

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 10-T2N-R66W

Cannon 13N-10HZ

Plan A Rev 0

Plan: Plan A Rev 0 Permit

## Sperry Drilling Services

## Proposal Report

14 December, 2012

Well Coordinates: 1,301,554.23 N, 3,204,425.59 E (40° 09' 31.85" N, 104° 46' 06.95" W)

Ground Level: 4,949.00 ft

Local Coordinate Origin:

Centered on Well Cannon 13N-10HZ

Viewing Datum:

RKB=17 @ 4966.00ft (Drilling Rig)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

**HALLIBURTON**

**HALLIBURTON**  
Sperry Drilling

**Plan Report for Cannon 13N-10HZ - Plan A Rev 0 Permit**

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)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Begin Nudge @ 1100.00ft</b>										
1,200.00	2.00	289.89	1,199.98	0.59	-1.64	-0.27	2.00	2.00	0.00	289.89
1,300.00	4.00	289.89	1,299.84	2.37	-6.56	-1.08	2.00	2.00	0.00	0.00
1,400.00	6.00	289.89	1,399.45	5.34	-14.76	-2.44	2.00	2.00	0.00	0.00
1,500.00	8.00	289.89	1,498.70	9.49	-26.22	-4.33	2.00	2.00	0.00	0.00
1,560.26	9.21	289.89	1,558.28	12.55	-34.69	-5.73	2.00	2.00	0.00	0.00
<b>End Nudge @ 1560.26ft</b>										
1,600.00	9.21	289.89	1,597.51	14.71	-40.67	-6.72	0.00	0.00	0.00	0.00
1,700.00	9.21	289.89	1,696.22	20.16	-55.71	-9.20	0.00	0.00	0.00	0.00
1,800.00	9.21	289.89	1,794.94	25.60	-70.76	-11.69	0.00	0.00	0.00	0.00
1,900.00	9.21	289.89	1,893.65	31.04	-85.80	-14.17	0.00	0.00	0.00	0.00
2,000.00	9.21	289.89	1,992.36	36.48	-100.84	-16.65	0.00	0.00	0.00	0.00
2,100.00	9.21	289.89	2,091.07	41.93	-115.88	-19.14	0.00	0.00	0.00	0.00
2,200.00	9.21	289.89	2,189.78	47.37	-130.93	-21.62	0.00	0.00	0.00	0.00
2,300.00	9.21	289.89	2,288.50	52.81	-145.97	-24.11	0.00	0.00	0.00	0.00
2,400.00	9.21	289.89	2,387.21	58.25	-161.01	-26.59	0.00	0.00	0.00	0.00
2,500.00	9.21	289.89	2,485.92	63.70	-176.06	-29.08	0.00	0.00	0.00	0.00
2,600.00	9.21	289.89	2,584.63	69.14	-191.10	-31.56	0.00	0.00	0.00	0.00
2,700.00	9.21	289.89	2,683.34	74.58	-206.14	-34.04	0.00	0.00	0.00	0.00
2,800.00	9.21	289.89	2,782.06	80.02	-221.18	-36.53	0.00	0.00	0.00	0.00
2,900.00	9.21	289.89	2,880.77	85.47	-236.23	-39.01	0.00	0.00	0.00	0.00
3,000.00	9.21	289.89	2,979.48	90.91	-251.27	-41.50	0.00	0.00	0.00	0.00
3,100.00	9.21	289.89	3,078.19	96.35	-266.31	-43.98	0.00	0.00	0.00	0.00
3,200.00	9.21	289.89	3,176.91	101.79	-281.36	-46.47	0.00	0.00	0.00	0.00
3,300.00	9.21	289.89	3,275.62	107.24	-296.40	-48.95	0.00	0.00	0.00	0.00
3,400.00	9.21	289.89	3,374.33	112.68	-311.44	-51.43	0.00	0.00	0.00	0.00
3,500.00	9.21	289.89	3,473.04	118.12	-326.48	-53.92	0.00	0.00	0.00	0.00
3,600.00	9.21	289.89	3,571.75	123.56	-341.53	-56.40	0.00	0.00	0.00	0.00
3,700.00	9.21	289.89	3,670.47	129.01	-356.57	-58.89	0.00	0.00	0.00	0.00
3,800.00	9.21	289.89	3,769.18	134.45	-371.61	-61.37	0.00	0.00	0.00	0.00
3,900.00	9.21	289.89	3,867.89	139.89	-386.66	-63.86	0.00	0.00	0.00	0.00
4,000.00	9.21	289.89	3,966.60	145.33	-401.70	-66.34	0.00	0.00	0.00	0.00
4,100.00	9.21	289.89	4,065.32	150.78	-416.74	-68.82	0.00	0.00	0.00	0.00
4,101.71	9.21	289.89	4,067.00	150.87	-417.00	-68.87	0.00	0.00	0.00	0.00
<b>Parkman</b>										
4,200.00	9.21	289.89	4,164.03	156.22	-431.78	-71.31	0.00	0.00	0.00	0.00
4,300.00	9.21	289.89	4,262.74	161.66	-446.83	-73.79	0.00	0.00	0.00	0.00
4,400.00	9.21	289.89	4,361.45	167.10	-461.87	-76.28	0.00	0.00	0.00	0.00
4,497.81	9.21	289.89	4,458.00	172.43	-476.58	-78.71	0.00	0.00	0.00	0.00
<b>Sussex</b>										
4,500.00	9.21	289.89	4,460.16	172.55	-476.91	-78.76	0.00	0.00	0.00	0.00
4,600.00	9.21	289.89	4,558.88	177.99	-491.96	-81.25	0.00	0.00	0.00	0.00
4,700.00	9.21	289.89	4,657.59	183.43	-507.00	-83.73	0.00	0.00	0.00	0.00
4,800.00	9.21	289.89	4,756.30	188.87	-522.04	-86.21	0.00	0.00	0.00	0.00
4,900.00	9.21	289.89	4,855.01	194.32	-537.08	-88.70	0.00	0.00	0.00	0.00
5,000.00	9.21	289.89	4,953.72	199.76	-552.13	-91.18	0.00	0.00	0.00	0.00

**Plan Report for Cannon 13N-10HZ - Plan A Rev 0 Permit**

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)	Toolface Azimuth (°)
5,100.00	9.21	289.89	5,052.44	205.20	-567.17	-93.67	0.00	0.00	0.00	0.00
5,200.00	9.21	289.89	5,151.15	210.64	-582.21	-96.15	0.00	0.00	0.00	0.00
5,300.00	9.21	289.89	5,249.86	216.08	-597.25	-98.64	0.00	0.00	0.00	0.00
5,400.00	9.21	289.89	5,348.57	221.53	-612.30	-101.12	0.00	0.00	0.00	0.00
5,500.00	9.21	289.89	5,447.29	226.97	-627.34	-103.60	0.00	0.00	0.00	0.00
5,600.00	9.21	289.89	5,546.00	232.41	-642.38	-106.09	0.00	0.00	0.00	0.00
5,700.00	9.21	289.89	5,644.71	237.85	-657.43	-108.57	0.00	0.00	0.00	0.00
5,800.00	9.21	289.89	5,743.42	243.30	-672.47	-111.06	0.00	0.00	0.00	0.00
5,900.00	9.21	289.89	5,842.13	248.74	-687.51	-113.54	0.00	0.00	0.00	0.00
6,000.00	9.21	289.89	5,940.85	254.18	-702.55	-116.03	0.00	0.00	0.00	0.00
6,100.00	9.21	289.89	6,039.56	259.62	-717.60	-118.51	0.00	0.00	0.00	0.00
6,200.00	9.21	289.89	6,138.27	265.07	-732.64	-121.00	0.00	0.00	0.00	0.00
6,300.00	9.21	289.89	6,236.98	270.51	-747.68	-123.48	0.00	0.00	0.00	0.00
6,400.00	9.21	289.89	6,335.70	275.95	-762.73	-125.96	0.00	0.00	0.00	0.00
6,500.00	9.21	289.89	6,434.41	281.39	-777.77	-128.45	0.00	0.00	0.00	0.00
6,600.00	9.21	289.89	6,533.12	286.84	-792.81	-130.93	0.00	0.00	0.00	0.00
6,665.92	9.21	289.89	6,598.19	290.42	-802.73	-132.57	0.00	0.00	0.00	0.00
<b>Begin Build @ 6665.92ft</b>										
6,700.00	8.65	268.09	6,631.87	291.27	-807.85	-132.42	10.00	-1.63	-63.98	-110.01
6,800.00	13.37	219.42	6,730.19	282.06	-822.75	-120.56	10.00	4.72	-48.67	-88.46
6,900.00	21.93	201.83	6,825.46	255.73	-837.06	-91.98	10.00	8.57	-17.60	-40.56
7,000.00	31.33	194.10	6,914.78	213.07	-850.38	-47.57	10.00	9.40	-7.72	-23.73
<b>Build Rate = 10.00/100ft</b>										
7,100.00	41.00	189.71	6,995.43	155.37	-862.28	11.34	10.00	9.66	-4.39	-16.80
7,195.34	50.32	186.89	7,062.00	87.98	-871.97	79.35	10.00	9.77	-2.96	-13.25
<b>Sharon Springs</b>										
7,200.00	50.77	186.77	7,064.96	84.40	-872.40	82.94	10.00	9.81	-2.52	-11.26
7,300.00	60.61	184.55	7,121.27	2.31	-880.45	165.07	10.00	9.83	-2.22	-11.19
7,311.90	61.78	184.32	7,127.00	-8.09	-881.25	175.42	10.00	9.85	-1.96	-9.93
<b>Niobrara A</b>										
7,395.18	69.99	182.81	7,161.00	-83.89	-885.94	250.74	10.00	9.86	-1.81	-9.82
<b>Niobrara B</b>										
7,400.00	70.47	182.73	7,162.63	-88.42	-886.16	255.23	10.00	9.87	-1.70	-9.21
7,500.00	80.35	181.12	7,187.80	-185.02	-889.38	350.67	10.00	9.88	-1.61	-9.18
7,600.00	90.23	179.60	7,196.00	-284.55	-890.00	448.51	10.00	9.89	-1.52	-8.77
7,600.45	90.28	179.60	7,196.00	-285.00	-890.00	448.95	10.00	9.88	-1.50	-8.65
<b>End Build @ 7600.45ft - Niobrara B TL - Heel - 7" Intermediate Casing - Cannon 13N_CP</b>										
7,700.00	90.28	179.60	7,195.52	-384.55	-889.30	546.55	0.00	0.00	0.00	-8.65
7,800.00	90.28	179.60	7,195.04	-484.54	-888.60	644.59	0.00	0.00	0.00	0.00
7,900.00	90.28	179.60	7,194.56	-584.54	-887.90	742.63	0.00	0.00	0.00	0.00
8,000.00	90.28	179.60	7,194.08	-684.54	-887.19	840.67	0.00	0.00	0.00	0.00
8,100.00	90.28	179.60	7,193.60	-784.53	-886.49	938.71	0.00	0.00	0.00	0.00
8,200.00	90.28	179.60	7,193.12	-884.53	-885.79	1,036.75	0.00	0.00	0.00	0.00
8,300.00	90.28	179.60	7,192.64	-984.52	-885.09	1,134.79	0.00	0.00	0.00	0.00
8,400.00	90.28	179.60	7,192.16	-1,084.52	-884.39	1,232.83	0.00	0.00	0.00	0.00
8,500.00	90.28	179.60	7,191.68	-1,184.52	-883.68	1,330.87	0.00	0.00	0.00	0.00
8,600.00	90.28	179.60	7,191.20	-1,284.51	-882.98	1,428.92	0.00	0.00	0.00	0.00
8,700.00	90.28	179.60	7,190.72	-1,384.51	-882.28	1,526.96	0.00	0.00	0.00	0.00
8,800.00	90.28	179.60	7,190.24	-1,484.51	-881.58	1,625.00	0.00	0.00	0.00	0.00
8,900.00	90.28	179.60	7,189.75	-1,584.50	-880.87	1,723.04	0.00	0.00	0.00	0.00
9,000.00	90.28	179.60	7,189.27	-1,684.50	-880.17	1,821.08	0.00	0.00	0.00	0.00
9,100.00	90.28	179.60	7,188.79	-1,784.50	-879.47	1,919.12	0.00	0.00	0.00	0.00
9,200.00	90.28	179.60	7,188.31	-1,884.49	-878.77	2,017.16	0.00	0.00	0.00	0.00
9,300.00	90.28	179.60	7,187.83	-1,984.49	-878.06	2,115.20	0.00	0.00	0.00	0.00
9,400.00	90.28	179.60	7,187.35	-2,084.48	-877.36	2,213.24	0.00	0.00	0.00	0.00
9,500.00	90.28	179.60	7,186.87	-2,184.48	-876.66	2,311.28	0.00	0.00	0.00	0.00
9,600.00	90.28	179.60	7,186.39	-2,284.48	-875.96	2,409.32	0.00	0.00	0.00	0.00
9,700.00	90.28	179.60	7,185.91	-2,384.47	-875.26	2,507.36	0.00	0.00	0.00	0.00
9,800.00	90.28	179.60	7,185.43	-2,484.47	-874.55	2,605.40	0.00	0.00	0.00	0.00

**Plan Report for Cannon 13N-10HZ - Plan A Rev 0 Permit**

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)	Toolface Azimuth (°)
9,900.00	90.28	179.60	7,184.95	-2,584.47	-873.85	2,703.44	0.00	0.00	0.00	0.00
10,000.00	90.28	179.60	7,184.47	-2,684.46	-873.15	2,801.48	0.00	0.00	0.00	0.00
10,100.00	90.28	179.60	7,183.99	-2,784.46	-872.45	2,899.52	0.00	0.00	0.00	0.00
10,200.00	90.28	179.60	7,183.51	-2,884.46	-871.74	2,997.56	0.00	0.00	0.00	0.00
10,300.00	90.28	179.60	7,183.03	-2,984.45	-871.04	3,095.60	0.00	0.00	0.00	0.00
10,400.00	90.28	179.60	7,182.55	-3,084.45	-870.34	3,193.64	0.00	0.00	0.00	0.00
10,500.00	90.28	179.60	7,182.07	-3,184.45	-869.64	3,291.68	0.00	0.00	0.00	0.00
10,600.00	90.28	179.60	7,181.59	-3,284.44	-868.94	3,389.72	0.00	0.00	0.00	0.00
10,700.00	90.28	179.60	7,181.10	-3,384.44	-868.23	3,487.76	0.00	0.00	0.00	0.00
10,800.00	90.28	179.60	7,180.62	-3,484.43	-867.53	3,585.80	0.00	0.00	0.00	0.00
10,900.00	90.28	179.60	7,180.14	-3,584.43	-866.83	3,683.84	0.00	0.00	0.00	0.00
11,000.00	90.28	179.60	7,179.66	-3,684.43	-866.13	3,781.88	0.00	0.00	0.00	0.00
11,100.00	90.28	179.60	7,179.18	-3,784.42	-865.42	3,879.92	0.00	0.00	0.00	0.00
11,200.00	90.28	179.60	7,178.70	-3,884.42	-864.72	3,977.96	0.00	0.00	0.00	0.00
11,300.00	90.28	179.60	7,178.22	-3,984.42	-864.02	4,076.01	0.00	0.00	0.00	0.00
11,400.00	90.28	179.60	7,177.74	-4,084.41	-863.32	4,174.05	0.00	0.00	0.00	0.00
11,500.00	90.28	179.60	7,177.26	-4,184.41	-862.62	4,272.09	0.00	0.00	0.00	0.00
11,600.00	90.28	179.60	7,176.78	-4,284.41	-861.91	4,370.13	0.00	0.00	0.00	0.00
11,700.00	90.28	179.60	7,176.30	-4,384.40	-861.21	4,468.17	0.00	0.00	0.00	0.00
11,762.17	90.28	179.60	7,176.00	-4,446.57	-860.77	4,529.12	0.00	0.00	0.00	0.00
<b>Niobrara B TL - Toe</b>										
11,762.18	90.28	179.60	7,176.00	-4,446.58	-860.77	4,529.12	0.00	0.00	0.00	0.00
<b>Cannon 13N_BHL</b>										

**Plan Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,100.00	1,100.00	0.00	0.00	Begin Nudge @ 1100.00ft
1,560.26	1,558.28	12.55	-34.69	End Nudge @ 1560.26ft
6,665.92	6,598.19	290.42	-802.73	Begin Build @ 6665.92ft
7,000.00	6,914.78	213.07	-850.38	Build Rate = 10.00/100ft
7,600.45	7,196.00	-285.00	-890.00	End Build @ 7600.45ft
11,762.18	7,176.00	-4,446.58	-860.77	Total Depth @ 11762.18ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Cannon 13N_BHL	190.96	Slot	0.00	0.00	0.00

**Survey tool program**

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	11,762.18	Plan A Rev 0 Permit	MWD

**Casing Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,600.45	7,196.00	7" Intermediate Casing	7	8-3/4

**Plan Report for Cannon 13N-10HZ - Plan A Rev 0 Permit****Formation Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,101.71	4,067.00	Parkman		0.00	
4,497.81	4,458.00	Sussex		0.00	
7,195.34	7,062.00	Sharon Springs		0.00	
7,311.90	7,127.00	Niobrara A		0.00	
7,395.18	7,161.00	Niobrara B		0.00	
7,600.45	7,196.00	Niobrara B TL - Heel		0.00	
11,762.17	7,176.00	Niobrara B TL - Toe		0.00	

***Targets associated with this wellbore***

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
-McPeck 14-10 - 160'	7,181.12	-3,379.92	-664.21	Circle
-McPeck 24-10 - 160'	7,176.52	-4,326.00	804.02	Circle
Cannon 13N_BHL	7,176.00	-4,446.58	-860.77	Point
Cannon 13N_SHL	0.00	0.00	0.00	Point
Cannon 13N_CP	7,196.00	-285.00	-890.00	Point

## North Reference Sheet for Sec. 10-T2N-R66W - Cannon 13N-10HZ - Plan A Rev 0

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

Vertical Depths are relative to RKB=17 @ 4966.00ft (Drilling Rig). Northing and Easting are relative to Cannon 13N-10HZ

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 -105.50°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99995813

Grid Coordinates of Well: 1,301,554.23 ft N, 3,204,425.59 ft E

Geographical Coordinates of Well: 40° 09' 31.85" N, 104° 46' 06.95" W

Grid Convergence at Surface is: 0.47°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,762.18ft  
the Bottom Hole Displacement is 4,529.12ft in the Direction of 190.96° (True).

Magnetic Convergence at surface is: -8.22° (13 December 2012, , BGGM2012)

