

Noble Energy

Weld County, CO (NAD 83)

Sec. 17-T6N-R63W

Colt A13-645

05-123-40910

Original Wellbore

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

06 April, 2015

Surface UWI : 05-123-40910

Well Coordinates: 1,421,561.62 N, 3,286,826.26 E (40° 29' 09.64" N, 104° 28' 07.72" W)

Ground Level: 4,664.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well Colt A13-645

KB @ 4694.00usft (Original Well Elev)

N

Grid

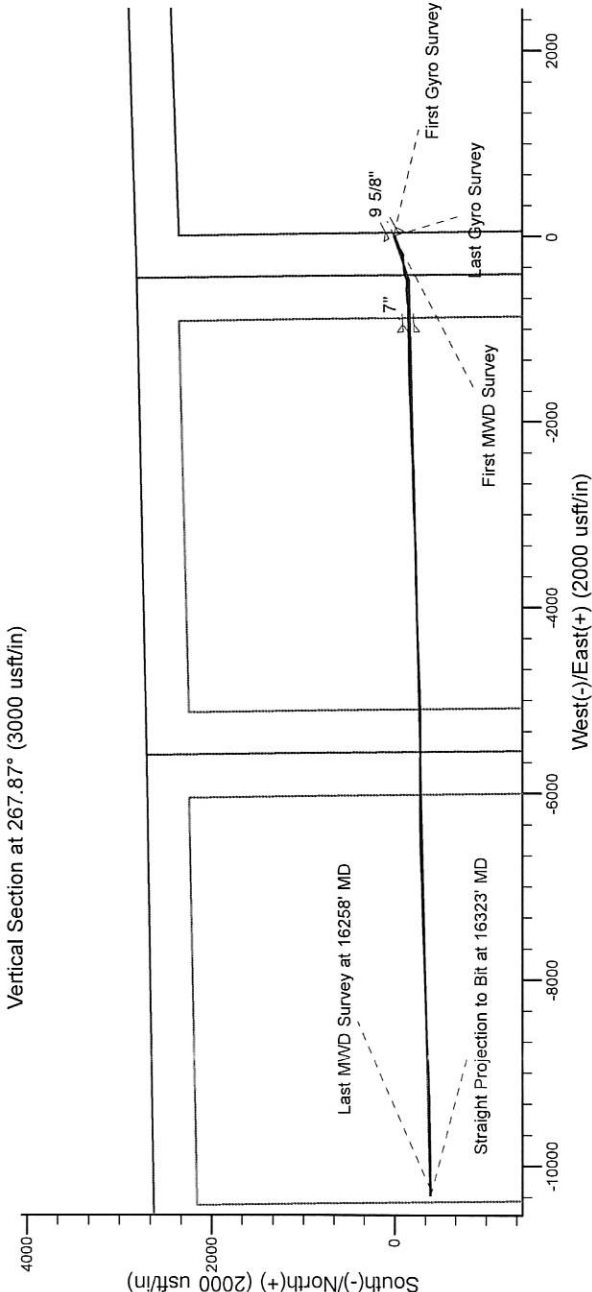
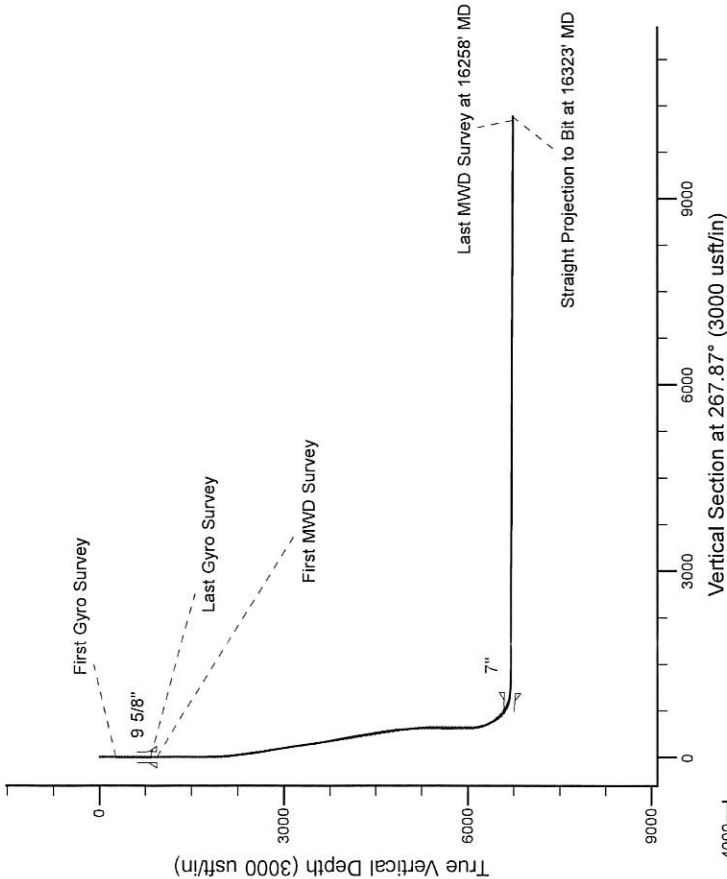
Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Project: Weld County, CO (NAD 83)
Site: Sec. 17-T6N-R63W
Well: Colt A13-645
Wellbore: Original Wellbore
Design: Actual Surveys

Noble Energy

HALLIBURTON
Sperry Drilling



Platted SHL: 2458' FSL 424' FWL
Platted Lat/Long: 40.486010 N, 104.468810 W
Location: Sec. 17-T6N-R63W

~7" Casing: 2309' FSL 628' FEL
Lat/Long: 40.485606 N, 104.472532 W
State Planes - CO Northern: 1421402.44N, 3285792.69 E
Location: Sec. 17-T6N-R63W

Platted BHL: 2310' FSL 535 FWL
Lat/Long: 40.485280 N, 104.505910 W
State Planes - CO Northern: 1421177.86 N, 3276510.29 E
Location: Sec. 13-T6N-R64W

LEGEND

— Original Wellbore, Rev A0 V0
— Actual Surveys

WELL DETAILS: Colt A13-645

Ground Level: 4664.00

KB @ 4694.00usft (Original Well Elev)

Created By: Amanda Marchand
Created On: 4/6/2015

Design Report for Colt A13-645 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
268.00	0.40	154.83	268.00	-0.85	0.40	-0.37	0.15
First Gyro Survey							
575.00	0.40	95.43	574.99	-1.92	1.92	-1.85	0.13
820.00	1.40	251.13	819.97	-2.97	-0.06	0.17	0.72
Last Gyro Survey							
922.00	0.82	241.45	921.95	-3.72	-1.88	2.02	0.60
First MWD Survey							
1,016.00	0.37	205.54	1,015.95	-4.31	-2.60	2.76	0.60
1,107.00	0.48	247.98	1,106.94	-4.72	-3.08	3.26	0.36
1,199.00	0.48	232.23	1,198.94	-5.10	-3.74	3.93	0.14
1,382.00	0.87	216.62	1,381.93	-6.69	-5.18	5.42	0.23
1,474.00	0.96	221.83	1,473.92	-7.82	-6.11	6.40	0.13
1,565.00	0.72	211.83	1,564.91	-8.88	-6.92	7.24	0.31
1,657.00	0.56	183.38	1,656.90	-9.82	-7.25	7.61	0.38
1,749.00	0.84	184.28	1,748.89	-10.94	-7.33	7.73	0.30
1,841.00	2.40	245.53	1,840.86	-12.41	-9.13	9.59	2.31
1,933.00	3.18	248.10	1,932.75	-14.16	-13.25	13.77	0.86
2,024.00	3.66	245.45	2,023.59	-16.31	-18.24	18.83	0.56
2,116.00	3.99	243.28	2,115.38	-18.96	-23.77	24.45	0.39
2,209.00	5.60	243.60	2,208.05	-22.44	-30.72	31.53	1.73
2,301.00	6.92	243.20	2,299.50	-26.93	-39.69	40.66	1.44
2,395.00	8.45	252.68	2,392.66	-31.54	-51.34	52.48	2.11
2,490.00	8.88	252.03	2,486.58	-35.88	-64.98	66.27	0.46
2,585.00	9.61	249.90	2,580.34	-40.87	-79.40	80.86	0.85
2,679.00	8.93	249.03	2,673.11	-46.18	-93.58	95.23	0.74
2,774.00	9.86	252.78	2,766.84	-51.22	-108.23	110.06	1.17
2,869.00	10.21	252.62	2,860.39	-56.15	-124.04	126.04	0.37
2,964.00	9.98	250.10	2,953.92	-61.46	-139.81	142.00	0.52
3,058.00	9.64	248.86	3,046.54	-67.08	-154.81	157.20	0.43
3,153.00	9.00	246.34	3,140.29	-72.93	-169.04	171.63	0.80
3,248.00	8.07	243.37	3,234.23	-78.90	-181.81	184.61	1.08
3,342.00	7.70	245.28	3,327.35	-84.49	-193.42	196.43	0.48
3,437.00	8.62	246.45	3,421.38	-89.99	-205.73	208.94	0.98
3,531.00	8.36	254.47	3,514.36	-94.64	-218.77	222.14	1.29
3,626.00	9.84	263.39	3,608.16	-97.42	-233.49	236.95	2.15
3,721.00	10.95	266.88	3,701.60	-98.85	-250.57	254.07	1.34
3,815.00	10.60	264.73	3,793.95	-100.13	-268.09	271.63	0.57
3,910.00	10.88	262.39	3,887.28	-102.12	-285.68	289.28	0.55
4,005.00	10.48	263.65	3,980.64	-104.26	-303.15	306.82	0.49
4,100.00	9.42	261.01	4,074.21	-106.43	-319.42	323.15	1.21
4,194.00	9.76	265.67	4,166.89	-108.23	-334.96	338.75	0.90
4,289.00	8.57	271.26	4,260.68	-108.69	-350.07	353.87	1.56
4,384.00	8.25	265.19	4,354.66	-109.10	-363.94	367.74	0.99
4,479.00	9.17	263.88	4,448.56	-110.48	-378.26	382.10	0.99
4,574.00	10.44	255.60	4,542.18	-113.43	-394.12	398.07	1.99
4,668.00	8.89	254.10	4,634.84	-117.54	-409.36	413.44	1.67
4,763.00	6.94	258.10	4,728.93	-120.73	-422.03	426.23	2.13
4,858.00	6.86	242.23	4,823.25	-124.56	-432.67	437.00	2.00
4,952.00	6.17	243.33	4,916.65	-129.44	-442.15	446.66	0.75

Design Report for Colt A13-645 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,047.00	5.49	244.14	5,011.16	-133.72	-450.80	455.46	0.72
5,141.00	2.62	265.62	5,104.91	-135.84	-456.99	461.73	3.40
5,236.00	1.79	276.60	5,199.84	-135.84	-460.63	465.36	0.98
5,330.00	0.45	155.88	5,293.83	-136.01	-461.94	466.68	2.19
5,425.00	0.87	55.70	5,388.83	-135.94	-461.19	465.93	1.10
5,520.00	0.94	45.74	5,483.81	-134.99	-460.04	464.74	0.18
5,614.00	0.68	29.44	5,577.80	-133.97	-459.21	463.88	0.37
5,709.00	1.42	176.84	5,672.80	-134.65	-458.87	463.56	2.13
5,803.00	1.85	194.47	5,766.76	-137.28	-459.19	463.97	0.70
5,898.00	1.39	228.23	5,861.72	-139.53	-460.43	465.30	1.09
5,993.00	0.65	262.13	5,956.71	-140.38	-461.82	466.72	0.97
6,088.00	1.11	279.47	6,051.70	-140.30	-463.26	468.16	0.55
6,135.00	5.23	259.59	6,098.61	-140.61	-465.82	470.72	8.94
6,183.00	9.01	261.38	6,146.24	-141.57	-471.69	476.63	7.89
6,277.00	16.87	274.07	6,237.79	-141.70	-492.61	497.54	8.84
6,372.00	25.07	274.54	6,326.43	-139.13	-526.48	531.29	8.63
6,420.00	27.47	274.66	6,369.47	-137.42	-547.66	552.39	5.00
6,467.00	30.92	269.32	6,410.50	-136.69	-570.54	575.23	9.19
6,515.00	33.84	265.50	6,451.03	-137.88	-596.21	600.92	7.43
6,562.00	37.19	265.77	6,489.28	-139.96	-623.43	628.20	7.14
6,610.00	42.28	264.34	6,526.18	-142.62	-653.98	658.83	10.77
6,657.00	47.85	263.67	6,559.37	-146.10	-687.06	692.02	11.89
6,705.00	55.01	263.48	6,589.28	-150.30	-724.33	729.41	14.92
6,752.00	60.07	267.08	6,614.50	-153.53	-763.83	769.01	12.55
6,800.00	63.82	270.40	6,637.07	-154.44	-806.16	811.35	9.91
6,847.00	69.21	271.40	6,655.80	-153.76	-849.25	854.38	11.63
6,895.00	75.93	268.57	6,670.17	-153.79	-895.01	900.11	15.09
6,942.00	81.93	267.17	6,679.19	-155.51	-941.08	946.21	13.10
6,992.00	85.71	267.84	6,684.57	-157.67	-990.74	995.91	7.68
7,216.00	88.83	269.28	6,695.24	-163.29	-1,214.38	1,219.61	1.53
7,311.00	88.37	269.01	6,697.56	-164.71	-1,309.34	1,314.56	0.56
7,406.00	88.61	269.35	6,700.07	-166.06	-1,404.30	1,409.50	0.44
7,501.00	90.40	269.05	6,700.89	-167.39	-1,499.28	1,504.47	1.91
7,595.00	90.06	268.44	6,700.51	-169.45	-1,593.26	1,598.45	0.74
7,690.00	89.66	267.77	6,700.74	-172.59	-1,688.20	1,693.45	0.82
7,785.00	89.45	267.33	6,701.48	-176.65	-1,783.11	1,788.45	0.51
7,880.00	90.71	267.64	6,701.35	-180.82	-1,878.02	1,883.44	1.37
7,974.00	91.26	267.36	6,699.73	-184.92	-1,971.92	1,977.43	0.66
8,069.00	91.97	267.05	6,697.05	-189.55	-2,066.76	2,072.38	0.82
8,164.00	90.92	268.29	6,694.66	-193.41	-2,161.65	2,167.35	1.71
8,259.00	89.97	268.81	6,693.92	-195.82	-2,256.62	2,262.34	1.14
8,353.00	88.27	268.33	6,695.36	-198.16	-2,350.57	2,356.31	1.88
8,448.00	88.46	268.44	6,698.07	-200.84	-2,445.50	2,451.27	0.23
8,543.00	88.27	268.43	6,700.78	-203.43	-2,540.42	2,546.23	0.20
8,638.00	90.65	268.61	6,701.68	-205.88	-2,635.38	2,641.21	2.51
8,733.00	90.83	268.18	6,700.45	-208.54	-2,730.33	2,736.20	0.49
8,828.00	90.55	268.85	6,699.31	-211.01	-2,825.29	2,831.19	0.76
8,922.00	89.88	268.23	6,698.96	-213.40	-2,919.26	2,925.18	0.97
9,017.00	88.92	267.10	6,699.95	-217.27	-3,014.18	3,020.17	1.56
9,112.00	89.20	267.11	6,701.51	-222.07	-3,109.04	3,115.15	0.29
9,206.00	89.32	267.63	6,702.72	-226.38	-3,202.93	3,209.14	0.57

Design Report for Colt A13-645 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,302.00	89.20	268.23	6,703.96	-229.85	-3,298.86	3,305.13	0.64
9,396.00	89.26	268.73	6,705.23	-232.34	-3,392.82	3,399.11	0.54
9,491.00	89.38	269.41	6,706.35	-233.88	-3,487.80	3,494.09	0.73
9,586.00	90.06	270.29	6,706.82	-234.13	-3,582.80	3,589.03	1.17
9,681.00	88.31	267.87	6,708.17	-235.66	-3,677.77	3,683.98	3.14
9,776.00	89.66	269.08	6,709.85	-238.18	-3,772.71	3,778.96	1.91
9,871.00	89.23	268.48	6,710.77	-240.21	-3,867.69	3,873.94	0.78
9,965.00	90.43	268.86	6,711.05	-242.39	-3,961.66	3,967.93	1.34
10,057.00	89.08	267.84	6,711.44	-245.04	-4,053.62	4,059.92	1.84
10,150.00	89.11	267.57	6,712.91	-248.76	-4,146.53	4,152.91	0.29
10,243.00	90.28	269.27	6,713.41	-251.33	-4,239.49	4,245.90	2.22
10,334.00	89.32	268.45	6,713.73	-253.14	-4,330.47	4,336.89	1.39
10,426.00	90.09	268.66	6,714.20	-255.46	-4,422.44	4,428.88	0.87
10,518.00	90.06	267.97	6,714.08	-258.16	-4,514.40	4,520.87	0.75
10,610.00	89.72	266.71	6,714.26	-262.43	-4,606.30	4,612.87	1.42
10,701.00	89.60	267.57	6,714.80	-266.97	-4,697.18	4,703.86	0.95
10,792.00	90.28	267.59	6,714.89	-270.81	-4,788.10	4,794.86	0.75
10,884.00	90.09	266.76	6,714.59	-275.35	-4,879.99	4,886.85	0.93
10,976.00	90.92	269.04	6,713.78	-278.72	-4,971.91	4,978.84	2.64
11,068.00	91.17	269.82	6,712.11	-279.63	-5,063.89	5,070.79	0.89
11,252.00	89.63	270.20	6,710.82	-279.60	-5,247.88	5,254.65	0.86
11,344.00	89.82	270.44	6,711.26	-279.09	-5,339.88	5,346.56	0.33
11,436.00	89.26	269.76	6,712.00	-278.93	-5,431.88	5,438.49	0.96
11,528.00	89.23	269.77	6,713.21	-279.30	-5,523.87	5,530.43	0.03
11,620.00	90.12	270.54	6,713.74	-279.06	-5,615.86	5,622.36	1.28
11,714.00	90.12	270.20	6,713.54	-278.45	-5,709.86	5,716.27	0.36
11,808.00	89.69	270.25	6,713.69	-278.08	-5,803.86	5,810.19	0.46
11,903.00	89.63	270.89	6,714.26	-277.13	-5,898.85	5,905.08	0.68
11,998.00	89.14	271.61	6,715.28	-275.06	-5,993.82	5,999.91	0.92
12,093.00	89.69	270.41	6,716.25	-273.39	-6,088.80	6,094.76	1.39
12,187.00	89.91	268.33	6,716.58	-274.42	-6,182.79	6,188.72	2.23
12,283.00	89.85	268.87	6,716.78	-276.77	-6,278.76	6,284.71	0.57
12,377.00	89.78	269.47	6,717.08	-278.13	-6,372.75	6,378.69	0.64
12,472.00	89.75	268.41	6,717.47	-279.89	-6,467.73	6,473.67	1.12
12,567.00	90.09	269.31	6,717.60	-281.78	-6,562.71	6,568.65	1.01
12,662.00	90.18	267.72	6,717.38	-284.24	-6,657.68	6,663.64	1.68
12,757.00	90.00	267.71	6,717.23	-288.03	-6,752.60	6,758.64	0.19
12,852.00	89.72	268.15	6,717.46	-291.46	-6,847.54	6,853.64	0.55
12,946.00	89.51	267.91	6,718.09	-294.69	-6,941.48	6,947.64	0.34
13,041.00	90.74	268.77	6,717.89	-297.44	-7,036.44	7,042.63	1.58
13,136.00	88.92	268.38	6,718.17	-299.80	-7,131.40	7,137.62	1.96
13,231.00	89.57	269.03	6,719.42	-301.95	-7,226.37	7,232.60	0.97
13,326.00	89.41	268.14	6,720.27	-304.29	-7,321.34	7,327.59	0.95
13,421.00	89.94	268.03	6,720.80	-307.47	-7,416.28	7,422.59	0.57
13,515.00	89.91	267.79	6,720.93	-310.90	-7,510.22	7,516.59	0.26
13,705.00	89.04	267.49	6,722.67	-318.72	-7,700.05	7,706.57	0.48
13,800.00	88.74	267.24	6,724.51	-323.09	-7,794.93	7,801.55	0.41
13,895.00	90.43	268.31	6,725.20	-326.78	-7,889.85	7,896.54	2.11
13,990.00	90.68	268.21	6,724.28	-329.66	-7,984.80	7,991.54	0.28
14,085.00	90.28	268.33	6,723.48	-332.53	-8,079.76	8,086.53	0.44
14,179.00	91.45	268.80	6,722.06	-334.88	-8,173.71	8,180.51	1.34

Design Report for Colt A13-645 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
14,274.00	90.00	268.63	6,720.86	-337.01	-8,268.68	8,275.49	1.54
14,369.00	89.45	268.40	6,721.32	-339.47	-8,363.65	8,370.48	0.63
14,464.00	88.70	268.13	6,722.85	-342.35	-8,458.59	8,465.47	0.84
14,559.00	89.35	267.92	6,724.47	-345.62	-8,553.52	8,560.45	0.72
14,653.00	89.66	266.27	6,725.28	-350.39	-8,647.39	8,654.44	1.79
14,748.00	89.91	266.82	6,725.63	-356.11	-8,742.22	8,749.41	0.64
14,843.00	89.69	265.81	6,725.97	-362.22	-8,837.02	8,844.38	1.09
14,937.00	90.06	266.63	6,726.17	-368.41	-8,930.81	8,938.34	0.96
15,032.00	90.56	269.32	6,725.66	-371.77	-9,025.74	9,033.33	2.88
15,127.00	90.46	269.10	6,724.81	-373.08	-9,120.73	9,128.30	0.25
15,222.00	90.71	269.53	6,723.84	-374.22	-9,215.72	9,223.26	0.52
15,317.00	89.01	269.17	6,724.07	-375.29	-9,310.71	9,318.22	1.83
15,412.00	88.33	268.60	6,726.28	-377.14	-9,405.66	9,413.18	0.93
15,507.00	90.25	269.79	6,727.46	-378.48	-9,500.64	9,508.14	2.38
15,697.00	88.30	268.55	6,729.86	-381.23	-9,690.59	9,698.07	1.22
15,792.00	88.15	268.70	6,732.80	-383.51	-9,785.52	9,793.01	0.22
15,886.00	88.80	269.09	6,735.30	-385.32	-9,879.47	9,886.96	0.81
16,076.00	90.12	269.13	6,737.09	-388.27	-10,069.43	10,076.91	0.70
16,171.00	91.73	269.37	6,735.56	-389.51	-10,164.41	10,171.86	1.71
16,258.00	92.13	269.60	6,732.63	-390.29	-10,251.36	10,258.78	0.53
Last MWD Survey at 16258' MD							
16,323.00	92.13	269.60	6,730.21	-390.75	-10,316.31	10,323.70	0.00
Straight Projection to Bit at 16323' MD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
268.00	268.00	-0.85	0.40	First Gyro Survey
820.00	819.97	-2.97	-0.06	Last Gyro Survey
922.00	921.95	-3.72	-1.88	First MWD Survey
16,258.00	6,732.63	-390.29	-10,251.36	Last MWD Survey at 16258' MD
16,323.00	6,730.21	-390.75	-10,316.31	Straight Projection to Bit at 16323' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Colt A13-645_BHL	267.87	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
268.00	820.00	Gyro Surveys	Flexi-Shot
922.00	6,992.00	Intermediate Surveys	MWD+IFR1+MS_WY
7,216.00	16,323.00	Production Surveys	MWD+IFR1+MS_WY

Design Report for Colt A13-645 - Actual Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,035.00	7"		7	8-3/4
922.00	9 5/8"		9-5/8	13-3/4

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Colt A13-645_BHL	0.00	0.00	6,735.04	-383.77	-10,316.33	1,421,177.86	3,276,510.29	40.485280	-104.505910
- actual wellpath misses target center by 8.48usft at 16322.79usft MD (6730.22 TVD, -390.75 N, -10316.10 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.47 °/100usft	Maximum Dogleg over Survey:	15.09 °/100usft at 6,895.00 usft
Net Tortosity applicable to Plans:	0.81 °/100usft	Directional Difficulty Index:	6.780

Audit Info

North Reference Sheet for Sec. 17-T6N-R63W - Colt A13-645 - Original Wellbore

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB @ 4694.00usft (Original Well Elev). Northing and Easting are relative to Colt A13-645

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996526

Grid Coordinates of Well: 1,421,561.62 usft N, 3,286,826.26 usft E

Geographical Coordinates of Well: 40° 29' 09.64" N, 104° 28' 07.72" W

Grid Convergence at Surface is: 0.67°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,323.00usft

the Bottom Hole Displacement is 10,323.71usft in the Direction of 267.83° (Grid).

Magnetic Convergence at surface is: -7.65° (2 March 2015, , BGGM2014)

