87	1,240.44	25.50	1,239.84	1.41	0.83	1.14
7,554.00	91.89	2.29	6,447.88	1,325.34	28.04	1,324.70	1.39	-0.31	1.35
7,639.00	91.80	3.69	6,445.14	1,410.18	32.47	1,409.45	1.65	-0.11	1.65
7,725.00	90.48	0.44	6,443.43	1,496.10	35.57	1,495.30	4.08	-1.53	-3.78
7,810.00	91.89	2.11	6,441.67	1,581.05	37.46	1,580.21	2.57	1.66	1.96
7,895.00	89.60	0.53	6,440.57	1,666.01	39.42	1,665.13	3.27	-2.69	-1.86
7,980.00	89.25	0.18	6,441.42	1,751.01	39.94	1,750.10	0.58	-0.41	-0.41
8,065.00	89.25	359.91	6,442.53	1,836.00	40.01	1,835.08	0.32	0.00	-0.32

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<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
8,151.00	89.60	359.74	6,443.39	1,922.00	39.75	1,921.07	0.45	0.41	-0.20	
8,236.00	91.19	0.27	6,442.81	2,006.99	39.75	2,006.06	1.97	1.87	0.62	
8,321.00	91.10	0.09	6,441.11	2,091.97	40.02	2,091.02	0.24	-0.11	-0.21	
8,406.00	89.52	1.23	6,440.65	2,176.96	41.00	2,175.98	2.29	-1.86	1.34	
8,492.00	84.77	359.30	6,444.93	2,262.83	41.40	2,261.83	5.96	-5.52	-2.24	
8,577.00	79.14	358.77	6,456.82	2,346.94	39.99	2,345.96	6.65	-6.62	-0.62	
<b>Last SDI MWD Survey</b>										
8,688.00	79.14	358.77	6,477.74	2,455.93	37.65	2,454.97	0.00	0.00	0.00	
<b>Projection to TD</b>										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
1,423.00	1,423.00	0.00	0.00	Casing Assumed Vertical	
1,455.00	1,455.00	-0.15	0.12	First SDI MWD Survey	
6,411.00	6,325.92	214.62	-3.56	Last Survey in 8 3/4" Hole	
6,483.00	6,363.32	276.12	-4.73	First Survey in 6 1/8" Hole	
8,577.00	6,456.82	2,346.94	39.99	Last SDI MWD Survey	
8,688.00	6,477.74	2,455.93	37.65	Projection to TD	

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