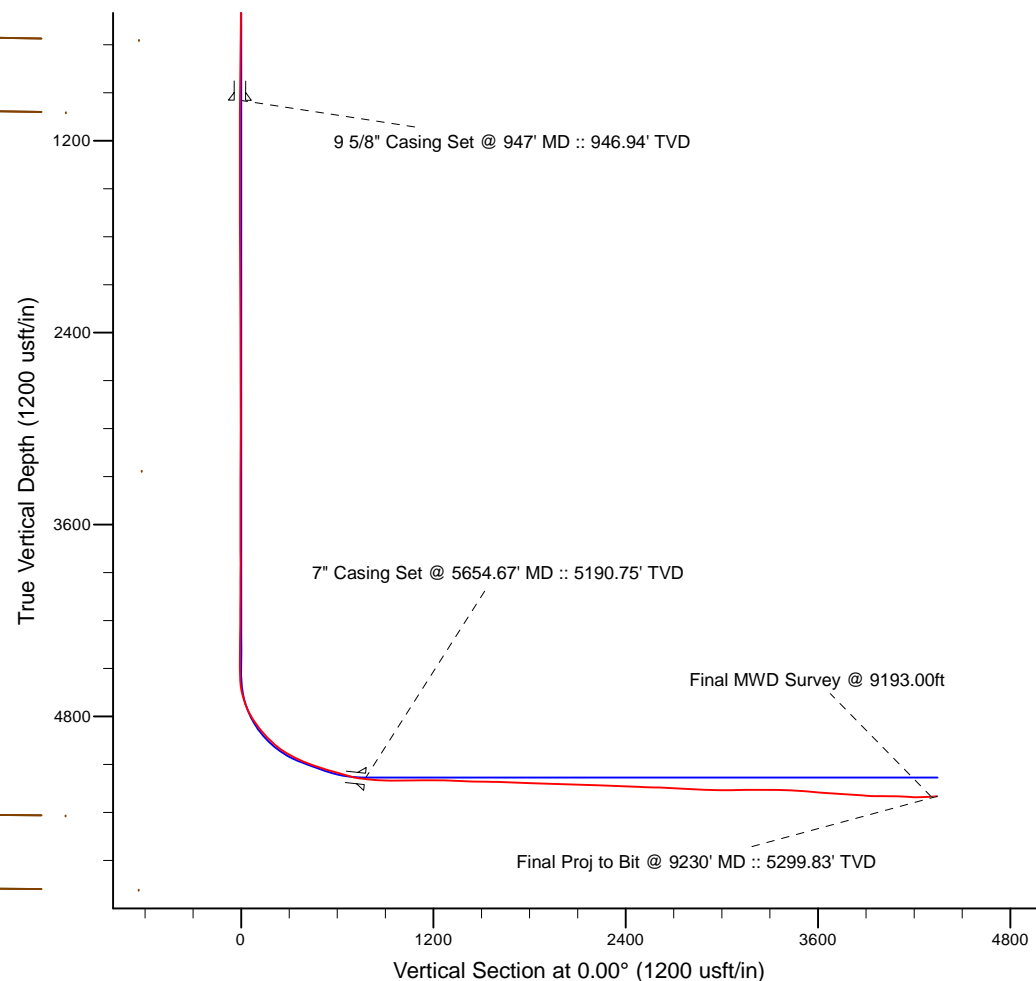
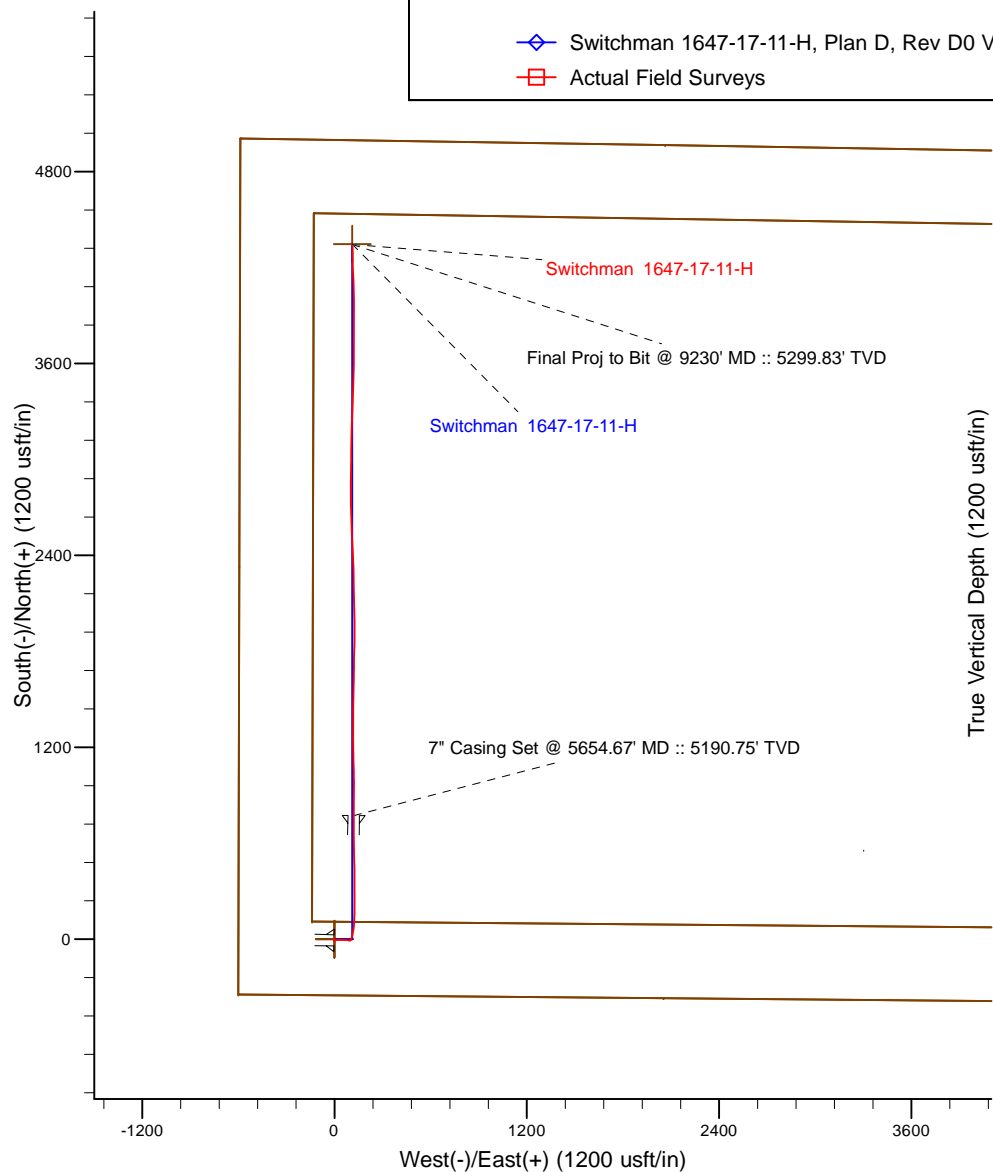


Project: Cheyenne County, CO (NAD 83)
 Site: Sec. 17-T16S-R47W
 Well: Switchman 1647-17-11-H
 Wellbore: Plan D
 Design: Actual Field Surveys



LEGEND

- Switchman 1647-17-11-H, Plan D, Rev D0 V0
- Actual Field Surveys



7 5/8" Casing: ~1123.72' FSL, ~718.45' FWL
 Lat/Long: 38.660192 N, -102.711097 E
 State Planes -CO Central: 1,313,361.99' N, 3,796,249.85' E
 Location: Sec. 17-T16S-R47W

BHL: ~652.44' FNL, ~699.42' FWL
 Lat/Long: 38.669997 N, -102.711131 E
 State Planes - CO Central: 1,316,930.86' N, 3,796,130.37' E
 Location: Sec. 17-T16S-R47W

WELL DETAILS: Switchman 1647-17-11-H	
Ground Level: 4185.00 RKB = 19' @ 4204.00usft (Pioneer 54)	
Design: Actual Field Surveys (Switchman 1647-17-11-H/Plan D)	
Created By: Clint Eshelman	Date: 2/5/2014
Reviewed: _____	Date: _____

Anadarko Petroleum Corp.

Cheyenne County, CO (NAD 83)

Sec. 17-T16S-R47W

Switchman 1647-17-11-H

Plan D

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

05 February, 2014

Well Coordinates: 1,312,586.05 N, 3,796,153.27 E (38° 39' 29.06" N, 102° 42' 41.46" W)

Ground Level: 4,185.00 usft

Local Coordinate Origin:

Centered on Well Switchman 1647-17-11-H

Viewing Datum:

RKB = 19' @ 4204.00usft (Pioneer 54)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Switchman 1647-17-11-H - Actual Field 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
131.00	0.28	178.24	131.00	-0.32	0.01	-0.32	0.21
First MWD Survey @ 131.00ft							
220.00	0.34	238.19	220.00	-0.68	-0.21	-0.68	0.35
310.00	0.22	223.79	310.00	-0.94	-0.55	-0.94	0.15
400.00	0.46	207.94	400.00	-1.39	-0.84	-1.39	0.28
431.00	0.61	211.21	430.99	-1.64	-0.99	-1.64	0.49
522.00	0.71	221.98	521.99	-2.47	-1.62	-2.47	0.17
613.00	1.16	211.40	612.98	-3.68	-2.47	-3.68	0.53
704.00	0.92	182.77	703.96	-5.19	-2.99	-5.19	0.62
795.00	0.70	152.73	794.95	-6.42	-2.77	-6.42	0.52
898.00	0.75	101.80	897.95	-7.11	-1.82	-7.11	0.61
947.00	0.54	91.06	946.94	-7.18	-1.27	-7.18	0.49
9 5/8" Casing Set @ 947' MD :: 946.94' TVD							
968.00	0.46	83.58	967.94	-7.17	-1.09	-7.17	0.49
998.00	0.35	91.93	997.94	-7.16	-0.88	-7.16	0.42
1,028.00	0.15	100.29	1,027.94	-7.17	-0.75	-7.17	0.68
1,058.00	0.15	137.39	1,057.94	-7.21	-0.69	-7.21	0.32
1,089.00	0.18	103.27	1,088.94	-7.25	-0.61	-7.25	0.33
1,184.00	0.27	93.80	1,183.94	-7.30	-0.24	-7.30	0.10
1,279.00	0.24	114.88	1,278.94	-7.40	0.16	-7.40	0.10
1,374.00	0.49	166.25	1,373.94	-7.88	0.44	-7.88	0.41
1,469.00	0.55	168.80	1,468.93	-8.72	0.62	-8.72	0.07
1,564.00	0.48	180.38	1,563.93	-9.56	0.71	-9.56	0.13
1,660.00	1.07	47.56	1,659.92	-9.36	1.37	-9.36	1.50
1,755.00	1.19	45.66	1,754.91	-8.07	2.73	-8.07	0.13
1,851.00	1.07	60.74	1,850.89	-6.94	4.22	-6.94	0.33
1,946.00	1.17	63.53	1,945.87	-6.07	5.87	-6.07	0.12
2,041.00	1.21	88.19	2,040.85	-5.61	7.74	-5.61	0.54
2,136.00	1.61	79.31	2,135.82	-5.33	10.05	-5.33	0.48
2,232.00	1.86	84.67	2,231.78	-4.93	12.93	-4.93	0.31
2,327.00	1.46	85.66	2,326.74	-4.70	15.67	-4.70	0.42
2,422.00	1.98	75.39	2,421.69	-4.19	18.46	-4.19	0.63
2,517.00	0.96	79.56	2,516.66	-3.64	20.83	-3.64	1.08
2,613.00	0.90	82.31	2,612.65	-3.39	22.37	-3.39	0.08
2,708.00	0.85	92.35	2,707.64	-3.32	23.82	-3.32	0.17
2,803.00	0.90	90.90	2,802.63	-3.36	25.27	-3.36	0.06
2,898.00	1.15	98.70	2,897.61	-3.52	26.95	-3.52	0.30
2,993.00	1.29	91.96	2,992.59	-3.70	28.97	-3.70	0.21
3,088.00	1.36	97.85	3,087.56	-3.89	31.15	-3.89	0.16
3,184.00	1.42	99.12	3,183.54	-4.23	33.45	-4.23	0.07
3,279.00	1.32	100.54	3,278.51	-4.62	35.69	-4.62	0.11
3,374.00	2.47	89.68	3,373.46	-4.81	38.82	-4.81	1.26
3,469.00	2.49	92.49	3,468.37	-4.88	42.92	-4.88	0.13
3,566.00	2.95	88.17	3,565.26	-4.90	47.52	-4.90	0.52
3,662.00	3.66	87.94	3,661.10	-4.71	53.05	-4.71	0.74
3,757.00	3.74	88.02	3,755.90	-4.49	59.18	-4.49	0.08
3,852.00	3.54	89.18	3,850.71	-4.34	65.21	-4.34	0.22
3,947.00	3.31	93.72	3,945.54	-4.48	70.88	-4.48	0.37
4,042.00	3.39	96.26	4,040.38	-4.96	76.41	-4.96	0.18

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,138.00	3.14	102.13	4,136.22	-5.82	81.80	-5.82	0.43
4,233.00	3.32	97.99	4,231.07	-6.75	87.07	-6.75	0.31
4,328.00	2.80	97.92	4,325.93	-7.46	92.09	-7.46	0.55
4,423.00	1.92	92.95	4,420.85	-7.86	95.98	-7.86	0.95
4,514.00	1.82	91.93	4,511.80	-7.98	98.95	-7.98	0.12
4,549.00	1.51	63.66	4,546.79	-7.80	99.91	-7.80	2.48
4,581.00	5.12	31.72	4,578.73	-6.40	101.04	-6.40	12.25
4,612.00	9.36	24.19	4,609.48	-2.92	102.80	-2.92	13.99
4,644.00	12.59	19.07	4,640.89	2.75	105.01	2.75	10.53
4,676.00	15.65	15.58	4,671.92	10.21	107.31	10.21	9.92
4,708.00	18.36	13.26	4,702.52	19.27	109.63	19.27	8.73
4,740.00	21.68	13.40	4,732.58	29.93	112.15	29.93	10.38
4,771.00	25.80	11.46	4,760.95	42.12	114.82	42.12	13.53
4,803.00	29.18	8.66	4,789.34	56.66	117.38	56.66	11.31
4,835.00	32.07	5.35	4,816.87	72.84	119.35	72.84	10.45
4,867.00	35.39	3.60	4,843.48	90.55	120.72	90.55	10.81
4,899.00	37.70	3.75	4,869.19	109.56	121.94	109.56	7.22
4,930.00	39.57	3.65	4,893.40	128.87	123.19	128.87	6.04
4,962.00	42.58	3.44	4,917.52	149.86	124.49	149.86	9.42
4,994.00	45.08	0.30	4,940.61	172.00	125.20	172.00	10.35
5,025.00	47.26	358.90	4,962.08	194.36	125.04	194.36	7.75
5,057.00	50.46	358.82	4,983.13	218.45	124.56	218.45	10.00
5,089.00	53.89	0.07	5,002.75	243.72	124.32	243.72	11.15
5,121.00	56.39	359.61	5,021.04	269.98	124.25	269.98	7.90
5,152.00	59.80	359.26	5,037.42	296.29	123.98	296.29	11.04
5,184.00	62.95	359.96	5,052.75	324.37	123.80	324.37	10.03
5,216.00	65.68	0.02	5,066.61	353.21	123.79	353.21	8.53
5,248.00	68.38	0.46	5,079.10	382.67	123.92	382.67	8.53
5,279.00	70.09	359.68	5,090.09	411.65	123.95	411.65	6.00
5,311.00	70.59	0.23	5,100.86	441.79	123.93	441.79	2.25
5,343.00	71.44	359.34	5,111.27	472.05	123.81	472.05	3.74
5,374.00	71.77	359.25	5,121.05	501.46	123.45	501.46	1.10
5,406.00	72.21	358.75	5,130.94	531.89	122.92	531.89	2.02
5,438.00	72.50	358.91	5,140.64	562.37	122.30	562.37	1.02
5,470.00	72.97	357.96	5,150.14	592.92	121.46	592.92	3.19
5,502.00	73.21	358.68	5,159.45	623.52	120.56	623.52	2.28
5,534.00	73.84	359.11	5,168.53	654.20	119.97	654.20	2.35
5,565.00	76.88	359.81	5,176.36	684.19	119.69	684.19	10.05
5,597.00	79.77	0.25	5,182.83	715.53	119.71	715.53	9.13
5,629.00	82.70	0.84	5,187.71	747.15	120.01	747.15	9.34
5,654.67	83.69	0.67	5,190.75	772.64	120.35	772.64	3.91
7" Casing Set @ 5654.67' MD :: 5190.75' TVD							
5,714.00	85.98	0.29	5,196.09	831.72	120.84	831.72	3.91
5,745.00	86.54	0.32	5,198.11	862.65	121.01	862.65	1.81
5,776.00	88.02	0.50	5,199.59	893.62	121.23	893.62	4.81
5,806.00	89.14	0.11	5,200.33	923.61	121.39	923.61	3.95
5,837.00	89.75	0.23	5,200.63	954.60	121.48	954.60	2.01
5,868.00	90.19	359.53	5,200.65	985.60	121.42	985.60	2.67
5,898.00	90.74	359.63	5,200.40	1,015.60	121.20	1,015.60	1.86
5,929.00	91.11	358.88	5,199.90	1,046.59	120.79	1,046.59	2.70
5,959.00	91.11	358.75	5,199.32	1,076.58	120.17	1,076.58	0.43

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,989.00	91.54	358.48	5,198.63	1,106.57	119.45	1,106.57	1.69
6,020.00	90.12	358.26	5,198.18	1,137.55	118.57	1,137.55	4.64
6,051.00	90.31	358.23	5,198.06	1,168.53	117.62	1,168.53	0.62
6,081.00	88.64	358.78	5,198.34	1,198.52	116.83	1,198.52	5.86
6,112.00	88.95	359.37	5,198.99	1,229.51	116.33	1,229.51	2.15
6,143.00	89.57	359.23	5,199.39	1,260.50	115.95	1,260.50	2.05
6,174.00	88.09	359.80	5,200.02	1,291.50	115.69	1,291.50	5.12
6,204.00	88.27	0.23	5,200.97	1,321.48	115.70	1,321.48	1.55
6,234.00	87.10	0.87	5,202.19	1,351.45	115.99	1,351.45	4.44
6,264.00	87.28	1.04	5,203.66	1,381.41	116.49	1,381.41	0.82
6,294.00	87.78	0.84	5,204.95	1,411.38	116.98	1,411.38	1.79
6,325.00	88.15	0.70	5,206.05	1,442.36	117.40	1,442.36	1.28
6,356.00	88.70	0.56	5,206.90	1,473.35	117.74	1,473.35	1.83
6,386.00	89.32	0.84	5,207.42	1,503.34	118.10	1,503.34	2.27
6,417.00	88.77	1.25	5,207.94	1,534.33	118.67	1,534.33	2.21
6,448.00	89.20	0.78	5,208.49	1,565.32	119.22	1,565.32	2.05
6,479.00	87.35	1.00	5,209.42	1,596.30	119.70	1,596.30	6.01
6,509.00	87.66	1.05	5,210.73	1,626.27	120.23	1,626.27	1.05
6,540.00	88.27	0.93	5,211.83	1,657.24	120.77	1,657.24	2.01
6,574.00	88.70	0.87	5,212.73	1,691.23	121.30	1,691.23	1.28
6,604.00	87.65	1.01	5,213.68	1,721.21	121.80	1,721.21	3.53
6,636.00	87.90	0.96	5,214.92	1,753.18	122.34	1,753.18	0.80
6,668.00	87.10	1.36	5,216.32	1,785.14	122.99	1,785.14	2.79
6,700.00	88.09	1.32	5,217.66	1,817.10	123.74	1,817.10	3.10
6,732.00	88.58	0.93	5,218.59	1,849.08	124.37	1,849.08	1.96
6,764.00	87.90	0.77	5,219.57	1,881.07	124.84	1,881.07	2.18
6,796.00	88.39	0.47	5,220.61	1,913.05	125.19	1,913.05	1.80
6,827.00	88.95	0.07	5,221.33	1,944.04	125.33	1,944.04	2.22
6,859.00	88.27	358.60	5,222.11	1,976.02	124.96	1,976.02	5.06
6,891.00	89.14	358.71	5,222.83	2,008.01	124.21	2,008.01	2.74
6,923.00	88.40	358.82	5,223.52	2,039.99	123.52	2,039.99	2.34
6,954.00	88.83	359.06	5,224.27	2,070.98	122.95	2,070.98	1.59
6,987.00	87.59	359.09	5,225.30	2,103.96	122.42	2,103.96	3.76
7,018.00	86.60	359.37	5,226.87	2,134.91	122.00	2,134.91	3.32
7,050.00	86.91	359.26	5,228.68	2,166.86	121.62	2,166.86	1.03
7,082.00	87.28	358.99	5,230.30	2,198.82	121.13	2,198.82	1.43
7,113.00	88.09	358.65	5,231.55	2,229.78	120.49	2,229.78	2.83
7,145.00	88.89	358.36	5,232.40	2,261.76	119.66	2,261.76	2.66
7,177.00	89.07	358.05	5,232.97	2,293.74	118.66	2,293.74	1.12
7,208.00	87.84	358.51	5,233.80	2,324.71	117.73	2,324.71	4.24
7,240.00	88.21	358.43	5,234.90	2,356.68	116.87	2,356.68	1.18
7,271.00	88.27	358.05	5,235.86	2,387.65	115.92	2,387.65	1.24
7,303.00	86.97	357.48	5,237.18	2,419.60	114.67	2,419.60	4.44
7,335.00	87.34	357.61	5,238.77	2,451.53	113.30	2,451.53	1.23
7,367.00	87.59	356.99	5,240.19	2,483.47	111.80	2,483.47	2.09
7,399.00	87.96	356.59	5,241.43	2,515.39	110.01	2,515.39	1.70
7,430.00	88.39	356.87	5,242.42	2,546.33	108.24	2,546.33	1.65
7,462.00	88.02	357.34	5,243.42	2,578.27	106.63	2,578.27	1.87
7,494.00	88.52	357.32	5,244.39	2,610.22	105.14	2,610.22	1.56
7,525.00	87.90	358.08	5,245.35	2,641.18	103.89	2,641.18	3.16
7,557.00	86.91	358.74	5,246.80	2,673.13	103.00	2,673.13	3.72

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,589.00	87.10	359.58	5,248.48	2,705.09	102.54	2,705.09	2.69
7,621.00	85.98	0.55	5,250.41	2,737.03	102.57	2,737.03	4.63
7,652.00	86.48	0.50	5,252.45	2,767.96	102.86	2,767.96	1.62
7,684.00	86.91	0.30	5,254.29	2,799.90	103.08	2,799.90	1.48
7,716.00	87.65	359.36	5,255.81	2,831.87	102.98	2,831.87	3.74
7,748.00	88.21	359.60	5,256.96	2,863.84	102.69	2,863.84	1.90
7,780.00	87.96	0.77	5,258.03	2,895.83	102.80	2,895.83	3.74
7,811.00	88.52	1.09	5,258.99	2,926.81	103.30	2,926.81	2.08
7,843.00	88.89	1.36	5,259.71	2,958.79	103.98	2,958.79	1.43
7,873.00	89.32	1.20	5,260.18	2,988.78	104.65	2,988.78	1.53
7,905.00	89.75	0.61	5,260.44	3,020.77	105.16	3,020.77	2.28
7,937.00	90.12	0.50	5,260.47	3,052.77	105.47	3,052.77	1.21
7,968.00	90.80	0.53	5,260.22	3,083.77	105.75	3,083.77	2.20
8,000.00	90.86	0.92	5,259.76	3,115.76	106.15	3,115.76	1.23
8,032.00	91.48	0.70	5,259.11	3,147.75	106.61	3,147.75	2.06
8,064.00	90.19	1.34	5,258.64	3,179.75	107.17	3,179.75	4.50
8,095.00	90.37	1.75	5,258.49	3,210.73	108.01	3,210.73	1.44
8,127.00	89.44	1.66	5,258.54	3,242.72	108.96	3,242.72	2.92
8,158.00	89.88	1.63	5,258.73	3,273.71	109.85	3,273.71	1.42
8,190.00	89.07	2.10	5,259.02	3,305.69	110.89	3,305.69	2.93
8,221.00	89.81	2.22	5,259.32	3,336.66	112.06	3,336.66	2.42
8,253.00	88.58	2.31	5,259.77	3,368.63	113.33	3,368.63	3.85
8,284.00	88.70	2.17	5,260.51	3,399.60	114.54	3,399.60	0.59
8,316.00	87.22	2.72	5,261.65	3,431.55	115.90	3,431.55	4.93
8,348.00	85.67	2.42	5,263.63	3,463.46	117.33	3,463.46	4.93
8,380.00	85.92	2.03	5,265.98	3,495.35	118.57	3,495.35	1.44
8,411.00	85.49	0.87	5,268.30	3,526.25	119.36	3,526.25	3.98
8,443.00	85.67	0.93	5,270.77	3,558.15	119.86	3,558.15	0.59
8,475.00	84.55	0.30	5,273.49	3,590.03	120.20	3,590.03	4.01
8,506.00	84.80	0.16	5,276.37	3,620.90	120.32	3,620.90	0.92
8,538.00	85.30	0.17	5,279.13	3,652.78	120.41	3,652.78	1.56
8,570.00	85.86	359.77	5,281.60	3,684.68	120.40	3,684.68	2.15
8,602.00	86.66	359.91	5,283.69	3,716.61	120.31	3,716.61	2.54
8,634.00	87.90	1.14	5,285.20	3,748.58	120.60	3,748.58	5.45
8,665.00	87.23	0.45	5,286.52	3,779.54	121.03	3,779.54	3.10
8,697.00	85.24	0.28	5,288.62	3,811.47	121.24	3,811.47	6.24
8,728.00	85.55	0.18	5,291.11	3,842.37	121.36	3,842.37	1.05
8,760.00	86.42	0.22	5,293.35	3,874.29	121.47	3,874.29	2.72
8,792.00	86.48	359.90	5,295.33	3,906.23	121.50	3,906.23	1.02
8,823.00	86.23	359.38	5,297.30	3,937.17	121.31	3,937.17	1.86
8,855.00	88.64	358.85	5,298.74	3,969.13	120.82	3,969.13	7.71
8,887.00	91.60	359.89	5,298.67	4,001.12	120.46	4,001.12	9.80
8,918.00	90.56	359.85	5,298.08	4,032.12	120.39	4,032.12	3.36
8,950.00	88.77	359.40	5,298.27	4,064.12	120.18	4,064.12	5.77
8,982.00	87.90	358.06	5,299.20	4,096.09	119.48	4,096.09	4.99
9,014.00	86.97	357.47	5,300.63	4,128.04	118.23	4,128.04	3.44
9,045.00	85.86	356.85	5,302.57	4,158.94	116.70	4,158.94	4.10
9,077.00	87.16	356.97	5,304.52	4,190.83	114.97	4,190.83	4.08
9,108.00	90.87	358.74	5,305.05	4,221.80	113.81	4,221.80	13.26
9,140.00	93.58	359.10	5,303.81	4,253.76	113.21	4,253.76	8.54
9,193.00	92.35	357.88	5,301.07	4,306.67	111.82	4,306.67	3.27

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
Final MWD Survey @ 9193.00ft							
9,230.00	92.35	357.88	5,299.55	4,343.62	110.45	4,343.62	0.00
Final Proj to Bit @ 9230' MD :: 5299.83' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
131.00	131.00	-0.32	0.01	First MWD Survey @ 131.00ft
9,193.00	5,301.07	4,306.67	111.82	Final MWD Survey @ 9193.00ft
9,230.00	5,299.55	4,343.62	110.45	Final Proj to Bit @ 9230' MD :: 5299.83' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.00	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
131.00	5,714.00	MWD Field Surveys Through Tangent	MWD+SC
5,745.00	9,193.00	MWD Post Tangent and Lateral Surveys	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
947.00	946.94	9 5/8" Casing Set @ 947' MD :: 946.94' TVD	9-5/8	12-1/4
5,654.67	5,190.75	7" Casing Set @ 5654.67' MD :: 5190.75' TVD	7	8-3/4

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

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
SWITCHMAN 1647-17 - actual wellpath hits target center	0.00	0.00	0.00	0.00	0.00	1,312,586.05	3,796,153.27	38° 39' 29.055 N	102° 42' 41.465 W
- Polygon									
Point 1				0.00	5,006.95	-587.29	1,317,572.45	3,795,412.62	
Point 2				0.00	4,965.86	2,063.02	1,317,612.71	3,798,062.86	
Point 3				0.00	4,922.51	4,709.33	1,317,650.60	3,800,709.16	
Point 4				0.00	2,229.18	4,726.56	1,314,959.16	3,800,809.04	
Point 5				0.00	-390.70	4,707.48	1,312,340.02	3,800,870.37	
Point 6				0.00	-367.84	2,053.25	1,312,281.41	3,798,216.78	
Point 7				0.00	-344.97	-600.98	1,312,222.81	3,795,563.18	
Point 8				0.00	2,330.99	-594.14	1,314,897.63	3,795,487.90	
Point 9				0.00	5,006.95	-587.29	1,317,572.45	3,795,412.62	
SWITCHMAN 1647-17 - actual wellpath hits target center	0.00	0.00	0.00	0.00	0.00	1,312,586.05	3,796,153.27	38° 39' 29.055 N	102° 42' 41.465 W
- Point									
SWITCHMAN 1647-17 - actual wellpath hits target center	0.00	0.00	0.00	0.00	0.00	1,312,586.05	3,796,153.27	38° 39' 29.055 N	102° 42' 41.465 W
- Polygon									
Point 1				0.00	4,539.76	-128.47	1,317,119.58	3,795,885.55	
Point 2				0.00	4,469.92	4,252.20	1,317,184.21	3,800,266.15	
Point 3				0.00	73.26	4,250.83	1,312,789.73	3,800,399.71	
Point 4				0.00	111.08	-139.81	1,312,692.79	3,796,010.13	
SWITCHMAN 1647-17 - actual wellpath misses target center by 118.58usft at 9230.00usft MD (5299.55 TVD, 4343.62 N, 110.45 E)	0.00	0.00	5,181.00	4,346.05	111.07	1,316,933.32	3,796,130.91	38° 40' 12.014 N	102° 42' 40.064 W
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	2.25 °/100usft	Maximum Dogleg over Survey:	13.99 °/100usft at 4,612.00 usft
Net Tortousity applicable to Plans:	1.10 °/100usft	Directional Difficulty Index:	6.209

Audit Info

North Reference Sheet for Sec. 17-T16S-R47W - Switchman 1647-17-11-H - Plan D

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

Vertical Depths are relative to RKB = 19' @ 4204.00usft (Pioneer 54). Northing and Easting are relative to Switchman 1647-17-11-H

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

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is 105° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:39° 45' 0.000 N°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996561

Grid Coordinates of Well: 1,312,586.05 usft N, 3,796,153.27 usft E

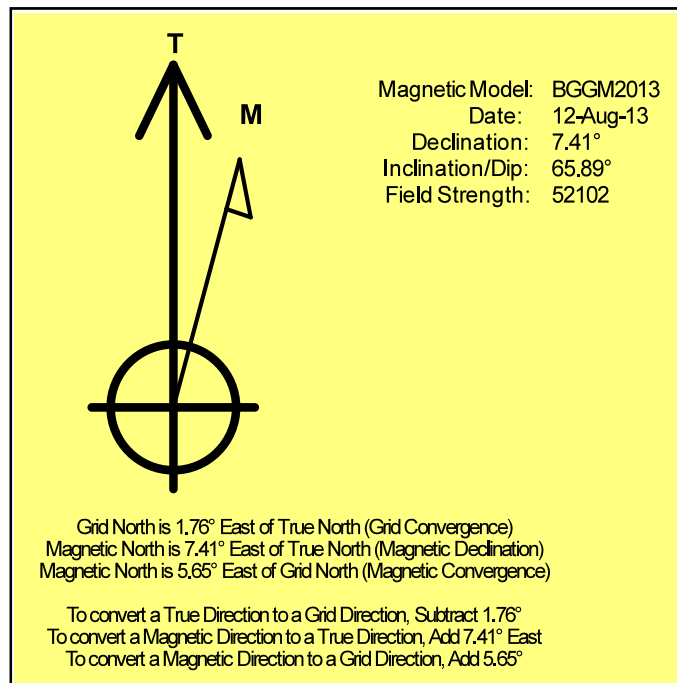
Geographical Coordinates of Well: 38° 39' 29.06" N, 102° 42' 41.46" W

Grid Convergence at Surface is: 1.76°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,230.00usft

the Bottom Hole Displacement is 4,345.02usft in the Direction of 1.46° (True).

Magnetic Convergence at surface is: -5.65° (12 August 2013, , BGGM2013)



Anadarko Petroleum Corp.

Cheyenne County, CO (NAD 83)

Sec. 17-T16S-R47W

Switchman 1647-17-11-H

Plan D

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

05 February, 2014

Well Coordinates: 1,312,586.05 N, 3,796,153.27 E (38° 39' 29.06" N, 102° 42' 41.46" W)

Ground Level: 4,185.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Switchman 1647-17-11-H

RKB = 19' @ 4204.00usft (Pioneer 54)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	38.658071	-102.711518	1,312,586.05	3,796,153.27
131.00	0.28	178.24	131.00	-0.32	0.01	38.658070	-102.711518	1,312,585.73	3,796,153.29
220.00	0.34	238.19	220.00	-0.68	-0.21	38.658069	-102.711519	1,312,585.37	3,796,153.09
310.00	0.22	223.79	310.00	-0.94	-0.55	38.658068	-102.711520	1,312,585.09	3,796,152.75
400.00	0.46	207.94	400.00	-1.39	-0.84	38.658067	-102.711521	1,312,584.64	3,796,152.47
431.00	0.61	211.21	430.99	-1.64	-0.99	38.658067	-102.711522	1,312,584.39	3,796,152.34
522.00	0.71	221.98	521.99	-2.47	-1.62	38.658064	-102.711524	1,312,583.53	3,796,151.74
613.00	1.16	211.40	612.98	-3.68	-2.47	38.658061	-102.711527	1,312,582.30	3,796,150.92
704.00	0.92	182.77	703.96	-5.19	-2.99	38.658057	-102.711529	1,312,580.77	3,796,150.45
795.00	0.70	152.73	794.95	-6.42	-2.77	38.658053	-102.711528	1,312,579.56	3,796,150.70
898.00	0.75	101.80	897.95	-7.11	-1.82	38.658051	-102.711525	1,312,578.89	3,796,151.67
947.00	0.54	91.06	946.94	-7.18	-1.27	38.658051	-102.711523	1,312,578.84	3,796,152.22
968.00	0.46	83.58	967.94	-7.17	-1.09	38.658051	-102.711522	1,312,578.85	3,796,152.40
998.00	0.35	91.93	997.94	-7.16	-0.88	38.658051	-102.711521	1,312,578.87	3,796,152.61
1,028.00	0.15	100.29	1,027.94	-7.17	-0.75	38.658051	-102.711521	1,312,578.86	3,796,152.74
1,058.00	0.15	137.39	1,057.94	-7.21	-0.69	38.658051	-102.711521	1,312,578.83	3,796,152.81
1,089.00	0.18	103.27	1,088.94	-7.25	-0.61	38.658051	-102.711520	1,312,578.79	3,796,152.89
1,184.00	0.27	93.80	1,183.94	-7.30	-0.24	38.658051	-102.711519	1,312,578.75	3,796,153.26
1,279.00	0.24	114.88	1,278.94	-7.40	0.16	38.658051	-102.711518	1,312,578.66	3,796,153.66
1,374.00	0.49	166.25	1,373.94	-7.88	0.44	38.658049	-102.711517	1,312,578.19	3,796,153.96
1,469.00	0.55	168.80	1,468.93	-8.72	0.62	38.658047	-102.711516	1,312,577.36	3,796,154.17
1,564.00	0.48	180.38	1,563.93	-9.56	0.71	38.658045	-102.711516	1,312,576.52	3,796,154.28
1,660.00	1.07	47.56	1,659.92	-9.36	1.37	38.658045	-102.711513	1,312,576.74	3,796,154.93
1,755.00	1.19	45.66	1,754.91	-8.07	2.73	38.658049	-102.711509	1,312,578.07	3,796,156.25
1,851.00	1.07	60.74	1,850.89	-6.94	4.22	38.658052	-102.711503	1,312,579.25	3,796,157.71
1,946.00	1.17	63.53	1,945.87	-6.07	5.87	38.658054	-102.711498	1,312,580.16	3,796,159.32
2,041.00	1.21	88.19	2,040.85	-5.61	7.74	38.658056	-102.711491	1,312,580.68	3,796,161.18
2,136.00	1.61	79.31	2,135.82	-5.33	10.05	38.658056	-102.711483	1,312,581.03	3,796,163.48
2,232.00	1.86	84.67	2,231.78	-4.93	12.93	38.658057	-102.711473	1,312,581.52	3,796,166.35
2,327.00	1.46	85.66	2,326.74	-4.70	15.67	38.658058	-102.711463	1,312,581.84	3,796,169.08
2,422.00	1.98	75.39	2,421.69	-4.19	18.46	38.658059	-102.711454	1,312,582.43	3,796,171.86
2,517.00	0.96	79.56	2,516.66	-3.64	20.83	38.658061	-102.711445	1,312,583.06	3,796,174.21
2,613.00	0.90	82.31	2,612.65	-3.39	22.37	38.658062	-102.711440	1,312,583.35	3,796,175.74
2,708.00	0.85	92.35	2,707.64	-3.32	23.82	38.658062	-102.711435	1,312,583.47	3,796,177.18
2,803.00	0.90	90.90	2,802.63	-3.36	25.27	38.658062	-102.711430	1,312,583.47	3,796,178.63
2,898.00	1.15	98.70	2,897.61	-3.52	26.95	38.658061	-102.711424	1,312,583.37	3,796,180.32
2,993.00	1.29	91.96	2,992.59	-3.70	28.97	38.658061	-102.711417	1,312,583.25	3,796,182.34
3,088.00	1.36	97.85	3,087.56	-3.89	31.15	38.658060	-102.711409	1,312,583.12	3,796,184.53
3,184.00	1.42	99.12	3,183.54	-4.23	33.45	38.658059	-102.711401	1,312,582.85	3,796,186.84
3,279.00	1.32	100.54	3,278.51	-4.62	35.69	38.658058	-102.711393	1,312,582.53	3,796,189.09
3,374.00	2.47	89.68	3,373.46	-4.81	38.82	38.658058	-102.711382	1,312,582.44	3,796,192.22
3,469.00	2.49	92.49	3,468.37	-4.88	42.92	38.658058	-102.711368	1,312,582.49	3,796,196.33

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
3,566.00	2.95	88.17	3,565.26	-4.90	47.52	38.658058	-102.711352	1,312,582.62	3,796,200.92
3,662.00	3.66	87.94	3,661.10	-4.71	53.05	38.658058	-102.711332	1,312,582.98	3,796,206.45
3,757.00	3.74	88.02	3,755.90	-4.49	59.18	38.658059	-102.711311	1,312,583.38	3,796,212.56
3,852.00	3.54	89.18	3,850.71	-4.34	65.21	38.658059	-102.711290	1,312,583.71	3,796,218.59
3,947.00	3.31	93.72	3,945.54	-4.48	70.88	38.658059	-102.711270	1,312,583.75	3,796,224.26
4,042.00	3.39	96.26	4,040.38	-4.96	76.41	38.658057	-102.711251	1,312,583.44	3,796,229.80
4,138.00	3.14	102.13	4,136.22	-5.82	81.80	38.658055	-102.711232	1,312,582.74	3,796,235.21
4,233.00	3.32	97.99	4,231.07	-6.75	87.07	38.658052	-102.711213	1,312,581.98	3,796,240.51
4,328.00	2.80	97.92	4,325.93	-7.46	92.09	38.658051	-102.711196	1,312,581.43	3,796,245.55
4,423.00	1.92	92.95	4,420.85	-7.86	95.98	38.658049	-102.711182	1,312,581.15	3,796,249.45
4,514.00	1.82	91.93	4,511.80	-7.98	98.95	38.658049	-102.711172	1,312,581.11	3,796,252.42
4,549.00	1.51	63.66	4,546.79	-7.80	99.91	38.658050	-102.711168	1,312,581.33	3,796,253.38
4,581.00	5.12	31.72	4,578.73	-6.40	101.04	38.658053	-102.711164	1,312,582.76	3,796,254.46
4,612.00	9.36	24.19	4,609.48	-2.92	102.80	38.658063	-102.711158	1,312,586.29	3,796,256.12
4,644.00	12.59	19.07	4,640.89	2.75	105.01	38.658079	-102.711151	1,312,592.03	3,796,258.15
4,676.00	15.65	15.58	4,671.92	10.21	107.31	38.658099	-102.711142	1,312,599.55	3,796,260.22
4,708.00	18.36	13.26	4,702.52	19.27	109.63	38.658124	-102.711134	1,312,608.68	3,796,262.25
4,740.00	21.68	13.40	4,732.58	29.93	112.15	38.658153	-102.711126	1,312,619.41	3,796,264.45
4,771.00	25.80	11.46	4,760.95	42.12	114.82	38.658187	-102.711116	1,312,631.67	3,796,266.75
4,803.00	29.18	8.66	4,789.34	56.66	117.38	38.658227	-102.711107	1,312,646.29	3,796,268.86
4,835.00	32.07	5.35	4,816.87	72.84	119.35	38.658271	-102.711100	1,312,662.51	3,796,270.33
4,867.00	35.39	3.60	4,843.48	90.55	120.72	38.658320	-102.711096	1,312,680.26	3,796,271.16
4,899.00	37.70	3.75	4,869.19	109.56	121.94	38.658372	-102.711091	1,312,699.30	3,796,271.79
4,930.00	39.57	3.65	4,893.40	128.87	123.19	38.658425	-102.711087	1,312,718.64	3,796,272.45
4,962.00	42.58	3.44	4,917.52	149.86	124.49	38.658482	-102.711082	1,312,739.66	3,796,273.10
4,994.00	45.08	0.30	4,940.61	172.00	125.20	38.658543	-102.711080	1,312,761.81	3,796,273.13
5,025.00	47.26	358.90	4,962.08	194.36	125.04	38.658605	-102.711080	1,312,784.15	3,796,272.29
5,057.00	50.46	358.82	4,983.13	218.45	124.56	38.658671	-102.711082	1,312,808.22	3,796,271.07
5,089.00	53.89	0.07	5,002.75	243.72	124.32	38.658740	-102.711083	1,312,833.47	3,796,270.05
5,121.00	56.39	359.61	5,021.04	269.98	124.25	38.658812	-102.711083	1,312,859.71	3,796,269.17
5,152.00	59.80	359.26	5,037.42	296.29	123.98	38.658885	-102.711084	1,312,886.00	3,796,268.10
5,184.00	62.95	359.96	5,052.75	324.37	123.80	38.658962	-102.711085	1,312,914.06	3,796,267.05
5,216.00	65.68	0.02	5,066.61	353.21	123.79	38.659041	-102.711085	1,312,942.88	3,796,266.16
5,248.00	68.38	0.46	5,079.10	382.67	123.92	38.659122	-102.711084	1,312,972.33	3,796,265.38
5,279.00	70.09	359.68	5,090.09	411.65	123.95	38.659201	-102.711084	1,313,001.30	3,796,264.53
5,311.00	70.59	0.23	5,100.86	441.79	123.93	38.659284	-102.711084	1,313,031.42	3,796,263.58
5,343.00	71.44	359.34	5,111.27	472.05	123.81	38.659367	-102.711085	1,313,061.66	3,796,262.54
5,374.00	71.77	359.25	5,121.05	501.46	123.45	38.659448	-102.711086	1,313,091.05	3,796,261.27
5,406.00	72.21	358.75	5,130.94	531.89	122.92	38.659531	-102.711088	1,313,121.44	3,796,259.81
5,438.00	72.50	358.91	5,140.64	562.37	122.30	38.659615	-102.711090	1,313,151.90	3,796,258.25
5,470.00	72.97	357.96	5,150.14	592.92	121.46	38.659699	-102.711093	1,313,182.40	3,796,256.48
5,502.00	73.21	358.68	5,159.45	623.52	120.56	38.659783	-102.711096	1,313,212.96	3,796,254.64

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
5,534.00	73.84	359.11	5,168.53	654.20	119.97	38.659867	-102.711098	1,313,243.61	3,796,253.11
5,565.00	76.88	359.81	5,176.36	684.19	119.69	38.659950	-102.711099	1,313,273.57	3,796,251.91
5,597.00	79.77	0.25	5,182.83	715.53	119.71	38.660036	-102.711099	1,313,304.89	3,796,250.96
5,629.00	82.70	0.84	5,187.71	747.15	120.01	38.660122	-102.711098	1,313,336.51	3,796,250.29
5,654.67	83.69	0.67	5,190.75	772.64	120.35	38.660192	-102.711097	1,313,361.99	3,796,249.85
5,714.00	85.98	0.29	5,196.09	831.72	120.84	38.660355	-102.711095	1,313,421.06	3,796,248.53
5,745.00	86.54	0.32	5,198.11	862.65	121.01	38.660440	-102.711095	1,313,451.98	3,796,247.75
5,776.00	88.02	0.50	5,199.59	893.62	121.23	38.660525	-102.711094	1,313,482.94	3,796,247.02
5,806.00	89.14	0.11	5,200.33	923.61	121.39	38.660607	-102.711093	1,313,512.92	3,796,246.26
5,837.00	89.75	0.23	5,200.63	954.60	121.48	38.660692	-102.711093	1,313,543.90	3,796,245.40
5,868.00	90.19	359.53	5,200.65	985.60	121.42	38.660777	-102.711093	1,313,574.88	3,796,244.38
5,898.00	90.74	359.63	5,200.40	1,015.60	121.20	38.660860	-102.711094	1,313,604.86	3,796,243.24
5,929.00	91.11	358.88	5,199.90	1,046.59	120.79	38.660945	-102.711095	1,313,635.83	3,796,241.89
5,959.00	91.11	358.75	5,199.32	1,076.58	120.17	38.661027	-102.711097	1,313,665.78	3,796,240.35
5,989.00	91.54	358.48	5,198.63	1,106.57	119.45	38.661109	-102.711100	1,313,695.73	3,796,238.70
6,020.00	90.12	358.26	5,198.18	1,137.55	118.57	38.661194	-102.711103	1,313,726.67	3,796,236.87
6,051.00	90.31	358.23	5,198.06	1,168.53	117.62	38.661279	-102.711106	1,313,757.61	3,796,234.97
6,081.00	88.64	358.78	5,198.34	1,198.52	116.83	38.661362	-102.711109	1,313,787.55	3,796,233.27
6,112.00	88.95	359.37	5,198.99	1,229.51	116.33	38.661447	-102.711111	1,313,818.51	3,796,231.82
6,143.00	89.57	359.23	5,199.39	1,260.50	115.95	38.661532	-102.711112	1,313,849.48	3,796,230.49
6,174.00	88.09	359.80	5,200.02	1,291.50	115.69	38.661617	-102.711113	1,313,880.45	3,796,229.27
6,204.00	88.27	0.23	5,200.97	1,321.48	115.70	38.661699	-102.711113	1,313,910.42	3,796,228.36
6,234.00	87.10	0.87	5,202.19	1,351.45	115.99	38.661782	-102.711112	1,313,940.38	3,796,227.73
6,264.00	87.28	1.04	5,203.66	1,381.41	116.49	38.661864	-102.711110	1,313,970.34	3,796,227.31
6,294.00	87.78	0.84	5,204.95	1,411.38	116.98	38.661946	-102.711109	1,314,000.31	3,796,226.88
6,325.00	88.15	0.70	5,206.05	1,442.36	117.40	38.662031	-102.711107	1,314,031.29	3,796,226.35
6,356.00	88.70	0.56	5,206.90	1,473.35	117.74	38.662116	-102.711106	1,314,062.27	3,796,225.74
6,386.00	89.32	0.84	5,207.42	1,503.34	118.10	38.662199	-102.711105	1,314,092.26	3,796,225.18
6,417.00	88.77	1.25	5,207.94	1,534.33	118.67	38.662284	-102.711103	1,314,123.25	3,796,224.80
6,448.00	89.20	0.78	5,208.49	1,565.32	119.22	38.662369	-102.711101	1,314,154.24	3,796,224.39
6,479.00	87.35	1.00	5,209.42	1,596.30	119.70	38.662454	-102.711099	1,314,185.22	3,796,223.92
6,509.00	87.66	1.05	5,210.73	1,626.27	120.23	38.662536	-102.711097	1,314,215.19	3,796,223.54
6,540.00	88.27	0.93	5,211.83	1,657.24	120.77	38.662621	-102.711095	1,314,246.17	3,796,223.12
6,574.00	88.70	0.87	5,212.73	1,691.23	121.30	38.662715	-102.711093	1,314,280.15	3,796,222.62
6,604.00	87.65	1.01	5,213.68	1,721.21	121.80	38.662797	-102.711092	1,314,310.13	3,796,222.19
6,636.00	87.90	0.96	5,214.92	1,753.18	122.34	38.662885	-102.711090	1,314,342.10	3,796,221.76
6,668.00	87.10	1.36	5,216.32	1,785.14	122.99	38.662973	-102.711088	1,314,374.07	3,796,221.42
6,700.00	88.09	1.32	5,217.66	1,817.10	123.74	38.663060	-102.711085	1,314,406.04	3,796,221.19
6,732.00	88.58	0.93	5,218.59	1,849.08	124.37	38.663148	-102.711083	1,314,438.02	3,796,220.83
6,764.00	87.90	0.77	5,219.57	1,881.07	124.84	38.663236	-102.711081	1,314,470.00	3,796,220.33
6,796.00	88.39	0.47	5,220.61	1,913.05	125.19	38.663324	-102.711080	1,314,501.97	3,796,219.69
6,827.00	88.95	0.07	5,221.33	1,944.04	125.33	38.663409	-102.711079	1,314,532.95	3,796,218.89

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
6,859.00	88.27	358.60	5,222.11	1,976.02	124.96	38.663497	-102.711081	1,314,564.91	3,796,217.53
6,891.00	89.14	358.71	5,222.83	2,008.01	124.21	38.663584	-102.711083	1,314,596.86	3,796,215.80
6,923.00	88.40	358.82	5,223.52	2,039.99	123.52	38.663672	-102.711086	1,314,628.81	3,796,214.13
6,954.00	88.83	359.06	5,224.27	2,070.98	122.95	38.663757	-102.711088	1,314,659.76	3,796,212.61
6,987.00	87.59	359.09	5,225.30	2,103.96	122.42	38.663848	-102.711090	1,314,692.70	3,796,211.06
7,018.00	86.60	359.37	5,226.87	2,134.91	122.00	38.663933	-102.711091	1,314,723.63	3,796,209.70
7,050.00	86.91	359.26	5,228.68	2,166.86	121.62	38.664021	-102.711092	1,314,755.55	3,796,208.33
7,082.00	87.28	358.99	5,230.30	2,198.82	121.13	38.664108	-102.711094	1,314,787.47	3,796,206.87
7,113.00	88.09	358.65	5,231.55	2,229.78	120.49	38.664193	-102.711096	1,314,818.41	3,796,205.28
7,145.00	88.89	358.36	5,232.40	2,261.76	119.66	38.664281	-102.711099	1,314,850.34	3,796,203.46
7,177.00	89.07	358.05	5,232.97	2,293.74	118.66	38.664369	-102.711103	1,314,882.28	3,796,201.48
7,208.00	87.84	358.51	5,233.80	2,324.71	117.73	38.664454	-102.711106	1,314,913.21	3,796,199.60
7,240.00	88.21	358.43	5,234.90	2,356.68	116.87	38.664542	-102.711109	1,314,945.13	3,796,197.76
7,271.00	88.27	358.05	5,235.86	2,387.65	115.92	38.664627	-102.711112	1,314,976.06	3,796,195.86
7,303.00	86.97	357.48	5,237.18	2,419.60	114.67	38.664715	-102.711117	1,315,007.95	3,796,193.64
7,335.00	87.34	357.61	5,238.77	2,451.53	113.30	38.664802	-102.711121	1,315,039.82	3,796,191.29
7,367.00	87.59	356.99	5,240.19	2,483.47	111.80	38.664890	-102.711127	1,315,071.70	3,796,188.80
7,399.00	87.96	356.59	5,241.43	2,515.39	110.01	38.664978	-102.711133	1,315,103.55	3,796,186.03
7,430.00	88.39	356.87	5,242.42	2,546.33	108.24	38.665063	-102.711139	1,315,134.41	3,796,183.32
7,462.00	88.02	357.34	5,243.42	2,578.27	106.63	38.665150	-102.711145	1,315,166.29	3,796,180.72
7,494.00	88.52	357.32	5,244.39	2,610.22	105.14	38.665238	-102.711150	1,315,198.18	3,796,178.25
7,525.00	87.90	358.08	5,245.35	2,641.18	103.89	38.665323	-102.711154	1,315,229.09	3,796,176.06
7,557.00	86.91	358.74	5,246.80	2,673.13	103.00	38.665411	-102.711158	1,315,261.00	3,796,174.19
7,589.00	87.10	359.58	5,248.48	2,705.09	102.54	38.665498	-102.711159	1,315,292.92	3,796,172.74
7,621.00	85.98	0.55	5,250.41	2,737.03	102.57	38.665586	-102.711159	1,315,324.84	3,796,171.80
7,652.00	86.48	0.50	5,252.45	2,767.96	102.86	38.665671	-102.711158	1,315,355.77	3,796,171.13
7,684.00	86.91	0.30	5,254.29	2,799.90	103.08	38.665759	-102.711157	1,315,387.71	3,796,170.38
7,716.00	87.65	359.36	5,255.81	2,831.87	102.98	38.665847	-102.711158	1,315,419.65	3,796,169.30
7,748.00	88.21	359.60	5,256.96	2,863.84	102.69	38.665934	-102.711159	1,315,451.60	3,796,168.03
7,780.00	87.96	0.77	5,258.03	2,895.83	102.80	38.666022	-102.711158	1,315,483.57	3,796,167.15
7,811.00	88.52	1.09	5,258.99	2,926.81	103.30	38.666107	-102.711156	1,315,514.55	3,796,166.70
7,843.00	88.89	1.36	5,259.71	2,958.79	103.98	38.666195	-102.711154	1,315,546.54	3,796,166.40
7,873.00	89.32	1.20	5,260.18	2,988.78	104.65	38.666277	-102.711152	1,315,576.53	3,796,166.15
7,905.00	89.75	0.61	5,260.44	3,020.77	105.16	38.666365	-102.711150	1,315,608.53	3,796,165.68
7,937.00	90.12	0.50	5,260.47	3,052.77	105.47	38.666453	-102.711149	1,315,640.52	3,796,165.01
7,968.00	90.80	0.53	5,260.22	3,083.77	105.75	38.666538	-102.711148	1,315,671.51	3,796,164.33
8,000.00	90.86	0.92	5,259.76	3,115.76	106.15	38.666626	-102.711146	1,315,703.50	3,796,163.76
8,032.00	91.48	0.70	5,259.11	3,147.75	106.61	38.666714	-102.711145	1,315,735.49	3,796,163.23
8,064.00	90.19	1.34	5,258.64	3,179.75	107.17	38.666802	-102.711143	1,315,767.48	3,796,162.81
8,095.00	90.37	1.75	5,258.49	3,210.73	108.01	38.666887	-102.711140	1,315,798.48	3,796,162.70
8,127.00	89.44	1.66	5,258.54	3,242.72	108.96	38.666975	-102.711137	1,315,830.48	3,796,162.67
8,158.00	89.88	1.63	5,258.73	3,273.71	109.85	38.667060	-102.711134	1,315,861.48	3,796,162.61

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
8,190.00	89.07	2.10	5,259.02	3,305.69	110.89	38.667148	-102.711130	1,315,893.47	3,796,162.67
8,221.00	89.81	2.22	5,259.32	3,336.66	112.06	38.667233	-102.711126	1,315,924.47	3,796,162.88
8,253.00	88.58	2.31	5,259.77	3,368.63	113.33	38.667320	-102.711121	1,315,956.46	3,796,163.17
8,284.00	88.70	2.17	5,260.51	3,399.60	114.54	38.667405	-102.711117	1,315,987.45	3,796,163.43
8,316.00	87.22	2.72	5,261.65	3,431.55	115.90	38.667493	-102.711112	1,316,019.43	3,796,163.81
8,348.00	85.67	2.42	5,263.63	3,463.46	117.33	38.667581	-102.711107	1,316,051.36	3,796,164.26
8,380.00	85.92	2.03	5,265.98	3,495.35	118.57	38.667668	-102.711103	1,316,083.27	3,796,164.52
8,411.00	85.49	0.87	5,268.30	3,526.25	119.36	38.667753	-102.711100	1,316,114.18	3,796,164.35
8,443.00	85.67	0.93	5,270.77	3,558.15	119.86	38.667841	-102.711098	1,316,146.08	3,796,163.88
8,475.00	84.55	0.30	5,273.49	3,590.03	120.20	38.667928	-102.711097	1,316,177.96	3,796,163.24
8,506.00	84.80	0.16	5,276.37	3,620.90	120.32	38.668013	-102.711097	1,316,208.81	3,796,162.42
8,538.00	85.30	0.17	5,279.13	3,652.78	120.41	38.668101	-102.711097	1,316,240.68	3,796,161.53
8,570.00	85.86	359.77	5,281.60	3,684.68	120.40	38.668188	-102.711097	1,316,272.57	3,796,160.53
8,602.00	86.66	359.91	5,283.69	3,716.61	120.31	38.668276	-102.711097	1,316,304.48	3,796,159.47
8,634.00	87.90	1.14	5,285.20	3,748.58	120.60	38.668364	-102.711096	1,316,336.44	3,796,158.78
8,665.00	87.23	0.45	5,286.52	3,779.54	121.03	38.668449	-102.711094	1,316,367.40	3,796,158.26
8,697.00	85.24	0.28	5,288.62	3,811.47	121.24	38.668536	-102.711094	1,316,399.32	3,796,157.48
8,728.00	85.55	0.18	5,291.11	3,842.37	121.36	38.668621	-102.711093	1,316,430.21	3,796,156.66
8,760.00	86.42	0.22	5,293.35	3,874.29	121.47	38.668709	-102.711093	1,316,462.12	3,796,155.79
8,792.00	86.48	359.90	5,295.33	3,906.23	121.50	38.668796	-102.711093	1,316,494.04	3,796,154.84
8,823.00	86.23	359.38	5,297.30	3,937.17	121.31	38.668881	-102.711093	1,316,524.95	3,796,153.70
8,855.00	88.64	358.85	5,298.74	3,969.13	120.82	38.668969	-102.711095	1,316,556.88	3,796,152.22
8,887.00	91.60	359.89	5,298.67	4,001.12	120.46	38.669057	-102.711096	1,316,588.85	3,796,150.89
8,918.00	90.56	359.85	5,298.08	4,032.12	120.39	38.669142	-102.711097	1,316,619.83	3,796,149.87
8,950.00	88.77	359.40	5,298.27	4,064.12	120.18	38.669230	-102.711097	1,316,651.80	3,796,148.68
8,982.00	87.90	358.06	5,299.20	4,096.09	119.48	38.669318	-102.711100	1,316,683.74	3,796,146.99
9,014.00	86.97	357.47	5,300.63	4,128.04	118.23	38.669405	-102.711104	1,316,715.63	3,796,144.76
9,045.00	85.86	356.85	5,302.57	4,158.94	116.70	38.669490	-102.711110	1,316,746.47	3,796,142.28
9,077.00	87.16	356.97	5,304.52	4,190.83	114.97	38.669578	-102.711116	1,316,778.29	3,796,139.58
9,108.00	90.87	358.74	5,305.05	4,221.80	113.81	38.669663	-102.711120	1,316,809.21	3,796,137.47
9,140.00	93.58	359.10	5,303.81	4,253.76	113.21	38.669751	-102.711122	1,316,841.14	3,796,135.89
9,193.00	92.35	357.88	5,301.07	4,306.67	111.82	38.669896	-102.711127	1,316,893.98	3,796,132.87
9,230.00	92.35	357.88	5,299.55	4,343.62	110.45	38.669997	-102.711131	1,316,930.86	3,796,130.37

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
131.00	131.00	-0.32	0.01	First MWD Survey @ 131.00ft
9,193.00	5,301.07	4,306.67	111.82	Final MWD Survey @ 9193.00ft
9,230.00	5,299.55	4,343.62	110.45	Final Proj to Bit @ 9230' MD :: 5299.83' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.00	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
131.00	5,714.00	MWD Field Surveys Through Tangent	MWD+SC
5,745.00	9,193.00	MWD Post Tangent and Lateral Surveys	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
947.00	946.94	9 5/8" Casing Set @ 947' MD :: 946.94' TVD	9-5/8	12-1/4
5,654.67	5,190.75	7" Casing Set @ 5654.67' MD :: 5190.75' TVD	7	8-3/4

Design Report for Switchman 1647-17-11-H - Actual Field Surveys

Design Targets

Shape	Target Name	TVD (usft)	Northing (usft)	Easting (usft)	+N/-S usft	+E/-W usft	Created	Updated
Polygon	SWITCHMAN 1647-17-11-	0.00	1,312,586.05	3,796,153.27	0.00	0.00	8/12/2013	2/5/2014
Point	SWITCHMAN 1647-17-11-	0.00	1,312,586.05	3,796,153.27	0.00	0.00	8/12/2013	2/5/2014
Polygon	SWITCHMAN 1647-17-11-	0.00	1,312,586.05	3,796,153.27	0.00	0.00	8/12/2013	2/5/2014
Point	SWITCHMAN 1647-17-11-	5,181.00	1,316,933.32	3,796,130.91	4,346.05	111.07	8/12/2013	12/31/2013

Directional Difficulty Index

Average Dogleg over Survey:	2.25 °/100usft	Maximum Dogleg over Survey:	13.99 °/100usft at 4,612.00 usft
Net Tortousity applicable to Plans:	1.10 °/100usft	Directional Difficulty Index:	6.209

Audit Info

North Reference Sheet for Sec. 17-T16S-R47W - Switchman 1647-17-11-H - Plan D

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

Vertical Depths are relative to RKB = 19' @ 4204.00usft (Pioneer 54). Northing and Easting are relative to Switchman 1647-17- 11-H

Coordinate System is US State Plane 1983, Colorado Central 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:39.750000°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996561

Grid Coordinates of Well: 1,312,586.05 usft N, 3,796,153.27 usft E

Geographical Coordinates of Well: 38° 39' 29.06" N, 102° 42' 41.46" W

Grid Convergence at Surface is: 1.76°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,230.00usft

the Bottom Hole Displacement is 4,345.02usft in the Direction of 1.46° (True).

Magnetic Convergence at surface is: -5.65° (12 August 2013, , BGGM2013)

