

# **US ROCKIES REGION PLANNING**

**COLORADO CENTRAL ZONE - 83**

**ARAPAHOE\_HOULIHAN PAD**

**HOULIHAN 4-1H**

**HOULIHAN 4-1H**

**Plan: HOULIHAN 4-1H (wp01)**

## **Standard Planning Report**

**07 October, 2011**



# Anadarko Petroleum Corp

## Planning Report

<b>Database:</b>	edmp	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-1H
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	25' rkb + 5633' GL @ 5658.00ft
<b>Project:</b>	COLORADO CENTRAL ZONE - 83	<b>MD Reference:</b>	25' rkb + 5633' GL @ 5658.00ft
<b>Site:</b>	ARAPAHOE_HOULIHAN PAD	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-1H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	HOULIHAN 4-1H		
<b>Design:</b>	HOULIHAN 4-1H (wp01)		

<b>Project</b>	COLORADO CENTRAL ZONE - 83		
<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 Central Zone		

Site		ARAPAHOE_HOULIHAN PAD			
Site Position:		Northing:	1,684,290.19 usft	Latitude:	39.708292
From:	Lat/Long	Easting:	3,269,002.37 usft	Longitude:	-104.543867
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.60 °

Well	HOULIHAN 4-1H					
Well Position	+N/-S	0.00 ft	Northing:	1,684,290.19 usft	Latitude:	39.708292
	+E/-W	0.00 ft	Easting:	3,269,002.37 usft	Longitude:	-104.543867
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	5,633.00 ft

<b>Wellbore</b>	HOULIHAN 4-1H				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	10/7/2011	8.64	66.51	52,750

<b>Design</b>	HOULIHAN 4-1H (wp01)			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S</b>	<b>+E/-W</b>	<b>Direction</b>
	(ft)	(ft)	(ft)	(°)
	0.00	0.00	0.00	91.46

<b>Plan Sections</b>										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,970.00	0.00	0.00	1,970.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,298.71	6.57	271.47	2,297.99	0.48	-18.83	2.00	2.00	0.00	271.47	
6,896.43	6.57	271.47	6,865.48	13.97	-545.05	0.00	0.00	0.00	0.00	
7,868.20	90.60	91.40	7,504.00	0.00	30.00	10.00	8.65	18.52	179.93	
7,875.58	90.63	91.47	7,503.92	-0.18	37.38	1.00	0.34	0.94	70.22	
11,974.81	90.63	91.47	7,459.00	-105.30	4,135.02	0.00	0.00	0.00	0.00	HOULIHAN 4-1H BHL

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<b>Project:</b>	COLORADO CENTRAL ZONE - 83	<b>MD Reference:</b>	25' rkb + 5633' GL @ 5658.00ft
<b>Site:</b>	ARAPAHOE_HOULIHAN PAD	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-1H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	HOULIHAN 4-1H		
<b>Design:</b>	HOULIHAN 4-1H (wp01)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
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
200.00	0.00	0.00	200.00	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
400.00	0.00	0.00	400.00	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
600.00	0.00	0.00	600.00	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
800.00	0.00	0.00	800.00	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
1,000.00	0.00	0.00	1,000.00	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
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,673.00	0.00	0.00	1,673.00	0.00	0.00	0.00	0.00	0.00	0.00
FOX HILLS									
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,820.00	0.00	0.00	1,820.00	0.00	0.00	0.00	0.00	0.00	0.00
9 5/8"									
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,970.00	0.00	0.00	1,970.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
2,000.00	0.60	271.47	2,000.00	0.00	-0.16	-0.16	2.00	2.00	0.00
2,100.00	2.60	271.47	2,099.96	0.08	-2.95	-2.95	2.00	2.00	0.00
2,200.00	4.60	271.47	2,199.75	0.24	-9.22	-9.23	2.00	2.00	0.00
2,298.71	6.57	271.47	2,297.99	0.48	-18.83	-18.84	2.00	2.00	0.00
Start 4597.72 hold at 2298.71 MD									
2,300.00	6.57	271.47	2,299.27	0.49	-18.98	-18.99	0.00	0.00	0.00
2,400.00	6.57	271.47	2,398.61	0.78	-30.42	-30.43	0.00	0.00	0.00
2,500.00	6.57	271.47	2,497.96	1.07	-41.87	-41.88	0.00	0.00	0.00
2,600.00	6.57	271.47	2,597.30	1.37	-53.31	-53.33	0.00	0.00	0.00
2,700.00	6.57	271.47	2,696.64	1.66	-64.76	-64.78	0.00	0.00	0.00
2,751.70	6.57	271.47	2,748.00	1.81	-70.68	-70.70	0.00	0.00	0.00
PARKMAN									
2,800.00	6.57	271.47	2,795.98	1.95	-76.21	-76.23	0.00	0.00	0.00
2,900.00	6.57	271.47	2,895.33	2.25	-87.65	-87.68	0.00	0.00	0.00
3,000.00	6.57	271.47	2,994.67	2.54	-99.10	-99.13	0.00	0.00	0.00
3,100.00	6.57	271.47	3,094.01	2.83	-110.54	-110.58	0.00	0.00	0.00
3,200.00	6.57	271.47	3,193.35	3.13	-121.99	-122.03	0.00	0.00	0.00
3,300.00	6.57	271.47	3,292.70	3.42	-133.43	-133.48	0.00	0.00	0.00
3,400.00	6.57	271.47	3,392.04	3.71	-144.88	-144.92	0.00	0.00	0.00
3,500.00	6.57	271.47	3,491.38	4.01	-156.32	-156.37	0.00	0.00	0.00
3,600.00	6.57	271.47	3,590.72	4.30	-167.77	-167.82	0.00	0.00	0.00
3,700.00	6.57	271.47	3,690.06	4.59	-179.21	-179.27	0.00	0.00	0.00
3,800.00	6.57	271.47	3,789.41	4.89	-190.66	-190.72	0.00	0.00	0.00
3,900.00	6.57	271.47	3,888.75	5.18	-202.10	-202.17	0.00	0.00	0.00
4,000.00	6.57	271.47	3,988.09	5.47	-213.55	-213.62	0.00	0.00	0.00
4,100.00	6.57	271.47	4,087.43	5.77	-224.99	-225.07	0.00	0.00	0.00
4,200.00	6.57	271.47	4,186.78	6.06	-236.44	-236.52	0.00	0.00	0.00
4,300.00	6.57	271.47	4,286.12	6.35	-247.88	-247.97	0.00	0.00	0.00

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<b>Project:</b>	COLORADO CENTRAL ZONE - 83	<b>MD Reference:</b>	25' rkb + 5633' GL @ 5658.00ft
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<b>Well:</b>	HOULIHAN 4-1H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	HOULIHAN 4-1H		
<b>Design:</b>	HOULIHAN 4-1H (wp01)		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,400.00	6.57	271.47	4,385.46	6.64	-259.33	-259.41	0.00	0.00	0.00
4,500.00	6.57	271.47	4,484.80	6.94	-270.77	-270.86	0.00	0.00	0.00
4,600.00	6.57	271.47	4,584.15	7.23	-282.22	-282.31	0.00	0.00	0.00
4,700.00	6.57	271.47	4,683.49	7.52	-293.66	-293.76	0.00	0.00	0.00
4,800.00	6.57	271.47	4,782.83	7.82	-305.11	-305.21	0.00	0.00	0.00
4,900.00	6.57	271.47	4,882.17	8.11	-316.56	-316.66	0.00	0.00	0.00
5,000.00	6.57	271.47	4,981.52	8.40	-328.00	-328.11	0.00	0.00	0.00
5,046.79	6.57	271.47	5,028.00	8.54	-333.36	-333.47	0.00	0.00	0.00
<b>SUSSEX</b>									
5,100.00	6.57	271.47	5,080.86	8.70	-339.45	-339.56	0.00	0.00	0.00
5,200.00	6.57	271.47	5,180.20	8.99	-350.89	-351.01	0.00	0.00	0.00
5,300.00	6.57	271.47	5,279.54	9.28	-362.34	-362.45	0.00	0.00	0.00
5,400.00	6.57	271.47	5,378.89	9.58	-373.78	-373.90	0.00	0.00	0.00
5,482.66	6.57	271.47	5,461.00	9.82	-383.24	-383.37	0.00	0.00	0.00
<b>SHANNON</b>									
5,500.00	6.57	271.47	5,478.23	9.87	-385.23	-385.35	0.00	0.00	0.00
5,600.00	6.57	271.47	5,577.57	10.16	-396.67	-396.80	0.00	0.00	0.00
5,700.00	6.57	271.47	5,676.91	10.46	-408.12	-408.25	0.00	0.00	0.00
5,800.00	6.57	271.47	5,776.26	10.75	-419.56	-419.70	0.00	0.00	0.00
5,900.00	6.57	271.47	5,875.60	11.04	-431.01	-431.15	0.00	0.00	0.00
6,000.00	6.57	271.47	5,974.94	11.34	-442.45	-442.60	0.00	0.00	0.00
6,100.00	6.57	271.47	6,074.28	11.63	-453.90	-454.05	0.00	0.00	0.00
6,200.00	6.57	271.47	6,173.63	11.92	-465.34	-465.50	0.00	0.00	0.00
6,300.00	6.57	271.47	6,272.97	12.22	-476.79	-476.94	0.00	0.00	0.00
6,400.00	6.57	271.47	6,372.31	12.51	-488.23	-488.39	0.00	0.00	0.00
6,500.00	6.57	271.47	6,471.65	12.80	-499.68	-499.84	0.00	0.00	0.00
6,600.00	6.57	271.47	6,571.00	13.10	-511.12	-511.29	0.00	0.00	0.00
6,700.00	6.57	271.47	6,670.34	13.39	-522.57	-522.74	0.00	0.00	0.00
6,800.00	6.57	271.47	6,769.68	13.68	-534.01	-534.19	0.00	0.00	0.00
6,896.43	6.57	271.47	6,865.48	13.97	-545.05	-545.23	0.00	0.00	0.00
<b>Start DLS 10.00 TFO 179.93</b>									
6,900.00	6.22	271.47	6,869.02	13.98	-545.45	-545.63	10.00	-10.00	0.11
7,000.00	3.78	91.28	6,968.88	14.04	-547.57	-547.75	10.00	-2.43	179.81
7,100.00	13.78	91.37	7,067.58	13.68	-532.32	-532.50	10.00	10.00	0.09
7,190.06	22.79	91.38	7,153.00	13.00	-504.10	-504.27	10.00	10.00	0.01
<b>SHARON SPRINGS</b>									
7,200.00	23.78	91.38	7,162.13	12.91	-500.18	-500.34	10.00	10.00	0.01
7,300.00	33.78	91.39	7,249.67	11.75	-452.10	-452.25	10.00	10.00	0.01
7,400.00	43.78	91.39	7,327.52	10.23	-389.56	-389.70	10.00	10.00	0.00
7,420.41	45.82	91.39	7,342.00	9.88	-375.18	-375.31	10.00	10.00	0.00
<b>NIOBRARA</b>									
7,500.00	53.78	91.39	7,393.33	8.40	-314.46	-314.57	10.00	10.00	0.00
7,600.00	63.78	91.40	7,445.09	6.32	-229.07	-229.16	10.00	10.00	0.00
7,700.00	73.78	91.40	7,481.23	4.05	-136.00	-136.05	10.00	10.00	0.00
7,800.00	83.78	91.40	7,500.66	1.66	-38.06	-38.09	10.00	10.00	0.00
7,868.20	90.60	91.40	7,504.00	0.00	30.00	29.99	10.00	10.00	0.00
<b>Start DLS 1.00 TFO 70.22 - 7"</b>									
7,875.58	90.63	91.47	7,503.92	-0.18	37.38	37.37	1.00	0.34	0.94
<b>Start 4099.23 hold at 7875.58 MD</b>									
7,900.00	90.63	91.47	7,503.65	-0.81	61.79	61.79	0.00	0.00	0.00
8,000.00	90.63	91.47	7,502.56	-3.38	161.75	161.78	0.00	0.00	0.00
8,100.00	90.63	91.47	7,501.46	-5.94	261.71	261.78	0.00	0.00	0.00
8,200.00	90.63	91.47	7,500.37	-8.50	361.67	361.77	0.00	0.00	0.00

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Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,300.00	90.63	91.47	7,499.27	-11.07	461.63	461.76	0.00	0.00	0.00
8,400.00	90.63	91.47	7,498.17	-13.63	561.59	561.76	0.00	0.00	0.00
8,500.00	90.63	91.47	7,497.08	-16.20	661.55	661.75	0.00	0.00	0.00
8,600.00	90.63	91.47	7,495.98	-18.76	761.51	761.75	0.00	0.00	0.00
8,700.00	90.63	91.47	7,494.89	-21.32	861.48	861.74	0.00	0.00	0.00
8,800.00	90.63	91.47	7,493.79	-23.89	961.44	961.73	0.00	0.00	0.00
8,900.00	90.63	91.47	7,492.69	-26.45	1,061.40	1,061.73	0.00	0.00	0.00
9,000.00	90.63	91.47	7,491.60	-29.02	1,161.36	1,161.72	0.00	0.00	0.00
9,100.00	90.63	91.47	7,490.50	-31.58	1,261.32	1,261.72	0.00	0.00	0.00
9,200.00	90.63	91.47	7,489.41	-34.15	1,361.28	1,361.71	0.00	0.00	0.00
9,300.00	90.63	91.47	7,488.31	-36.71	1,461.24	1,461.70	0.00	0.00	0.00
9,400.00	90.63	91.47	7,487.22	-39.27	1,561.20	1,561.70	0.00	0.00	0.00
9,500.00	90.63	91.47	7,486.12	-41.84	1,661.16	1,661.69	0.00	0.00	0.00
9,600.00	90.63	91.47	7,485.02	-44.40	1,761.13	1,761.68	0.00	0.00	0.00
9,700.00	90.63	91.47	7,483.93	-46.97	1,861.09	1,861.68	0.00	0.00	0.00
9,800.00	90.63	91.47	7,482.83	-49.53	1,961.05	1,961.67	0.00	0.00	0.00
9,900.00	90.63	91.47	7,481.74	-52.10	2,061.01	2,061.67	0.00	0.00	0.00
10,000.00	90.63	91.47	7,480.64	-54.66	2,160.97	2,161.66	0.00	0.00	0.00
10,100.00	90.63	91.47	7,479.54	-57.22	2,260.93	2,261.65	0.00	0.00	0.00
10,200.00	90.63	91.47	7,478.45	-59.79	2,360.89	2,361.65	0.00	0.00	0.00
10,300.00	90.63	91.47	7,477.35	-62.35	2,460.85	2,461.64	0.00	0.00	0.00
10,400.00	90.63	91.47	7,476.26	-64.92	2,560.81	2,561.64	0.00	0.00	0.00
10,500.00	90.63	91.47	7,475.16	-67.48	2,660.78	2,661.63	0.00	0.00	0.00
10,600.00	90.63	91.47	7,474.07	-70.04	2,760.74	2,761.62	0.00	0.00	0.00
10,700.00	90.63	91.47	7,472.97	-72.61	2,860.70	2,861.62	0.00	0.00	0.00
10,800.00	90.63	91.47	7,471.87	-75.17	2,960.66	2,961.61	0.00	0.00	0.00
10,900.00	90.63	91.47	7,470.78	-77.74	3,060.62	3,061.61	0.00	0.00	0.00
11,000.00	90.63	91.47	7,469.68	-80.30	3,160.58	3,161.60	0.00	0.00	0.00
11,100.00	90.63	91.47	7,468.59	-82.87	3,260.54	3,261.59	0.00	0.00	0.00
11,200.00	90.63	91.47	7,467.49	-85.43	3,360.50	3,361.59	0.00	0.00	0.00
11,300.00	90.63	91.47	7,466.39	-87.99	3,460.46	3,461.58	0.00	0.00	0.00
11,400.00	90.63	91.47	7,465.30	-90.56	3,560.43	3,561.58	0.00	0.00	0.00
11,500.00	90.63	91.47	7,464.20	-93.12	3,660.39	3,661.57	0.00	0.00	0.00
11,600.00	90.63	91.47	7,463.11	-95.69	3,760.35	3,761.56	0.00	0.00	0.00
11,700.00	90.63	91.47	7,462.01	-98.25	3,860.31	3,861.56	0.00	0.00	0.00
11,800.00	90.63	91.47	7,460.92	-100.82	3,960.27	3,961.55	0.00	0.00	0.00
11,900.00	90.63	91.47	7,459.82	-103.38	4,060.23	4,061.55	0.00	0.00	0.00
11,974.81	90.63	91.47	7,459.00	-105.30	4,135.02	4,136.36	0.00	0.00	0.00
TD at 11974.81 - HOULIHAN 4-1H BHL									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
HOULIHAN 4-1H BHL	0.00	0.00	7,459.00	-105.30	4,135.02	1,684,228.41	3,273,138.25	39.708002	-104.529170
- hit/miss target									
- Shape									
- plan hits target center									
- Point									

# Anadarko Petroleum Corp

## Planning Report

<b>Database:</b>	edmp	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-1H
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	25' rkb + 5633' GL @ 5658.00ft
<b>Project:</b>	COLORADO CENTRAL ZONE - 83	<b>MD Reference:</b>	25' rkb + 5633' GL @ 5658.00ft
<b>Site:</b>	ARAPAHOE_HOULIHAN PAD	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-1H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	HOULIHAN 4-1H		
<b>Design:</b>	HOULIHAN 4-1H (wp01)		

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
1,820.00	1,820.00	9 5/8"	9-5/8	12-1/4	
7,868.20	7,504.00	7"	7	8-3/4	

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,673.00	1,673.00	FOX HILLS		0.00	
2,751.70	2,748.00	PARKMAN		0.00	
5,046.79	5,028.00	SUSSEX		0.00	
5,482.66	5,461.00	SHANNON		0.00	
7,190.06	7,153.00	SHARON SPRINGS		0.00	
7,420.41	7,342.00	NIOBRARA		0.00	

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
1,970.00	1,970.00	0.00	0.00	Start Build 2.00	
2,298.71	2,297.99	0.48	-18.83	Start 4597.72 hold at 2298.71 MD	
6,896.43	6,865.48	13.97	-545.05	Start DLS 10.00 TFO 179.93	
7,868.20	7,504.00	0.00	30.00	Start DLS 1.00 TFO 70.22	
7,875.58	7,503.92	-0.18	37.38	Start 4099.23 hold at 7875.58 MD	
11,974.81	7,459.00	-105.30	4,135.02	TD at 11974.81	