



# **Anadarko Petroleum Corporation**

**Riverbend**

**Riverbend 14 Pad**

**Riverbend 03-13 (111413) - Slot 03-13**

**03-13**

**Survey: 03-13**

## **Survey Report - Geographic**

**12 January, 2012**

# Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Riverbend 03-13 (111413) - Slot 03-13
<b>Project:</b>	Riverbend	<b>TVD Reference:</b>	KB @ 4967.00ft (Original Well Elev)
<b>Site:</b>	Riverbend 14 Pad	<b>MD Reference:</b>	KB @ 4967.00ft (Original Well Elev)
<b>Well:</b>	Riverbend 03-13 (111413)	<b>North Reference:</b>	True
<b>Wellbore:</b>	03-13	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	03-13	<b>Database:</b>	EDM5000

<b>Project</b>	Riverbend		
<b>Map System:</b>	Universal Transverse Mercator	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD83 Colorado - HARN		
<b>Map Zone:</b>	Zone 13N (108 W to 102 W)		

<b>Site</b>	Riverbend 14 Pad		
<b>Site Position:</b>		<b>Northing:</b>	14,547,138.00 usft
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,683,122.87 usft
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13.20 in
		<b>Latitude:</b>	40.055934°N
		<b>Longitude:</b>	104.847381°W
		<b>Grid Convergence:</b>	0.10 °

<b>Well</b>	Riverbend 03-13 (111413) - Slot 03-13		
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b> 14,547,128.00 usft
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b> 1,683,122.92 usft
<b>Position Uncertainty</b>	0.00 ft	<b>Wellhead Elevation:</b>	ft
		<b>Latitude:</b>	40.055907°N
		<b>Longitude:</b>	104.847381°W
		<b>Ground Level:</b>	4,952.00 ft

<b>Wellbore</b>	03-13		
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination</b>
			(°)
	IGRF2010	02/22/12	8.79
			<b>Dip Angle</b>
			(°)
			66.73
			<b>Field Strength</b>
			(nT)
			52,867

<b>Design</b>	03-13		
<b>Audit Notes:</b>			
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL
		<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S</b>	<b>+E/-W</b>
	(ft)	(ft)	(ft)
	0.00	0.00	0.00
			<b>Direction</b>
			(°)
			82.53

<b>Survey Program</b>	<b>Date</b>	01/07/12		
<b>From</b>	<b>To</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
(ft)	(ft)			
83.00	8,332.00	03-13 (03-13)	MWD	MWD - Standard

<b>Survey</b>									
<b>Measured</b>	<b>Vertical</b>								
<b>Depth</b>	<b>Depth</b>	<b>+N/-S</b>	<b>+E/-W</b>	<b>Map</b>	<b>Map</b>				
(ft)	(ft)	(ft)	(ft)	<b>Northing</b>	<b>Easting</b>	<b>Latitude</b>	<b>Longitude</b>		
(ft)	(ft)	(ft)	(ft)	(usft)	(usft)				
0.00	0.00	0.00	0.00	14,547,128.00	1,683,122.92	40.055907°N	104.847381°W		
14.58	0.08	214.18	14.58	14,547,127.99	1,683,122.91	40.055907°N	104.847381°W		
<b>Harry S Chikuma #1 (VE)</b>									
83.00	0.48	214.18	83.00	-0.29	-0.20	14,547,127.71	1,683,122.72	40.055906°N	104.847382°W
175.00	0.62	140.48	175.00	-0.99	-0.10	14,547,127.01	1,683,122.82	40.055904°N	104.847382°W
268.00	2.11	85.60	267.97	-1.25	1.93	14,547,126.76	1,683,124.85	40.055903°N	104.847374°W
360.00	4.22	80.06	359.82	-0.53	6.96	14,547,127.48	1,683,129.87	40.055905°N	104.847356°W
450.00	6.02	78.70	449.46	0.96	14.85	14,547,128.99	1,683,137.76	40.055909°N	104.847328°W
539.00	7.78	80.50	537.81	2.87	25.36	14,547,130.92	1,683,148.28	40.055915°N	104.847291°W
629.00	8.92	81.20	626.86	4.95	38.27	14,547,133.01	1,683,161.18	40.055920°N	104.847244°W
719.00	9.49	79.49	715.70	7.37	52.46	14,547,135.46	1,683,175.36	40.055927°N	104.847194°W
806.00	10.50	79.18	801.38	10.16	67.30	14,547,138.28	1,683,190.20	40.055935°N	104.847141°W

# Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Riverbend 03-13 (111413) - Slot 03-13
<b>Project:</b>	Riverbend	<b>TVD Reference:</b>	KB @ 4967.00ft (Original Well Elev)
<b>Site:</b>	Riverbend 14 Pad	<b>MD Reference:</b>	KB @ 4967.00ft (Original Well Elev)
<b>Well:</b>	Riverbend 03-13 (111413)	<b>North Reference:</b>	True
<b>Wellbore:</b>	03-13	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	03-13	<b>Database:</b>	EDM5000

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
894.00	10.59	79.80	887.89	13.10	83.13	14,547,141.24	1,683,206.03	40.055943°N	104.847084°W
912.00	10.68	79.97	905.58	13.68	86.40	14,547,141.83	1,683,209.29	40.055944°N	104.847072°W
957.00	10.68	79.97	949.80	15.14	94.61	14,547,143.30	1,683,217.50	40.055948°N	104.847043°W
1,018.00	10.81	78.17	1,009.73	17.29	105.78	14,547,145.48	1,683,228.67	40.055954°N	104.847003°W
1,107.00	13.32	82.70	1,096.76	20.31	124.12	14,547,148.52	1,683,247.00	40.055962°N	104.846938°W
1,197.00	16.08	83.40	1,183.81	23.06	146.79	14,547,151.31	1,683,269.67	40.055970°N	104.846857°W
1,286.00	17.80	84.67	1,268.94	25.74	172.58	14,547,154.04	1,683,295.45	40.055977°N	104.846764°W
1,375.00	16.92	81.60	1,353.89	28.89	198.94	14,547,157.24	1,683,321.80	40.055986°N	104.846670°W
1,465.00	18.11	85.46	1,439.72	31.91	225.84	14,547,160.30	1,683,348.70	40.055994°N	104.846574°W
1,554.00	17.89	82.39	1,524.36	34.82	253.18	14,547,163.26	1,683,376.04	40.056002°N	104.846476°W
1,643.00	17.89	81.07	1,609.06	38.75	280.23	14,547,167.23	1,683,403.08	40.056013°N	104.846380°W
1,732.00	17.58	85.86	1,693.84	41.84	307.14	14,547,170.37	1,683,429.99	40.056022°N	104.846284°W
1,821.00	17.31	84.59	1,778.74	44.06	333.73	14,547,172.64	1,683,456.57	40.056028°N	104.846189°W
1,911.00	17.40	83.79	1,864.65	46.78	360.44	14,547,175.40	1,683,483.27	40.056035°N	104.846093°W
2,000.00	17.01	81.77	1,949.66	50.08	386.55	14,547,178.75	1,683,509.38	40.056044°N	104.846000°W
2,091.00	17.58	85.86	2,036.55	52.98	413.43	14,547,181.69	1,683,536.26	40.056052°N	104.845904°W
2,181.00	17.18	83.18	2,122.45	55.54	440.19	14,547,184.30	1,683,563.01	40.056059°N	104.845808°W
2,270.00	16.70	81.29	2,207.58	59.04	465.88	14,547,187.84	1,683,588.69	40.056069°N	104.845716°W
2,359.00	17.01	83.97	2,292.76	62.34	491.47	14,547,191.19	1,683,614.28	40.056078°N	104.845625°W
2,448.00	17.49	85.29	2,377.76	64.81	517.74	14,547,193.70	1,683,640.55	40.056085°N	104.845531°W
2,539.00	16.39	84.37	2,464.81	67.19	544.15	14,547,196.13	1,683,666.95	40.056091°N	104.845437°W
2,629.00	17.49	85.77	2,550.90	69.43	570.27	14,547,198.41	1,683,693.07	40.056097°N	104.845343°W
2,719.00	18.81	87.49	2,636.42	71.07	598.26	14,547,200.09	1,683,721.05	40.056102°N	104.845243°W
2,809.00	17.71	85.60	2,721.89	72.75	626.40	14,547,201.83	1,683,749.19	40.056106°N	104.845143°W
2,899.00	16.79	83.27	2,807.84	75.33	652.96	14,547,204.45	1,683,775.75	40.056113°N	104.845048°W
2,989.00	16.39	86.39	2,894.10	77.65	678.54	14,547,206.81	1,683,801.33	40.056120°N	104.844956°W
3,079.00	18.59	85.60	2,979.93	79.55	705.52	14,547,208.76	1,683,828.30	40.056125°N	104.844860°W
3,169.00	17.31	85.29	3,065.55	81.75	733.17	14,547,211.01	1,683,855.95	40.056131°N	104.844761°W
3,259.00	18.59	83.79	3,151.17	84.40	760.78	14,547,213.71	1,683,883.55	40.056138°N	104.844662°W
3,349.00	17.49	84.67	3,236.74	87.21	788.51	14,547,216.56	1,683,911.27	40.056146°N	104.844563°W
3,438.00	18.02	86.17	3,321.50	89.37	815.56	14,547,218.77	1,683,938.32	40.056152°N	104.844467°W
3,527.00	16.39	85.07	3,406.52	91.37	841.81	14,547,220.81	1,683,964.56	40.056158°N	104.844373°W
3,617.00	17.80	84.06	3,492.54	93.89	868.14	14,547,223.37	1,683,990.89	40.056164°N	104.844279°W
3,707.00	15.69	85.68	3,578.72	96.23	893.96	14,547,225.76	1,684,016.71	40.056171°N	104.844186°W
3,793.00	17.01	78.99	3,661.25	99.50	917.91	14,547,229.08	1,684,040.65	40.056180°N	104.844101°W
3,880.00	15.82	80.89	3,744.70	103.81	942.11	14,547,233.43	1,684,064.85	40.056192°N	104.844014°W
3,969.00	16.48	87.27	3,830.19	106.34	966.70	14,547,235.99	1,684,089.43	40.056199°N	104.843926°W
4,057.00	16.79	87.88	3,914.51	107.40	991.87	14,547,237.10	1,684,114.60	40.056202°N	104.843837°W
4,146.00	17.09	87.40	3,999.65	108.47	1,017.78	14,547,238.21	1,684,140.51	40.056204°N	104.843744°W
4,235.00	16.00	87.97	4,084.96	109.50	1,043.10	14,547,239.29	1,684,165.83	40.056207°N	104.843653°W
4,323.00	15.69	81.20	4,169.63	111.75	1,066.98	14,547,241.58	1,684,189.70	40.056213°N	104.843568°W
4,412.00	17.80	79.49	4,254.85	116.07	1,092.25	14,547,245.94	1,684,214.97	40.056225°N	104.843478°W
4,500.00	18.28	79.49	4,338.52	121.04	1,119.05	14,547,250.96	1,684,241.75	40.056239°N	104.843382°W
4,589.00	16.30	78.48	4,423.50	126.08	1,145.01	14,547,256.05	1,684,267.71	40.056253°N	104.843289°W
4,676.00	16.08	78.78	4,507.05	130.86	1,168.79	14,547,260.87	1,684,291.48	40.056266°N	104.843204°W
4,765.00	16.70	79.88	4,592.43	135.51	1,193.47	14,547,265.56	1,684,316.15	40.056279°N	104.843116°W
4,853.00	17.71	84.06	4,676.49	139.12	1,219.24	14,547,269.21	1,684,341.91	40.056289°N	104.843024°W
4,942.00	17.40	83.66	4,761.35	141.99	1,245.93	14,547,272.12	1,684,368.59	40.056296°N	104.842929°W
5,033.00	17.01	84.76	4,848.28	144.70	1,272.70	14,547,274.89	1,684,395.37	40.056304°N	104.842833°W
5,123.00	17.58	83.88	4,934.21	147.36	1,299.33	14,547,277.58	1,684,421.99	40.056311°N	104.842738°W
5,212.00	16.22	82.82	5,019.36	150.34	1,325.03	14,547,280.62	1,684,447.68	40.056319°N	104.842646°W
5,303.00	15.91	86.56	5,106.81	152.68	1,350.09	14,547,283.00	1,684,472.74	40.056326°N	104.842556°W
5,392.00	16.48	88.89	5,192.28	153.66	1,374.88	14,547,284.01	1,684,497.53	40.056328°N	104.842468°W
5,481.00	17.09	86.30	5,277.49	154.74	1,400.56	14,547,285.15	1,684,523.20	40.056331°N	104.842376°W
5,570.00	17.40	83.88	5,362.49	157.01	1,426.84	14,547,287.45	1,684,549.48	40.056338°N	104.842282°W

# Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Riverbend 03-13 (111413) - Slot 03-13
<b>Project:</b>	Riverbend	<b>TVD Reference:</b>	KB @ 4967.00ft (Original Well Elev)
<b>Site:</b>	Riverbend 14 Pad	<b>MD Reference:</b>	KB @ 4967.00ft (Original Well Elev)
<b>Well:</b>	Riverbend 03-13 (111413)	<b>North Reference:</b>	True
<b>Wellbore:</b>	03-13	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	03-13	<b>Database:</b>	EDM5000

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,660.00	15.91	82.96	5,448.71	159.95	1,452.46	14,547,290.45	1,684,575.10	40.056346°N	104.842191°W
5,749.00	16.48	84.89	5,534.18	162.57	1,477.14	14,547,293.11	1,684,599.78	40.056353°N	104.842102°W
5,837.00	16.79	91.27	5,618.50	163.40	1,502.29	14,547,293.98	1,684,624.92	40.056355°N	104.842012°W
5,928.00	15.90	86.87	5,705.83	163.79	1,527.87	14,547,294.41	1,684,650.50	40.056356°N	104.841921°W
6,016.00	13.18	85.99	5,791.00	165.15	1,549.92	14,547,295.81	1,684,672.55	40.056360°N	104.841842°W
6,103.00	13.01	81.29	5,875.74	167.33	1,569.50	14,547,298.02	1,684,692.12	40.056366°N	104.841772°W
6,191.00	11.21	81.86	5,961.78	170.04	1,587.76	14,547,300.76	1,684,710.38	40.056373°N	104.841707°W
6,279.00	9.10	80.37	6,048.40	172.42	1,603.09	14,547,303.17	1,684,725.70	40.056380°N	104.841652°W
6,369.00	7.38	75.40	6,137.47	175.06	1,615.70	14,547,305.84	1,684,738.31	40.056387°N	104.841607°W
6,459.00	6.11	75.18	6,226.84	177.75	1,625.92	14,547,308.53	1,684,748.53	40.056395°N	104.841571°W
6,549.00	5.32	73.29	6,316.39	180.17	1,634.55	14,547,310.97	1,684,757.15	40.056401°N	104.841540°W
6,638.00	4.92	72.76	6,405.04	182.49	1,642.15	14,547,313.31	1,684,764.74	40.056408°N	104.841513°W
6,725.00	4.22	71.89	6,491.76	184.59	1,648.75	14,547,315.42	1,684,771.35	40.056413°N	104.841489°W
6,815.00	3.60	66.08	6,581.55	186.76	1,654.48	14,547,317.60	1,684,777.07	40.056419°N	104.841469°W
6,889.30	3.10	64.33	6,655.72	188.58	1,658.42	14,547,319.42	1,684,781.01	40.056424°N	104.841454°W
03-13 BH - 03-13 Legal Window									
6,905.00	2.99	63.89	6,671.40	188.94	1,659.17	14,547,319.79	1,684,781.76	40.056425°N	104.841452°W
6,995.00	2.50	58.48	6,761.30	191.00	1,662.95	14,547,321.85	1,684,785.54	40.056431°N	104.841438°W
7,083.00	2.11	62.09	6,849.23	192.76	1,666.02	14,547,323.62	1,684,788.60	40.056436°N	104.841427°W
7,172.00	2.11	70.39	6,938.17	194.08	1,669.01	14,547,324.94	1,684,791.59	40.056439°N	104.841417°W
7,261.00	1.89	74.26	7,027.11	195.03	1,671.97	14,547,325.90	1,684,794.55	40.056442°N	104.841406°W
7,351.00	2.11	83.39	7,117.06	195.62	1,675.04	14,547,326.49	1,684,797.62	40.056444°N	104.841395°W
7,441.00	2.02	87.66	7,207.00	195.88	1,678.27	14,547,326.76	1,684,800.85	40.056444°N	104.841384°W
7,531.00	2.59	72.59	7,296.93	196.55	1,681.80	14,547,327.44	1,684,804.37	40.056446°N	104.841371°W
7,619.00	1.80	92.98	7,384.86	197.07	1,685.08	14,547,327.96	1,684,807.65	40.056448°N	104.841359°W
7,707.00	1.10	144.97	7,472.84	196.31	1,686.94	14,547,327.20	1,684,809.52	40.056446°N	104.841353°W
7,794.00	1.19	144.00	7,559.82	194.90	1,687.95	14,547,325.79	1,684,810.53	40.056442°N	104.841349°W
7,883.00	1.32	152.17	7,648.80	193.24	1,688.97	14,547,324.14	1,684,811.55	40.056437°N	104.841345°W
7,972.00	1.19	157.10	7,737.78	191.48	1,689.81	14,547,322.38	1,684,812.39	40.056432°N	104.841342°W
8,062.00	0.79	164.79	7,827.76	190.02	1,690.34	14,547,320.92	1,684,812.92	40.056428°N	104.841340°W
8,150.00	0.48	199.59	7,915.76	189.09	1,690.37	14,547,319.99	1,684,812.96	40.056426°N	104.841340°W
8,239.00	0.22	205.96	8,004.76	188.59	1,690.17	14,547,319.49	1,684,812.76	40.056424°N	104.841341°W
8,284.00	0.22	200.60	8,049.76	188.43	1,690.11	14,547,319.33	1,684,812.69	40.056424°N	104.841341°W
8,332.00	0.22	200.60	8,097.76	188.26	1,690.04	14,547,319.15	1,684,812.63	40.056423°N	104.841341°W
Proj to TD at 8332 MD/8098 TVD									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
8,332.00	8,097.76	188.26	1,690.04	Proj to TD at 8332 MD/8098 TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_