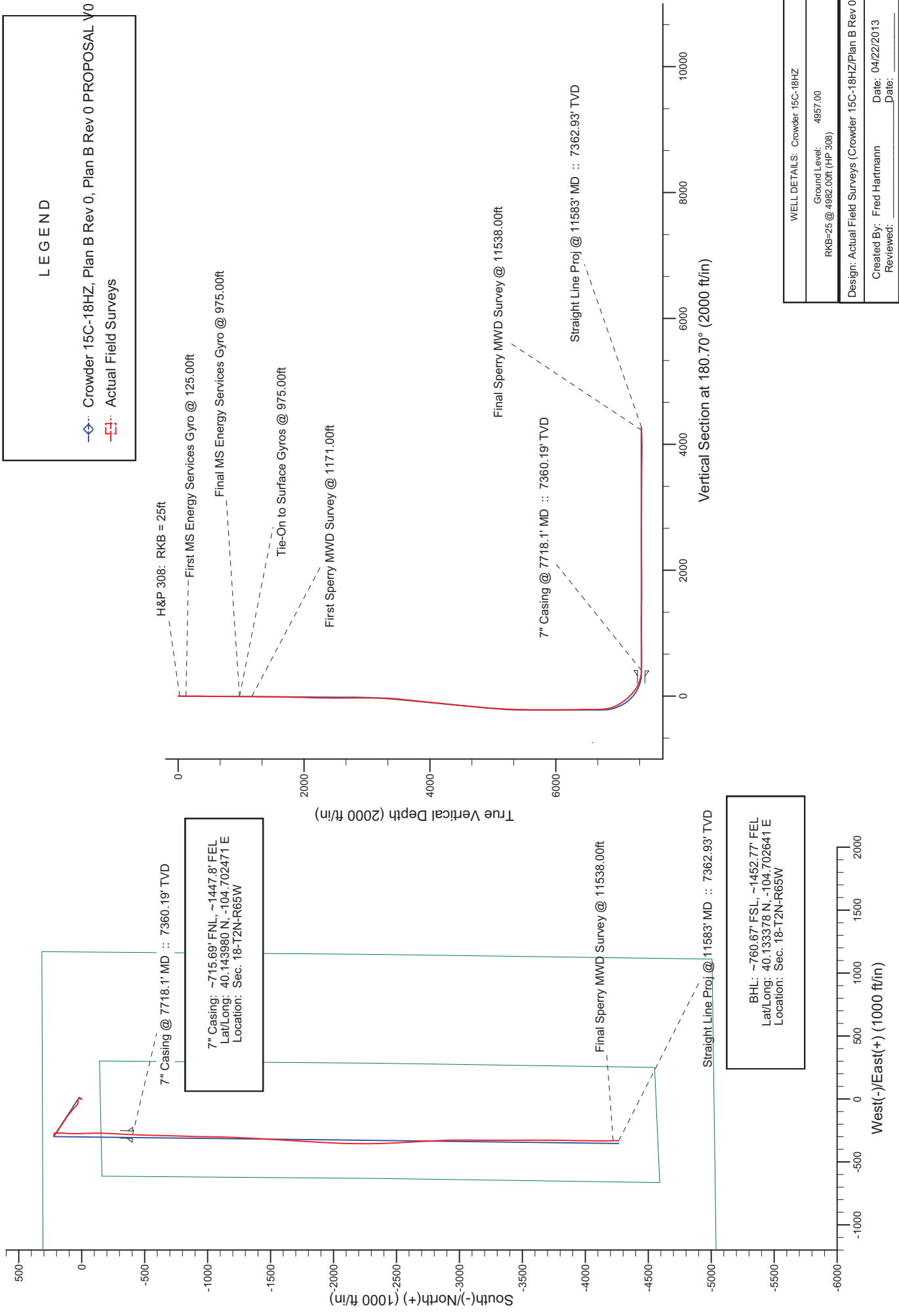


Project: Weld County, CO (NAD 83)
 Site: Sec. 18-T2N-R65W
 Well: Crowder 15C-18HZ
 Wellbore: Plan B Rev 0
 Design: Actual Field Surveys



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 18-T2N-R65W

Crowder 15C-18HZ

Plan B Rev 0

Design: Actual Field Surveys

Sperry Drilling Services Standard Report

22 April, 2013

Well Coordinates: 1,296,704.19 N, 3,223,235.72 E (40° 08' 42.32" N, 104° 42' 05.25" W)

Ground Level: 4,957.00 ft

Local Coordinate Origin:

Centered on Well Crowder 15C-18HZ

Viewing Datum:

RKB=25 @ 4982.00ft (HP 308)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

HALLIBURTON

Design Report for Crowder 15C-18HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00
H&P 308: RKB = 25ft							
125.00	0.34	319.96	125.00	0.23	-0.19	-0.22	0.34
First MS Energy Services Gyro @ 125.00ft							
225.00	0.37	344.29	225.00	0.77	-0.47	-0.76	0.15
325.00	0.35	7.40	325.00	1.38	-0.52	-1.37	0.15
425.00	0.62	31.20	424.99	2.14	-0.20	-2.14	0.33
525.00	0.59	20.86	524.99	3.09	0.27	-3.09	0.11
625.00	0.39	50.48	624.98	3.79	0.71	-3.79	0.32
725.00	0.50	13.01	724.98	4.43	1.07	-4.44	0.30
825.00	0.32	44.47	824.98	5.05	1.37	-5.07	0.28
925.00	0.08	42.98	924.98	5.30	1.61	-5.32	0.24
975.00	0.50	34.87	974.98	5.51	1.76	-5.53	0.84
Final MS Energy Services Gyro @ 975.00ft - Tie-On to Surface Gyros @ 975.00ft							
1,171.00	0.49	349.75	1,170.97	7.03	2.10	-7.06	0.19
First Sperry MWD Survey @ 1171.00ft							
1,263.00	0.41	351.13	1,262.97	7.75	1.98	-7.77	0.09
1,355.00	0.62	39.85	1,354.96	8.45	2.25	-8.48	0.51
1,447.00	0.85	23.21	1,446.96	9.46	2.83	-9.50	0.34
1,631.00	1.05	10.51	1,630.93	12.37	3.68	-12.42	0.16
1,814.00	1.59	355.77	1,813.88	16.56	3.80	-16.60	0.35
2,004.00	1.20	343.14	2,003.83	21.09	3.03	-21.12	0.26
2,194.00	1.03	338.98	2,193.79	24.59	1.84	-24.61	0.10
2,383.00	1.62	328.44	2,382.74	28.45	-0.17	-28.44	0.34
2,573.00	1.84	283.54	2,572.66	31.45	-4.54	-31.39	0.70
2,763.00	1.50	251.66	2,762.58	31.38	-9.87	-31.26	0.51
2,952.00	2.20	242.91	2,951.48	28.95	-15.45	-28.76	0.40
3,047.00	3.18	269.61	3,046.38	28.10	-19.71	-27.86	1.65
3,142.00	4.34	280.69	3,141.18	28.75	-25.87	-28.43	1.44
3,237.00	4.77	285.49	3,235.88	30.47	-33.21	-30.07	0.60
3,332.00	6.30	301.18	3,330.44	34.23	-41.48	-33.72	2.25
3,427.00	6.58	308.24	3,424.84	40.30	-50.21	-39.68	0.88
3,522.00	7.81	315.52	3,519.09	48.27	-59.01	-47.55	1.61
3,617.00	9.43	313.65	3,613.01	58.25	-69.17	-57.40	1.73
3,711.00	9.62	312.80	3,705.72	68.90	-80.50	-67.91	0.25
3,806.00	8.21	306.79	3,799.57	78.36	-91.76	-77.23	1.78
3,901.00	9.74	311.36	3,893.41	87.73	-103.22	-86.46	1.78
3,996.00	10.60	307.65	3,986.91	98.38	-116.17	-96.95	1.14
4,091.00	9.57	304.54	4,080.45	108.19	-129.60	-106.60	1.23
4,186.00	11.83	305.38	4,173.79	118.31	-144.04	-116.54	2.38
4,281.00	11.10	304.05	4,266.89	129.07	-159.56	-127.11	0.82
4,375.00	9.93	304.38	4,359.31	138.71	-173.75	-136.58	1.25
4,470.00	9.17	300.07	4,453.00	147.13	-187.06	-144.83	1.10
4,565.00	10.88	303.92	4,546.54	155.93	-201.05	-153.46	1.93
4,660.00	10.06	302.53	4,639.96	165.39	-215.49	-162.75	0.90
4,755.00	9.18	304.03	4,733.62	174.10	-228.76	-171.29	0.96
4,945.00	7.42	304.99	4,921.63	189.61	-251.37	-186.53	0.93
5,134.00	5.21	316.75	5,109.47	202.86	-267.25	-199.58	1.35
5,229.00	4.44	313.55	5,204.14	208.54	-272.88	-205.19	0.86

Design Report for Crowder 15C-18HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,324.00	3.46	310.65	5,298.91	212.94	-277.72	-209.53	1.05
5,419.00	2.06	315.49	5,393.80	216.03	-281.09	-212.58	1.49
5,514.00	2.20	307.66	5,488.73	218.36	-283.73	-214.87	0.34
5,608.00	1.54	297.36	5,582.68	220.04	-286.28	-216.53	0.79
5,703.00	1.04	295.85	5,677.66	221.00	-288.19	-217.47	0.53
5,893.00	0.51	265.88	5,867.64	221.69	-290.58	-218.13	0.34
5,987.00	0.36	174.23	5,961.64	221.37	-290.97	-217.80	0.67
6,177.00	4.10	95.26	6,151.47	220.15	-284.14	-216.67	2.13
6,273.00	3.23	104.29	6,247.28	219.17	-278.11	-215.76	1.08
6,367.00	2.86	105.56	6,341.14	217.89	-273.28	-214.53	0.40
6,556.00	0.68	196.82	6,530.06	215.55	-269.06	-212.25	1.56
6,651.00	0.90	216.47	6,625.05	214.41	-269.67	-211.10	0.36
6,745.00	1.62	184.13	6,719.03	212.49	-270.20	-209.17	1.05
6,777.00	4.92	180.84	6,750.97	210.67	-270.26	-207.35	10.32
6,808.00	6.75	179.47	6,781.81	207.52	-270.26	-204.20	5.92
6,840.00	9.21	179.34	6,813.50	203.07	-270.21	-199.76	7.69
6,872.00	12.81	180.20	6,844.91	196.96	-270.19	-193.65	11.26
6,902.00	16.64	179.14	6,873.91	189.34	-270.14	-186.03	12.80
6,935.00	20.03	180.40	6,905.23	178.96	-270.11	-175.65	10.34
6,966.00	23.61	181.36	6,934.01	167.44	-270.29	-164.13	11.61
6,998.00	26.58	182.75	6,962.99	153.88	-270.79	-150.56	9.46
7,030.00	29.20	183.42	6,991.27	138.94	-271.60	-135.61	8.25
7,061.00	30.90	185.77	7,018.10	123.47	-272.85	-120.12	6.67
7,093.00	32.91	182.99	7,045.27	106.61	-274.13	-103.25	7.78
7,125.00	35.00	181.59	7,071.81	88.75	-274.84	-85.39	6.97
7,156.00	37.49	179.76	7,096.81	70.43	-275.05	-67.06	8.76
7,188.00	39.97	179.74	7,121.77	50.41	-274.96	-47.04	7.75
7,219.00	41.93	178.87	7,145.18	30.09	-274.71	-26.73	6.58
7,251.00	44.01	178.40	7,168.60	8.29	-274.19	-4.94	6.58
7,283.00	45.95	178.55	7,191.23	-14.32	-273.59	17.66	6.07
7,314.00	48.00	178.39	7,212.38	-36.97	-272.98	40.31	6.62
7,346.00	50.93	178.09	7,233.18	-61.28	-272.23	64.60	9.18
7,377.00	54.29	178.76	7,252.00	-85.90	-271.56	89.21	10.97
7,409.00	57.50	179.37	7,269.94	-112.39	-271.13	115.69	10.15
7,441.00	60.67	180.56	7,286.38	-139.84	-271.12	143.14	10.41
7,472.00	63.37	181.73	7,300.92	-167.20	-271.67	170.51	9.33
7,504.00	66.95	182.78	7,314.36	-196.22	-272.81	199.53	11.58
7,535.00	70.10	182.44	7,325.71	-225.03	-274.13	228.36	10.21
7,567.00	73.57	182.19	7,335.68	-255.41	-275.35	258.75	10.87
7,599.00	75.62	183.59	7,344.18	-286.21	-276.91	289.58	7.67
7,630.00	78.43	183.83	7,351.14	-316.36	-278.87	319.74	9.10
7,678.00	85.27	182.93	7,357.94	-363.76	-281.66	367.17	14.37
7,718.10	88.31	181.92	7,360.19	-403.76	-283.35	407.19	7.99
7" Casing @ 7718.1' MD :: 7360.19' TVD							
7,733.00	89.44	181.54	7,360.48	-418.65	-283.80	422.08	7.99
7,828.00	89.38	181.67	7,361.46	-513.60	-286.46	517.07	0.15
7,923.00	89.63	181.79	7,362.28	-608.56	-289.33	612.05	0.29
8,017.00	90.37	181.75	7,362.28	-702.51	-292.24	706.03	0.79
8,112.00	92.04	181.49	7,360.28	-797.45	-294.92	800.99	1.78
8,207.00	90.31	181.27	7,358.33	-892.40	-297.21	895.96	1.84
8,302.00	90.37	181.16	7,357.77	-987.38	-299.22	990.96	0.13

Design Report for Crowder 15C-18HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,397.00	89.69	181.51	7,357.72	-1,082.35	-301.44	1,085.95	0.81
8,492.00	90.74	181.61	7,357.36	-1,177.31	-304.02	1,180.94	1.11
8,587.00	89.94	182.93	7,356.80	-1,272.23	-307.78	1,275.90	1.62
8,681.00	88.02	182.86	7,358.47	-1,366.09	-312.53	1,369.81	2.04
8,776.00	88.70	182.72	7,361.19	-1,460.94	-317.15	1,464.71	0.73
8,871.00	89.63	183.58	7,362.58	-1,555.79	-322.37	1,559.61	1.33
8,966.00	89.88	184.04	7,362.98	-1,650.57	-328.69	1,654.47	0.55
9,061.00	90.12	184.32	7,362.98	-1,745.32	-335.61	1,749.29	0.39
9,156.00	89.81	183.28	7,363.04	-1,840.11	-341.91	1,844.15	1.14
9,250.00	90.86	182.59	7,362.49	-1,933.98	-346.72	1,938.08	1.34
9,345.00	91.23	182.45	7,360.76	-2,028.88	-350.89	2,033.01	0.42
9,440.00	90.74	181.22	7,359.13	-2,123.81	-353.94	2,127.98	1.39
9,535.00	90.80	179.90	7,357.85	-2,218.80	-354.86	2,222.97	1.39
9,630.00	90.68	179.29	7,356.62	-2,313.79	-354.19	2,317.94	0.65
9,724.00	90.43	178.28	7,355.71	-2,407.76	-352.20	2,411.88	1.11
9,819.00	88.33	176.72	7,356.74	-2,502.65	-348.06	2,506.72	2.75
9,914.00	88.64	176.41	7,359.25	-2,597.45	-342.37	2,601.44	0.46
10,009.00	90.06	176.83	7,360.33	-2,692.28	-336.77	2,696.19	1.56
10,104.00	89.94	177.64	7,360.33	-2,787.17	-332.18	2,791.02	0.86
10,198.00	89.38	177.85	7,360.89	-2,881.09	-328.49	2,884.89	0.64
10,293.00	89.57	179.66	7,361.76	-2,976.06	-326.42	2,979.83	1.92
10,388.00	90.19	180.83	7,361.96	-3,071.06	-326.83	3,074.82	1.39
10,483.00	90.37	180.58	7,361.49	-3,166.05	-328.00	3,169.82	0.32
10,577.00	90.31	179.92	7,360.93	-3,260.05	-328.41	3,263.81	0.71
10,672.00	89.75	179.00	7,360.88	-3,355.04	-327.51	3,358.79	1.13
10,767.00	89.57	180.46	7,361.45	-3,450.03	-327.06	3,453.77	1.55
10,861.00	88.08	179.28	7,363.38	-3,544.01	-326.85	3,547.74	2.02
10,956.00	89.38	180.84	7,365.48	-3,638.98	-326.95	3,642.70	2.14
11,051.00	89.57	180.95	7,366.35	-3,733.97	-328.43	3,737.70	0.23
11,145.00	89.32	180.45	7,367.26	-3,827.95	-329.58	3,831.70	0.59
11,241.00	89.51	180.64	7,368.24	-3,923.94	-330.50	3,927.69	0.28
11,336.00	91.18	180.62	7,367.67	-4,018.93	-331.54	4,022.68	1.76
11,430.00	91.05	180.07	7,365.84	-4,112.91	-332.11	4,116.66	0.60
11,538.00	91.11	179.42	7,363.81	-4,220.89	-331.63	4,224.63	0.60
Final Sperry MWD Survey @ 11538.00ft							
11,583.00	91.11	179.42	7,362.93	-4,265.88	-331.17	4,269.61	0.00
Straight Line Proj @ 11583' MD :: 7362.93' TVD							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
25.00	25.00	0.00	0.00	H&P 308: RKB = 25ft
125.00	125.00	0.23	-0.19	First MS Energy Services Gyro @ 125.00ft
975.00	974.98	5.51	1.76	Final MS Energy Services Gyro @ 975.00ft
975.00	974.98	5.51	1.76	Tie-On to Surface Gyros @ 975.00ft
1,171.00	1,170.97	7.03	2.10	First Sperry MWD Survey @ 1171.00ft
11,538.00	7,363.81	-4,220.89	-331.63	Final Sperry MWD Survey @ 11538.00ft
11,583.00	7,362.93	-4,265.88	-331.17	Straight Line Proj @ 11583' MD :: 7362.93' TVD