

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 29 T3N-R65W

Wardell 27N-29HZ

Plan B Rev 2

Design: Actual Field Surveys

## Sperry Drilling Services Standard Report

18 June, 2012

Well Coordinates: 1,313,179.56 N, 3,228,365.75 E (40° 11' 24.67" N, 104° 40' 57.23" W)

Ground Level: 4,870.00 ft

Local Coordinate Origin:

Centered on Well Wardell 27N-29HZ

Viewing Datum:

RKB=16ft @ 4886.00ft (Xtreme 22)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

**HALLIBURTON**

# SPERRY-SUN DRILLING SERVICES

## CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anardrko
WELL:	Wardell 27N-29hz
FIELD:	Wardell
RIG:	Xtreme 22
LEGALS:	Sec. 29 T3N-R65W
COUNTY:	Weld
STATE:	Colorado
CAL. METHOD:	Min. Curv.
MAG. DECL. APPLIED:	8.66
VERTICAL SEC. DIR. :	357.620

SSDS Job Number :	9434417
Start Date of Job :	6/7/2012
End Date of Job :	6/18/2012
Lead Directional Driller:	Robbie Arnold
	Brandon Watson
Other SSDS DD's :	
SSDS MWD Engineers :	Clay Wass
	Ryan white

Geo Pilot Engineer :

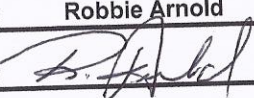
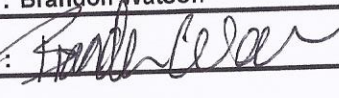
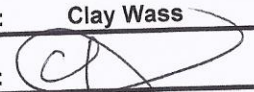
Surface Casing  
First Wireline Survey  
Last Wireline Survey

KOP Depth/Sidetrack MD  
MWD Tie-on

First MWD Survey Depth  
Last MWD Survey Depth  
Bit Extrapolation @ TD

Main Hole =====>		1st Side Track =====>		2nd Side Track =====>		3rd Side Track =====>		4th Side Track =====>	
	Tie-on		Tie On		Tie On		Tie On		Tie On
	SS		MWD						
	SS								
6382.00	KOP	14750.00	KOP-ST1		KOP-ST2		KOP-ST3		KOP-ST4
967.00	MWD		MWD		MWD		MWD		MWD
11444.00	MWD		MWD		MWD		MWD		MWD
11485.00	T.D.		T.D.		T.D.		T.D.		T.D.

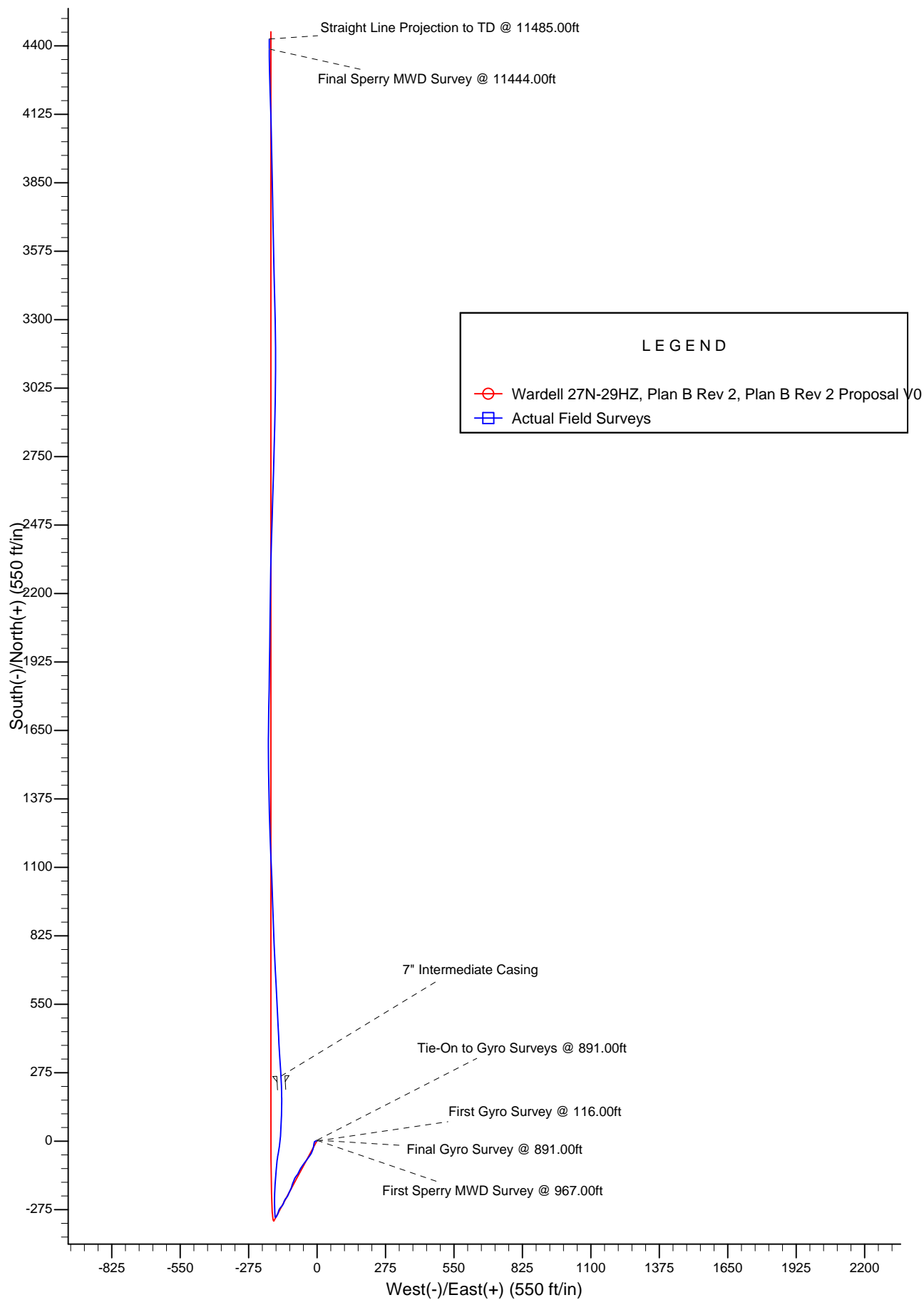
The following Sperry Drilling Services personnel, certify the above survey information to be accurate to the best of our knowledge:

Print Name : Robbie Arnold	Print Name : Brandon Watson	Print Name : 0
Sign Name : 	Sign Name : 	Sign Name :
Print Name : Clay Wass	Print Name : Ryan white	Print Name : 0
Sign Name : 	Sign Name :	Sign Name :

Examples of  
Survey Types:

TieOn  
MWD  
ESS  
Gyro  
SS

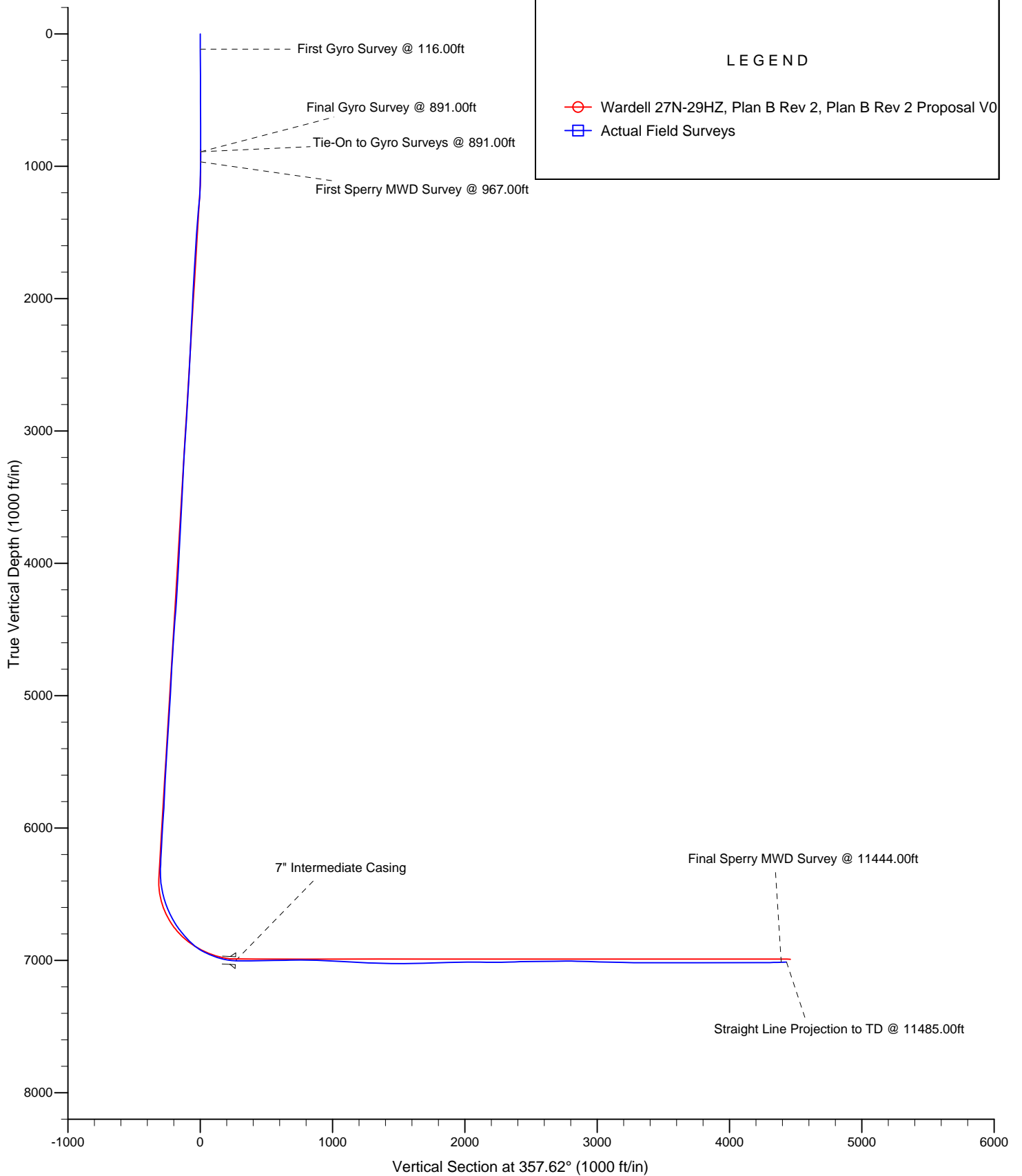
Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)  
Sperry-Sun Drilling Services (SSDS) Measurement While Drilling (MWD) Survey's  
Sperry-Sun Drilling Services (SSDS) Electronic Survey System (ESS) Survey's  
Gyro Survey's ; Provided by third party vendor, or by Sperry-Sun Drilling Services (SSDS)  
Single Shot (SS) Survey's ; Provided by Sperry-Sun Drilling Services (SSDS) or third party vendor.



Project: Weld County, CO (NAD 83)  
Site: Sec. 29 T3N-R65W  
Well: Wardell 27N-29HZ

# Anadarko Petroleum Corp.

**HALLIBURTON**  
Sperry Drilling



**Design Report for Wardell 27N-29HZ - 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
116.00	0.71	12.78	116.00	0.70	0.16	0.69	0.61
<b>First Gyro Survey @ 116.00ft</b>							
216.00	0.48	356.99	215.99	1.72	0.27	1.71	0.28
316.00	0.13	35.89	315.99	2.23	0.32	2.22	0.39
416.00	0.12	5.54	415.99	2.43	0.40	2.41	0.07
516.00	0.31	46.86	515.99	2.72	0.60	2.69	0.23
616.00	0.35	352.43	615.99	3.21	0.76	3.17	0.30
716.00	0.32	357.09	715.99	3.79	0.71	3.76	0.04
816.00	0.38	295.15	815.98	4.21	0.39	4.19	0.36
891.00	0.19	152.78	890.98	4.20	0.22	4.19	0.72
<b>Final Gyro Survey @ 891.00ft - Tie-On to Gyro Surveys @ 891.00ft</b>							
967.00	1.38	235.51	966.98	3.57	-0.47	3.59	1.80
<b>First Sperry MWD Survey @ 967.00ft</b>							
1,042.00	2.72	239.43	1,041.93	2.16	-2.75	2.27	1.80
1,134.00	3.18	244.06	1,133.80	-0.07	-6.92	0.22	0.56
1,166.00	3.05	244.56	1,165.76	-0.82	-8.49	-0.47	0.42
1,195.00	3.74	222.61	1,194.71	-1.85	-9.83	-1.44	5.03
1,224.00	4.32	198.86	1,223.64	-3.58	-10.82	-3.13	6.04
1,256.00	6.07	183.93	1,255.51	-6.41	-11.33	-5.93	6.87
1,288.00	6.31	187.53	1,287.32	-9.84	-11.67	-9.35	1.43
1,316.00	4.80	202.55	1,315.19	-12.45	-12.32	-11.93	7.44
1,347.00	4.17	190.58	1,346.09	-14.75	-13.03	-14.20	3.63
1,407.00	4.43	187.38	1,405.93	-19.20	-13.73	-18.61	0.59
1,497.00	4.66	192.01	1,495.64	-26.22	-14.93	-25.58	0.48
1,589.00	3.95	197.36	1,587.38	-32.90	-16.66	-32.18	0.89
1,682.00	3.82	205.35	1,680.17	-38.76	-18.94	-37.94	0.60
1,774.00	3.94	196.83	1,771.96	-44.55	-21.17	-43.63	0.64
1,865.00	3.61	220.78	1,862.77	-49.71	-23.94	-48.68	1.76
1,955.00	3.27	204.74	1,952.61	-54.19	-26.87	-53.03	1.13
2,041.00	2.89	204.87	2,038.48	-58.38	-28.80	-57.14	0.44
2,125.00	4.43	221.59	2,122.31	-62.73	-31.85	-61.36	2.21
2,215.00	3.73	219.45	2,212.08	-67.59	-36.02	-66.04	0.80
2,301.00	3.74	213.88	2,297.90	-72.08	-39.36	-70.38	0.42
2,387.00	3.39	218.72	2,383.73	-76.39	-42.51	-74.56	0.54
2,473.00	3.58	214.06	2,469.58	-80.60	-45.61	-78.64	0.40
2,559.00	3.13	213.91	2,555.43	-84.77	-48.42	-82.69	0.52
2,645.00	4.30	218.00	2,641.25	-89.26	-51.71	-87.04	1.39
2,730.00	4.41	220.12	2,726.00	-94.27	-55.78	-91.88	0.23
2,817.00	4.69	212.65	2,812.73	-99.83	-59.86	-97.26	0.75
2,902.00	4.44	215.95	2,897.46	-105.42	-63.66	-102.68	0.43
2,988.00	4.28	205.19	2,983.21	-111.01	-66.98	-108.14	0.97
3,074.00	4.39	201.64	3,068.96	-116.98	-69.56	-113.99	0.34
3,160.00	4.08	207.84	3,154.73	-122.74	-72.21	-119.64	0.64
3,245.00	3.67	209.66	3,239.54	-127.78	-74.96	-124.56	0.50
3,331.00	3.30	211.38	3,325.38	-132.29	-77.61	-128.95	0.45
3,417.00	3.71	221.35	3,411.22	-136.49	-80.74	-133.02	0.85
3,503.00	3.84	214.39	3,497.03	-140.95	-84.21	-137.34	0.55
3,589.00	3.20	215.94	3,582.87	-145.27	-87.24	-141.53	0.75
3,674.00	3.00	207.77	3,667.74	-149.16	-89.67	-145.31	0.57

**Design Report for Wardell 27N-29HZ - Actual Field Surveys**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
3,760.00	2.44	194.57	3,753.65	-152.92	-91.18	-149.01	0.97
3,846.00	4.04	202.37	3,839.51	-157.50	-92.79	-153.51	1.93
3,931.00	4.04	201.67	3,924.30	-163.05	-95.04	-158.96	0.06
4,017.00	3.86	205.05	4,010.09	-168.49	-97.38	-164.30	0.34
4,103.00	3.28	196.89	4,095.93	-173.46	-99.32	-169.19	0.90
4,189.00	3.04	192.02	4,181.79	-178.05	-100.51	-173.72	0.42
4,274.00	4.17	197.13	4,266.63	-183.21	-101.89	-178.82	1.38
4,360.00	4.74	203.15	4,352.37	-189.46	-104.21	-184.97	0.86
4,446.00	5.01	204.08	4,438.05	-196.16	-107.14	-191.54	0.33
4,531.00	4.32	207.74	4,522.77	-202.38	-110.14	-197.63	0.88
4,617.00	4.19	204.05	4,608.54	-208.12	-112.93	-203.25	0.35
4,703.00	3.82	200.94	4,694.33	-213.66	-115.24	-208.69	0.50
4,789.00	4.42	206.80	4,780.10	-219.29	-117.75	-214.22	0.85
4,874.00	3.73	216.55	4,864.89	-224.44	-120.88	-219.23	1.15
4,959.00	3.79	219.88	4,949.71	-228.82	-124.33	-223.46	0.27
5,045.00	3.50	214.94	5,035.53	-233.15	-127.65	-227.65	0.50
5,131.00	4.62	203.47	5,121.32	-238.48	-130.53	-232.85	1.60
5,217.00	3.83	200.48	5,207.08	-244.35	-132.92	-238.62	0.95
5,303.00	3.59	198.54	5,292.90	-249.59	-134.78	-243.78	0.31
5,389.00	4.80	212.72	5,378.67	-255.17	-137.58	-249.24	1.84
5,475.00	4.48	220.59	5,464.39	-260.75	-141.71	-254.64	0.83
5,560.00	4.55	216.43	5,549.13	-265.98	-145.87	-259.70	0.39
5,647.00	3.66	215.25	5,635.90	-271.03	-149.53	-264.58	1.03
5,733.00	2.70	212.21	5,721.77	-274.98	-152.19	-268.42	1.13
5,819.00	3.13	194.02	5,807.66	-278.97	-153.84	-272.34	1.18
5,905.00	4.62	197.07	5,893.46	-284.56	-155.42	-277.86	1.75
5,991.00	3.84	198.75	5,979.23	-290.60	-157.37	-283.82	0.92
6,077.00	2.94	204.90	6,065.08	-295.33	-159.22	-288.46	1.13
6,163.00	3.86	211.90	6,150.92	-299.79	-161.68	-292.81	1.17
6,248.00	3.11	214.43	6,235.77	-304.12	-164.49	-297.02	0.90
6,333.00	2.00	217.45	6,320.68	-307.20	-166.70	-300.01	1.32
6,381.00	2.36	353.32	6,368.66	-306.88	-167.32	-299.67	8.42
6,418.00	5.87	342.72	6,405.56	-304.31	-167.98	-297.08	9.67
6,461.00	10.16	356.15	6,448.14	-298.43	-168.88	-291.16	10.82
6,504.00	11.86	355.61	6,490.34	-290.24	-169.48	-282.95	3.96
6,547.00	15.59	357.87	6,532.11	-280.05	-170.03	-272.75	8.76
6,589.00	19.34	358.65	6,572.17	-267.46	-170.40	-260.15	8.95
6,633.00	22.71	359.29	6,613.23	-251.68	-170.68	-244.37	7.68
6,673.00	25.79	359.78	6,649.70	-235.25	-170.81	-227.96	7.72
6,718.00	29.67	1.70	6,689.52	-214.32	-170.52	-207.06	8.85
6,759.00	32.06	3.28	6,724.71	-193.31	-169.59	-186.10	6.15
6,805.00	36.60	4.09	6,762.69	-167.43	-167.92	-160.31	9.92
6,847.00	39.48	4.45	6,795.77	-141.62	-165.99	-134.61	6.88
6,890.00	43.01	4.38	6,828.09	-113.36	-163.80	-106.46	8.21
6,933.00	45.80	6.45	6,858.81	-83.42	-160.95	-76.66	7.31
6,977.00	50.70	10.59	6,888.11	-50.98	-156.05	-44.46	13.16
7,017.00	56.23	7.28	6,911.92	-19.25	-151.09	-12.96	15.34
7,064.00	62.78	4.77	6,935.76	21.00	-146.87	27.08	14.67
7,104.00	68.53	2.20	6,952.24	57.36	-144.68	63.32	15.52
7,147.00	68.25	2.01	6,968.08	97.31	-143.21	103.17	0.77
7,190.00	72.64	0.98	6,982.47	137.81	-142.16	143.59	10.46

**Design Report for Wardell 27N-29HZ - Actual Field Surveys**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
7,233.00	78.42	359.45	6,993.21	179.43	-142.01	185.17	13.88
7,276.00	84.08	357.80	6,999.75	221.89	-143.03	227.64	13.70
7,316.00	87.48	357.04	7,002.69	261.74	-144.83	267.53	8.72
<b>7" Intermediate Casing</b>							
7,347.00	90.12	356.45	7,003.34	292.68	-146.59	298.51	8.72
7,433.00	90.31	356.35	7,003.01	378.51	-151.99	384.49	0.25
7,519.00	91.30	357.71	7,001.81	464.38	-156.45	470.48	1.96
7,605.00	90.87	357.17	7,000.18	550.28	-160.29	556.46	0.80
7,690.00	90.12	356.95	6,999.44	635.16	-164.65	641.45	0.92
7,776.00	91.54	356.92	6,998.20	721.03	-169.24	727.43	1.65
7,861.00	90.00	357.58	6,997.05	805.92	-173.32	812.42	1.97
7,946.00	87.22	358.23	6,999.12	890.83	-176.43	897.39	3.36
8,030.00	86.79	358.19	7,003.51	974.67	-179.05	981.27	0.51
8,113.00	86.48	357.99	7,008.38	1,057.49	-181.81	1,064.12	0.44
8,197.00	87.28	357.70	7,012.95	1,141.30	-184.96	1,148.00	1.01
8,281.00	86.85	357.84	7,017.25	1,225.13	-188.23	1,231.89	0.54
8,365.00	88.21	358.32	7,020.87	1,309.00	-191.04	1,315.80	1.72
8,448.00	89.01	359.07	7,022.88	1,391.95	-192.93	1,398.76	1.32
8,531.00	89.44	359.08	7,024.01	1,474.93	-194.27	1,481.73	0.52
8,613.00	89.94	359.38	7,024.45	1,556.92	-195.37	1,563.69	0.71
8,699.00	92.60	0.72	7,022.54	1,642.89	-195.30	1,649.59	3.46
8,785.00	91.92	1.13	7,019.15	1,728.82	-193.91	1,735.38	0.92
8,871.00	91.91	0.90	7,016.28	1,814.75	-192.39	1,821.18	0.27
8,957.00	90.56	0.59	7,014.42	1,900.72	-191.27	1,907.03	1.61
9,042.00	89.38	1.11	7,014.47	1,985.71	-190.01	1,991.89	1.52
9,128.00	90.25	0.43	7,014.75	2,071.70	-188.85	2,077.76	1.28
9,214.00	90.06	0.63	7,014.51	2,157.70	-188.06	2,163.65	0.32
9,300.00	89.88	0.76	7,014.56	2,243.69	-187.01	2,249.52	0.26
9,385.00	92.60	1.40	7,012.72	2,328.65	-185.41	2,334.34	3.29
9,471.00	91.24	1.89	7,009.84	2,414.56	-182.94	2,420.08	1.68
9,557.00	90.93	1.52	7,008.21	2,500.51	-180.39	2,505.84	0.56
9,643.00	90.56	1.82	7,007.09	2,586.47	-177.88	2,591.62	0.55
9,728.00	90.56	1.34	7,006.26	2,671.43	-175.54	2,676.41	0.56
9,814.00	90.37	1.61	7,005.56	2,757.40	-173.32	2,762.22	0.38
9,900.00	88.70	1.46	7,006.26	2,843.36	-171.02	2,848.01	1.95
9,986.00	88.27	1.48	7,008.54	2,929.30	-168.81	2,933.79	0.50
10,072.00	88.39	0.47	7,011.04	3,015.25	-167.35	3,019.60	1.18
10,158.00	88.08	0.44	7,013.69	3,101.21	-166.67	3,105.45	0.36
10,243.00	89.14	359.53	7,015.75	3,186.18	-166.69	3,190.36	1.64
10,329.00	88.95	359.12	7,017.19	3,272.16	-167.70	3,276.30	0.53
10,415.00	90.12	358.48	7,017.88	3,358.14	-169.50	3,362.28	1.55
10,501.00	89.57	358.74	7,018.12	3,444.11	-171.59	3,448.27	0.71
10,587.00	90.80	358.74	7,017.84	3,530.09	-173.48	3,534.25	1.43
10,673.00	90.19	359.02	7,017.10	3,616.07	-175.16	3,620.23	0.78
10,758.00	89.75	358.85	7,017.14	3,701.06	-176.74	3,705.20	0.55
10,844.00	89.20	358.92	7,017.93	3,787.04	-178.42	3,791.18	0.64
10,930.00	90.80	358.65	7,017.93	3,873.01	-180.24	3,877.16	1.89
11,016.00	90.49	358.82	7,016.96	3,958.99	-182.14	3,963.14	0.41
11,101.00	90.19	359.03	7,016.46	4,043.97	-183.73	4,048.11	0.43
11,187.00	89.94	358.13	7,016.36	4,129.94	-185.86	4,134.10	1.09
11,273.00	90.25	358.40	7,016.22	4,215.90	-188.47	4,220.09	0.48

## Design Report for Wardell 27N-29HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
11,359.00	89.94	358.49	7,016.07	4,301.87	-190.80	4,306.08	0.38
11,444.00	92.23	0.25	7,014.46	4,386.84	-191.74	4,391.02	3.40
<b>Final Sperry MWD Survey @ 11444.00ft</b>							
11,485.00	92.23	0.25	7,012.87	4,427.81	-191.56	4,431.95	0.00
<b>Straight Line Projection to TD @ 11485.00ft</b>							

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
116.00	116.00	0.70	0.16	First Gyro Survey @ 116.00ft
891.00	890.98	4.20	0.22	Final Gyro Survey @ 891.00ft
891.00	890.98	4.20	0.22	Tie-On to Gyro Surveys @ 891.00ft
967.00	966.98	3.57	-0.47	First Sperry MWD Survey @ 967.00ft
11,444.00	7,014.46	4,386.84	-191.74	Final Sperry MWD Survey @ 11444.00ft
11,485.00	7,012.87	4,427.81	-191.56	Straight Line Projection to TD @ 11485.00ft

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
User	Wardell 27N-29HZ_BHL	357.62	Slot	0.00	0.00	0.00

### Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
116.00	891.00	Surface Gyros	NS-GYRO-MS
983.00	7,276.00	Sperry MWD Survey	MWD
7,347.00	11,485.00	Sperry MWD Survey - Lateral	MWD

### Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,316.00	7,002.71	7" Intermediate Casing	7	8-3/4

**Design Report for Wardell 27N-29HZ - Actual Field Surveys****Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Wardell 27N-29HZ_! - actual wellpath hits target center - Point	0.00	0.00	0.00	0.01	0.00	,179.568167	,8,365.747717	40.190185	-104.682564
Wardell 27N-29HZ_! - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.01	0.00	,179.568167	,8,365.747717	40.190185	-104.682564
Point 1			1,299.37	-372.35		1,312,819.22	3,229,668.44		
Point 2			1,299.22	2,271.48		1,315,462.82	3,229,643.92		
Point 3			1,300.10	4,927.64		1,318,118.76	3,229,620.32		
Point 4			-1,335.67	4,908.49		1,318,075.32	3,226,984.95		
Point 5			-3,971.45	4,889.19		1,318,031.72	3,224,349.57		
Point 6			-3,962.90	2,251.40		1,315,394.24	3,224,382.43		
Point 7			-3,954.40	-362.77		1,312,780.37	3,224,415.03		
Point 8			-1,327.77	-368.22		1,312,799.13	3,227,041.48		
Point 9			1,299.37	-372.35		1,312,819.22	3,229,668.44		
Wardell 27N-29HZ_! - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.01	0.00	,179.568167	,8,365.747717	40.190185	-104.682564
Point 1			839.32	88.40		1,313,275.69	3,229,204.18		
Point 2			839.20	2,271.54		1,315,458.64	3,229,183.94		
Point 3			839.93	4,464.26		1,317,651.18	3,229,164.46		
Point 4			-1,332.32	4,448.49		1,317,615.39	3,226,992.54		
Point 5			-3,509.95	4,432.54		1,317,579.37	3,224,815.24		
Point 6			-3,502.89	2,252.90		1,315,399.98	3,224,842.39		
Point 7			-3,495.87	96.30		1,313,243.63	3,224,869.29		
Point 8			-1,326.93	91.80		1,313,259.12	3,227,038.08		
Point 9			839.32	88.40		1,313,275.69	3,229,204.18		
Wardell 27N-29HZ_!_ - actual wellpath misses target center by 36.93ft at 11485.00ft MD (7012.87 TVD, 4427.81 N, -191.56 E) - Point	0.00	0.00	6,991.00	4,456.88	-185.20	,634.351564	,8,139.482398	40.202419	-104.683227
Wardell 27N-29HZ_!_ - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.01	0.00	,179.568167	,8,365.747717	40.190185	-104.682564
Point 1			443.10	4,935.55		1,318,118.77	3,228,763.32		
Point 2			442.22	2,279.40		1,315,462.84	3,228,786.92		
Point 3			442.37	-364.43		1,312,819.24	3,228,811.44		
Point 4			-473.63	-355.98		1,312,819.24	3,227,895.44		
Point 5			-473.78	2,287.84		1,315,462.84	3,227,870.92		
Point 6			-472.90	4,944.00		1,318,118.78	3,227,847.32		

## North Reference Sheet for Sec. 29 T3N-R65W - Wardell 27N-29HZ - Plan B Rev 2

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

Vertical Depths are relative to RKB=16ft @ 4886.00ft (Xtreme 22). Northing and Easting are relative to Wardell 27N-29HZ

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 -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.000644ft, False Northing: 1,000,000.001308ft, Scale Reduction: 0.99995740

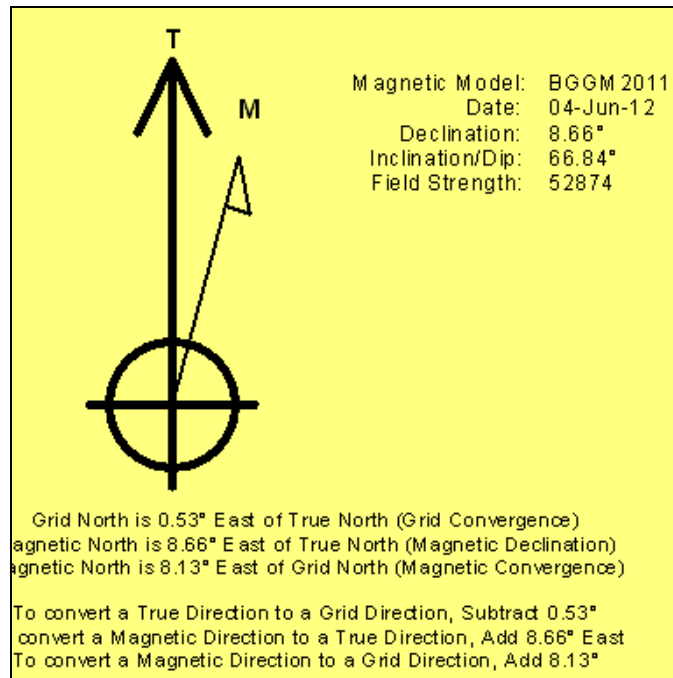
Grid Coordinates of Well: 1,313,179.559855 ft N, 3,228,365.747793 ft E

Geographical Coordinates of Well: 40° 11' 24.67" N, 104° 40' 57.23" W

Grid Convergence at Surface is: 0.53°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,485.00ft  
the Bottom Hole Displacement is 4,431.95ft in the Direction of 357.52° (True).

Magnetic Convergence at surface is: -8.13° ( 4 June 2012, , BGGM2011)



# **Anadarko Petroleum Corp.**

**Weld County, CO (NAD 83)**

**Sec. 29 T3N-R65W**

**Wardell 27N-29HZ**

**Plan B Rev 2**

**Design: Actual Field Surveys**

## **Survey Report - Geographic**

**18 June, 2012**

# Halliburton Company

## Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corp.	<b>Local Co-ordinate Reference:</b>	Well Wardell 27N-29HZ
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Site:</b>	Sec. 29 T3N-R65W	<b>MD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Well:</b>	Wardell 27N-29HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Plan B Rev 2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual Field Surveys	<b>Database:</b>	EDM 2003.16 Single User Db

<b>Project</b>	Weld County, CO (NAD 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 Northern Zone		Using geodetic scale factor

Site	Sec. 29 T3N-R65W				
Site Position:		Northing:	1,313,179.460366ft	Latitude:	40.190185
From:	Lat/Long	Easting:	3,228,349.544428ft	Longitude:	-104.682622
Position Uncertainty:	0.00 ft	Slot Radius:	"	Grid Convergence:	0.53 °

Well	Wardell 27N-29HZ					
Well Position	+N/-S	0.00 ft	Northing:	1,313,179.559855 ft	Latitude:	40.190185
	+E/-W	0.00 ft	Easting:	3,228,365.747793 ft	Longitude:	-104.682564
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	4,870.00 ft

<b>Wellbore</b>	Plan B Rev 2				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	BGGM2011	2012-06-04	8.66	66.84	52,874

Design	Actual Field Surveys			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	357.62

<b>Survey Program</b>	<b>Date</b>	2012-06-18			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
116.00	891.00	Surface Gyros (Plan B Rev 2)	NS-GYRO-MS	North sensing gyrocompassing m/s	
983.00	7,276.00	Sperry MWD Survey (Plan B Rev 2)	MWD	MWD - Standard	
7,347.00	11,485.00	Sperry MWD Survey - Lateral (Plan B Rev 2)	MWD	MWD - Standard	

# Halliburton Company

## Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corp.	<b>Local Co-ordinate Reference:</b>	Well Wardell 27N-29HZ
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Site:</b>	Sec. 29 T3N-R65W	<b>MD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Well:</b>	Wardell 27N-29HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Plan B Rev 2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual Field Surveys	<b>Database:</b>	EDM 2003.16 Single User Db

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	13,179.559855	28,365.747793	40.190185	-104.682564
116.00	0.71	12.78	116.00	0.70	0.16	13,180.262173	28,365.900305	40.190187	-104.682563
<b>First Gyro Survey @ 116.00ft</b>									
216.00	0.48	356.99	215.99	1.72	0.27	13,181.285672	28,366.005930	40.190190	-104.682563
316.00	0.13	35.89	315.99	2.23	0.32	13,181.796245	28,366.045734	40.190191	-104.682563
416.00	0.12	5.54	415.99	2.43	0.40	13,181.993073	28,366.120535	40.190192	-104.682563
516.00	0.31	46.86	515.99	2.72	0.60	13,182.284172	28,366.325359	40.190192	-104.682562
616.00	0.35	352.43	615.99	3.21	0.76	13,182.773330	28,366.478012	40.190194	-104.682561
716.00	0.32	357.09	715.99	3.79	0.71	13,183.354439	28,366.418241	40.190195	-104.682561
816.00	0.38	295.15	815.98	4.21	0.39	13,183.771329	28,366.100047	40.190196	-104.682563
891.00	0.19	152.78	890.98	4.20	0.22	13,183.764893	28,365.931856	40.190196	-104.682563
<b>Final Gyro Survey @ 891.00ft - Tie-On to Gyro Surveys @ 891.00ft</b>									
967.00	1.38	235.51	966.98	3.57	-0.47	13,183.129040	28,365.242275	40.190195	-104.682566
<b>First Sperry MWD Survey @ 967.00ft</b>									
1,042.00	2.72	239.43	1,041.93	2.16	-2.75	13,181.692448	28,362.980051	40.190191	-104.682574
1,134.00	3.18	244.06	1,133.80	-0.07	-6.92	13,179.427710	28,358.826701	40.190185	-104.682589
1,166.00	3.05	244.56	1,165.76	-0.82	-8.49	13,178.659385	28,357.266865	40.190183	-104.682594
1,195.00	3.74	222.61	1,194.71	-1.85	-9.83	13,177.619575	28,355.939355	40.190180	-104.682599
1,224.00	4.32	198.86	1,223.64	-3.58	-10.82	13,175.880728	28,354.961909	40.190175	-104.682603
1,256.00	6.07	183.93	1,255.51	-6.41	-11.33	13,173.047523	28,354.482409	40.190167	-104.682605
1,288.00	6.31	187.53	1,287.32	-9.84	-11.67	13,169.613328	28,354.167661	40.190158	-104.682606
1,316.00	4.80	202.55	1,315.19	-12.45	-12.32	13,166.999898	28,353.540786	40.190151	-104.682608
1,347.00	4.17	190.58	1,346.09	-14.75	-13.03	13,164.687747	28,352.857746	40.190144	-104.682611
1,407.00	4.43	187.38	1,405.93	-19.20	-13.73	13,160.239245	28,352.200568	40.190132	-104.682613
1,497.00	4.66	192.01	1,495.64	-26.22	-14.93	13,153.205728	28,351.058198	40.190113	-104.682617
1,589.00	3.95	197.36	1,587.38	-32.90	-16.66	13,146.510526	28,349.396777	40.190095	-104.682624
1,682.00	3.82	205.35	1,680.17	-38.76	-18.94	13,140.633027	28,347.168820	40.190078	-104.682632
1,774.00	3.94	196.83	1,771.96	-44.55	-21.17	13,134.818050	28,344.995160	40.190063	-104.682640
1,865.00	3.61	220.78	1,862.77	-49.71	-23.94	13,129.630719	28,342.266385	40.190048	-104.682650
1,955.00	3.27	204.74	1,952.61	-54.19	-26.87	13,125.127234	28,339.382930	40.190036	-104.682660
2,041.00	2.89	204.87	2,038.48	-58.38	-28.80	13,120.915108	28,337.483488	40.190025	-104.682667
2,125.00	4.43	221.59	2,122.31	-62.73	-31.85	13,116.539502	28,334.479550	40.190013	-104.682678
2,215.00	3.73	219.45	2,212.08	-67.59	-36.02	13,111.641273	28,330.357272	40.189999	-104.682693
2,301.00	3.74	213.88	2,297.90	-72.08	-39.36	13,107.122180	28,327.057891	40.189987	-104.682705
2,387.00	3.39	218.72	2,383.73	-76.39	-42.51	13,102.781016	28,323.943832	40.189975	-104.682716
2,473.00	3.58	214.06	2,469.58	-80.60	-45.61	13,098.544605	28,320.888621	40.189964	-104.682727
2,559.00	3.13	213.91	2,555.43	-84.77	-48.42	13,094.346068	28,318.113689	40.189952	-104.682737
2,645.00	4.30	218.00	2,641.25	-89.26	-51.71	13,089.826768	28,314.860432	40.189940	-104.682749
2,730.00	4.41	220.12	2,726.00	-94.27	-55.78	13,084.779628	28,310.839253	40.189926	-104.682764
2,817.00	4.69	212.65	2,812.73	-99.83	-59.86	13,079.189965	28,306.816458	40.189911	-104.682778
2,902.00	4.44	215.95	2,897.46	-105.42	-63.66	13,073.565986	28,303.061939	40.189895	-104.682792
2,988.00	4.28	205.19	2,983.21	-111.01	-66.98	13,067.937023	28,299.793606	40.189880	-104.682804
3,074.00	4.39	201.64	3,068.96	-116.98	-69.56	13,061.950351	28,297.269126	40.189864	-104.682813
3,160.00	4.08	207.84	3,154.73	-122.74	-72.21	13,056.161679	28,294.679914	40.189848	-104.682822
3,245.00	3.67	209.66	3,239.54	-127.78	-74.96	13,051.098829	28,291.968223	40.189834	-104.682832
3,331.00	3.30	211.38	3,325.38	-132.29	-77.61	13,046.569764	28,289.359030	40.189822	-104.682842
3,417.00	3.71	221.35	3,411.22	-136.49	-80.74	13,042.339337	28,286.270896	40.189810	-104.682853
3,503.00	3.84	214.39	3,497.03	-140.95	-84.21	13,037.842667	28,282.847593	40.189798	-104.682865
3,589.00	3.20	215.94	3,582.87	-145.27	-87.24	13,033.495240	28,279.852259	40.189786	-104.682876
3,674.00	3.00	207.77	3,667.74	-149.16	-89.67	13,029.584280	28,277.459496	40.189775	-104.682885
3,760.00	2.44	194.57	3,753.65	-152.92	-91.18	13,025.807597	28,275.985228	40.189765	-104.682890
3,846.00	4.04	202.37	3,839.51	-157.50	-92.79	13,021.219528	28,274.413913	40.189753	-104.682896
3,931.00	4.04	201.67	3,924.30	-163.05	-95.04	13,015.647754	28,272.220051	40.189737	-104.682904
4,017.00	3.86	205.05	4,010.09	-168.49	-97.38	13,010.188799	28,269.926061	40.189722	-104.682913
4,103.00	3.28	196.89	4,095.93	-173.46	-99.32	13,005.194692	28,268.031632	40.189709	-104.682920

# Halliburton Company

## Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corp.	<b>Local Co-ordinate Reference:</b>	Well Wardell 27N-29HZ
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Site:</b>	Sec. 29 T3N-R65W	<b>MD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Well:</b>	Wardell 27N-29HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Plan B Rev 2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual Field Surveys	<b>Database:</b>	EDM 2003.16 Single User Db

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
4,189.00	3.04	192.02	4,181.79	-178.05	-100.51	13,000.599532	28,266.884289	40.189696	-104.682924
4,274.00	4.17	197.13	4,266.63	-183.21	-101.89	12,995.429247	28,265.552263	40.189682	-104.682929
4,360.00	4.74	203.15	4,352.37	-189.46	-104.21	12,989.153087	28,263.292190	40.189665	-104.682937
4,446.00	5.01	204.08	4,438.05	-196.16	-107.14	12,982.431098	28,260.425064	40.189646	-104.682947
4,531.00	4.32	207.74	4,522.77	-202.38	-110.14	12,976.181873	28,257.478172	40.189629	-104.682958
4,617.00	4.19	204.05	4,608.54	-208.12	-112.93	12,970.420841	28,254.743253	40.189614	-104.682968
4,703.00	3.82	200.94	4,694.33	-213.66	-115.24	12,964.855473	28,252.490340	40.189598	-104.682976
4,789.00	4.42	206.80	4,780.10	-219.29	-117.75	12,959.199187	28,250.024459	40.189583	-104.682985
4,874.00	3.73	216.55	4,864.89	-224.44	-120.88	12,954.026088	28,246.948768	40.189569	-104.682997
4,959.00	3.79	219.88	4,949.71	-228.82	-124.33	12,949.617803	28,243.541647	40.189557	-104.683009
5,045.00	3.50	214.94	5,035.53	-233.15	-127.65	12,945.254432	28,240.255997	40.189545	-104.683021
5,131.00	4.62	203.47	5,121.32	-238.48	-130.53	12,939.899158	28,237.422381	40.189530	-104.683031
5,217.00	3.83	200.48	5,207.08	-244.35	-132.92	12,934.009904	28,235.092279	40.189514	-104.683040
5,303.00	3.59	198.54	5,292.90	-249.59	-134.78	12,928.749718	28,233.279701	40.189500	-104.683046
5,389.00	4.80	212.72	5,378.67	-255.17	-137.58	12,923.144048	28,230.530152	40.189484	-104.683056
5,475.00	4.48	220.59	5,464.39	-260.75	-141.71	12,917.528572	28,226.451584	40.189469	-104.683071
5,560.00	4.55	216.43	5,549.13	-265.98	-145.87	12,912.257052	28,222.338097	40.189455	-104.683086
5,647.00	3.66	215.25	5,635.90	-271.03	-149.53	12,907.179560	28,218.732953	40.189441	-104.683099
5,733.00	2.70	212.21	5,721.77	-274.98	-152.19	12,903.199779	28,216.105672	40.189430	-104.683109
5,819.00	3.13	194.02	5,807.66	-278.97	-153.84	12,899.193047	28,214.494088	40.189419	-104.683115
5,905.00	4.62	197.07	5,893.46	-284.56	-155.42	12,893.589719	28,212.960176	40.189404	-104.683120
5,991.00	3.84	198.75	5,979.23	-290.60	-157.37	12,887.534393	28,211.073629	40.189387	-104.683127
6,077.00	2.94	204.90	6,065.08	-295.33	-159.22	12,882.790222	28,209.263075	40.189374	-104.683134
6,163.00	3.86	211.90	6,150.92	-299.79	-161.68	12,878.309837	28,206.846057	40.189362	-104.683143
6,248.00	3.11	214.43	6,235.77	-304.12	-164.49	12,873.953411	28,204.070616	40.189350	-104.683153
6,333.00	2.00	217.45	6,320.68	-307.20	-166.70	12,870.853904	28,201.893542	40.189342	-104.683161
6,381.00	2.36	353.32	6,368.66	-306.88	-167.32	12,871.164869	28,201.266145	40.189342	-104.683163
6,418.00	5.87	342.72	6,405.56	-304.31	-167.98	12,873.722737	28,200.591728	40.189350	-104.683165
6,461.00	10.16	356.15	6,448.14	-298.43	-168.88	12,879.600684	28,199.629246	40.189366	-104.683168
6,504.00	11.86	355.61	6,490.34	-290.24	-169.48	12,887.784852	28,198.960877	40.189388	-104.683171
6,547.00	15.59	357.87	6,532.11	-280.05	-170.03	12,897.962464	28,198.313868	40.189416	-104.683173
6,589.00	19.34	358.65	6,572.17	-267.46	-170.40	12,910.555055	28,197.824036	40.189451	-104.683174
6,633.00	22.71	359.29	6,613.23	-251.68	-170.68	12,926.332341	28,197.401612	40.189494	-104.683175
6,673.00	25.79	359.78	6,649.70	-235.25	-170.81	12,942.755889	28,197.121088	40.189539	-104.683175
6,718.00	29.67	1.70	6,689.52	-214.32	-170.52	12,963.687005	28,197.221073	40.189597	-104.683174
6,759.00	32.06	3.28	6,724.71	-193.31	-169.59	12,984.703959	28,197.951109	40.189654	-104.683171
6,805.00	36.60	4.09	6,762.69	-167.43	-167.92	13,010.597709	28,199.389879	40.189725	-104.683165
6,847.00	39.48	4.45	6,795.77	-141.62	-165.99	13,036.419334	28,201.081237	40.189796	-104.683158
6,890.00	43.01	4.38	6,828.09	-113.36	-163.80	13,064.697537	28,203.001910	40.189874	-104.683150
6,933.00	45.80	6.45	6,858.81	-83.42	-160.95	13,094.667683	28,205.577878	40.189956	-104.683140
6,977.00	50.70	10.59	6,888.11	-50.98	-156.05	13,127.144459	28,210.183187	40.190045	-104.683123
7,017.00	56.23	7.28	6,911.92	-19.25	-151.09	13,158.922452	28,214.846055	40.190132	-104.683105
7,064.00	62.78	4.77	6,935.76	21.00	-146.87	13,199.209185	28,218.692958	40.190243	-104.683090
7,104.00	68.53	2.20	6,952.24	57.36	-144.68	13,235.583909	28,220.553205	40.190342	-104.683082
7,147.00	68.25	2.01	6,968.08	97.31	-143.21	13,275.544629	28,221.653299	40.190452	-104.683077
7,190.00	72.64	0.98	6,982.47	137.81	-142.16	13,316.046428	28,222.331846	40.190563	-104.683073
7,233.00	78.42	359.45	6,993.21	179.43	-142.01	13,357.660931	28,222.097144	40.190677	-104.683072
7,276.00	84.08	357.80	6,999.75	221.89	-143.03	13,400.116266	28,220.681746	40.190794	-104.683076
7,316.00	87.48	357.04	7,002.69	261.74	-144.83	13,439.941284	28,218.517833	40.190903	-104.683082
<b>7" Intermediate Casing</b>									
7,347.00	90.12	356.45	7,003.34	292.68	-146.59	13,470.862734	28,216.472464	40.190988	-104.683089
7,433.00	90.31	356.35	7,003.01	378.51	-151.99	13,556.635299	28,210.281817	40.191224	-104.683108
7,519.00	91.30	357.71	7,001.81	464.38	-156.45	13,642.459840	28,205.035187	40.191460	-104.683124
7,605.00	90.87	357.17	7,000.18	550.28	-160.29	13,728.315376	28,200.403163	40.191695	-104.683138
7,690.00	90.12	356.95	6,999.44	635.16	-164.65	13,813.152265	28,195.261608	40.191928	-104.683153

# Halliburton Company

## Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corp.	<b>Local Co-ordinate Reference:</b>	Well Wardell 27N-29HZ
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Site:</b>	Sec. 29 T3N-R65W	<b>MD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Well:</b>	Wardell 27N-29HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Plan B Rev 2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual Field Surveys	<b>Database:</b>	EDM 2003.16 Single User Db

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (ft)	Map Easting (ft)	Latitude	Longitude
7,776.00	91.54	356.92	6,998.20	721.03	-169.24	13,898.968348	28,189.872788	40.192164	-104.683170
7,861.00	90.00	357.58	6,997.05	805.92	-173.32	13,983.814964	28,185.013081	40.192397	-104.683184
7,946.00	87.22	358.23	6,999.12	890.83	-176.43	14,068.688499	28,181.124314	40.192630	-104.683196
8,030.00	86.79	358.19	7,003.51	974.67	-179.05	14,152.501344	28,177.731422	40.192860	-104.683205
8,113.00	86.48	357.99	7,008.38	1,057.49	-181.81	14,235.279563	28,174.206761	40.193088	-104.683215
8,197.00	87.28	357.70	7,012.95	1,141.30	-184.96	14,319.058754	28,170.280414	40.193318	-104.683226
8,281.00	86.85	357.84	7,017.25	1,225.13	-188.23	14,402.847597	28,166.243748	40.193548	-104.683238
8,365.00	88.21	358.32	7,020.87	1,309.00	-191.04	14,486.687178	28,162.659392	40.193778	-104.683248
8,448.00	89.01	359.07	7,022.88	1,391.95	-192.93	14,569.615492	28,160.005295	40.194006	-104.683255
8,531.00	89.44	359.08	7,024.01	1,474.93	-194.27	14,652.577478	28,157.900708	40.194234	-104.683259
8,613.00	89.94	359.38	7,024.45	1,556.92	-195.37	14,734.551386	28,156.043081	40.194459	-104.683263
8,699.00	92.60	0.72	7,022.54	1,642.89	-195.30	14,820.513918	28,155.325130	40.194695	-104.683263
8,785.00	91.92	1.13	7,019.15	1,728.82	-193.91	14,906.440614	28,155.920335	40.194930	-104.683258
8,871.00	91.91	0.90	7,016.28	1,814.75	-192.39	14,992.385761	28,156.650606	40.195166	-104.683253
8,957.00	90.56	0.59	7,014.42	1,900.72	-191.27	15,078.359412	28,156.975902	40.195402	-104.683249
9,042.00	89.38	1.11	7,014.47	1,985.71	-190.01	15,163.352645	28,157.453308	40.195636	-104.683244
9,128.00	90.25	0.43	7,014.75	2,071.70	-188.85	15,249.346436	28,157.816250	40.195872	-104.683240
9,214.00	90.06	0.63	7,014.51	2,157.70	-188.06	15,335.342375	28,157.818993	40.196108	-104.683237
9,300.00	89.88	0.76	7,014.56	2,243.69	-187.01	15,421.338281	28,158.069387	40.196344	-104.683233
9,385.00	92.60	1.40	7,012.72	2,328.65	-185.41	15,506.302396	28,158.887475	40.196577	-104.683228
9,471.00	91.24	1.89	7,009.84	2,414.56	-182.94	15,592.231843	28,160.562797	40.196813	-104.683219
9,557.00	90.93	1.52	7,008.21	2,500.51	-180.39	15,678.194370	28,162.328659	40.197049	-104.683210
9,643.00	90.56	1.82	7,007.09	2,586.47	-177.88	15,764.166115	28,164.042196	40.197285	-104.683201
9,728.00	90.56	1.34	7,006.26	2,671.43	-175.54	15,849.143864	28,165.602380	40.197518	-104.683192
9,814.00	90.37	1.61	7,005.56	2,757.40	-173.32	15,935.125508	28,167.023380	40.197754	-104.683184
9,900.00	88.70	1.46	7,006.26	2,843.36	-171.02	16,021.102668	28,168.534378	40.197990	-104.683176
9,986.00	88.27	1.48	7,008.54	2,929.30	-168.81	16,107.057127	28,169.947422	40.198226	-104.683168
10,072.00	88.39	0.47	7,011.04	3,015.25	-167.35	16,193.013193	28,170.617750	40.198462	-104.683163
10,158.00	88.08	0.44	7,013.69	3,101.21	-166.67	16,278.968554	28,170.507978	40.198698	-104.683161
10,243.00	89.14	359.53	7,015.75	3,186.18	-166.69	16,363.933996	28,169.702317	40.198931	-104.683161
10,329.00	88.95	359.12	7,017.19	3,272.16	-167.70	16,449.899207	28,167.896849	40.199167	-104.683164
10,415.00	90.12	358.48	7,017.88	3,358.14	-169.50	16,535.851656	28,165.303499	40.199403	-104.683171
10,501.00	89.57	358.74	7,018.12	3,444.11	-171.59	16,621.799086	28,162.425035	40.199639	-104.683178
10,587.00	90.80	358.74	7,017.84	3,530.09	-173.48	16,707.751446	28,159.741634	40.199875	-104.683185
10,673.00	90.19	359.02	7,017.10	3,616.07	-175.16	16,793.708505	28,157.268317	40.200111	-104.683191
10,758.00	89.75	358.85	7,017.14	3,701.06	-176.74	16,878.671776	28,154.905210	40.200344	-104.683197
10,844.00	89.20	358.92	7,017.93	3,787.04	-178.42	16,964.628806	28,152.439389	40.200580	-104.683203
10,930.00	90.80	358.65	7,017.93	3,873.01	-180.24	17,050.582473	28,149.823519	40.200816	-104.683209
11,016.00	90.49	358.82	7,016.96	3,958.99	-182.14	17,136.531114	28,147.132730	40.201052	-104.683216
11,101.00	90.19	359.03	7,016.46	4,043.97	-183.73	17,221.492582	28,144.754835	40.201286	-104.683222
11,187.00	89.94	358.13	7,016.36	4,129.94	-185.86	17,307.438205	28,141.831381	40.201522	-104.683229
11,273.00	90.25	358.40	7,016.22	4,215.90	-188.47	17,393.367160	28,138.435436	40.201758	-104.683239
11,359.00	89.94	358.49	7,016.07	4,301.87	-190.80	17,479.306431	28,135.309459	40.201993	-104.683247
11,444.00	92.23	0.25	7,014.46	4,386.84	-191.74	17,564.261202	28,133.591462	40.202227	-104.683250
<b>Final Sperry MWD Survey @ 11444.00ft</b>									
11,485.00	92.23	0.25	7,012.87	4,427.81	-191.56	17,605.227924	28,133.392565	40.202339	-104.683250
<b>Straight Line Projection to TD @ 11485.00ft</b>									

# Halliburton Company

## Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corp.	<b>Local Co-ordinate Reference:</b>	Well Wardell 27N-29HZ
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Site:</b>	Sec. 29 T3N-R65W	<b>MD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Well:</b>	Wardell 27N-29HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Plan B Rev 2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual Field Surveys	<b>Database:</b>	EDM 2003.16 Single User Db

### Targets

Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N-S (ft)	+E-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Wardell 27N-29HZ_SI	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
Wardell 27N-29HZ_Si	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	-372.35	1,299.37	1,312,819.22	3,229,668.44		
Point 2				0.00	2,271.48	1,299.22	1,315,462.82	3,229,643.92		
Point 3				0.00	4,927.64	1,300.10	1,318,118.76	3,229,620.32		
Point 4				0.00	4,908.49	-1,335.67	1,318,075.32	3,226,984.95		
Point 5				0.00	4,889.19	-3,971.45	1,318,031.72	3,224,349.57		
Point 6				0.00	2,251.40	-3,962.90	1,315,394.24	3,224,382.43		
Point 7				0.00	-362.77	-3,954.40	1,312,780.37	3,224,415.03		
Point 8				0.00	-368.22	-1,327.77	1,312,799.13	3,227,041.48		
Point 9				0.00	-372.35	1,299.37	1,312,819.22	3,229,668.44		
Wardell 27N-29HZ_Si	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	88.40	839.32	1,313,275.69	3,229,204.18		
Point 2				0.00	2,271.54	839.20	1,315,458.64	3,229,183.94		
Point 3				0.00	4,464.26	839.93	1,317,651.18	3,229,164.46		
Point 4				0.00	4,448.49	-1,332.32	1,317,615.39	3,226,992.54		
Point 5				0.00	4,432.54	-3,509.95	1,317,579.37	3,224,815.24		
Point 6				0.00	2,252.90	-3,502.89	1,315,399.98	3,224,842.39		
Point 7				0.00	96.30	-3,495.87	1,313,243.63	3,224,869.29		
Point 8				0.00	91.80	-1,326.93	1,313,259.12	3,227,038.08		
Point 9				0.00	88.40	839.32	1,313,275.69	3,229,204.18		
Wardell 27N-29HZ_BI	- actual wellpath misses target center by 36.93ft at 11485.00ft MD (7012.87 TVD, 4427.81 N, -191.56 E)	0.00	0.00	6,991.00	4,456.88	-185.20	317,634.351564	228,139.482398	40.202419	-104.683227
Wardell 27N-29HZ_Li	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	4,935.55	443.10	1,318,118.77	3,228,763.32		
Point 2				0.00	2,279.40	442.22	1,315,462.84	3,228,786.92		
Point 3				0.00	-364.43	442.37	1,312,819.24	3,228,811.44		
Point 4				0.00	-355.98	-473.63	1,312,819.24	3,227,895.44		
Point 5				0.00	2,287.84	-473.78	1,315,462.84	3,227,870.92		
Point 6				0.00	4,944.00	-472.90	1,318,118.78	3,227,847.32		

### Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,316.00	7,002.69	7" Intermediate Casing	7	8-3/4

# Halliburton Company

## Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corp.	<b>Local Co-ordinate Reference:</b>	Well Wardell 27N-29HZ
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Site:</b>	Sec. 29 T3N-R65W	<b>MD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Well:</b>	Wardell 27N-29HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Plan B Rev 2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual Field Surveys	<b>Database:</b>	EDM 2003.16 Single User Db

### Targets

Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Wardell 27N-29HZ_SI	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
Wardell 27N-29HZ_Si	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	-372.35	1,299.37	1,312,819.22	3,229,668.44		
Point 2				0.00	2,271.48	1,299.22	1,315,462.82	3,229,643.92		
Point 3				0.00	4,927.64	1,300.10	1,318,118.76	3,229,620.32		
Point 4				0.00	4,908.49	-1,335.67	1,318,075.32	3,226,984.95		
Point 5				0.00	4,889.19	-3,971.45	1,318,031.72	3,224,349.57		
Point 6				0.00	2,251.40	-3,962.90	1,315,394.24	3,224,382.43		
Point 7				0.00	-362.77	-3,954.40	1,312,780.37	3,224,415.03		
Point 8				0.00	-368.22	-1,327.77	1,312,799.13	3,227,041.48		
Point 9				0.00	-372.35	1,299.37	1,312,819.22	3,229,668.44		
Wardell 27N-29HZ_Si	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	88.40	839.32	1,313,275.69	3,229,204.18		
Point 2				0.00	2,271.54	839.20	1,315,458.64	3,229,183.94		
Point 3				0.00	4,464.26	839.93	1,317,651.18	3,229,164.46		
Point 4				0.00	4,448.49	-1,332.32	1,317,615.39	3,226,992.54		
Point 5				0.00	4,432.54	-3,509.95	1,317,579.37	3,224,815.24		
Point 6				0.00	2,252.90	-3,502.89	1,315,399.98	3,224,842.39		
Point 7				0.00	96.30	-3,495.87	1,313,243.63	3,224,869.29		
Point 8				0.00	91.80	-1,326.93	1,313,259.12	3,227,038.08		
Point 9				0.00	88.40	839.32	1,313,275.69	3,229,204.18		
Wardell 27N-29HZ_BI	- actual wellpath misses target center by 36.93ft at 11485.00ft MD (7012.87 TVD, 4427.81 N, -191.56 E)	0.00	0.00	6,991.00	4,456.88	-185.20	317,634.351564	228,139.482398	40.202419	-104.683227
Wardell 27N-29HZ_Li	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	4,935.55	443.10	1,318,118.77	3,228,763.32		
Point 2				0.00	2,279.40	442.22	1,315,462.84	3,228,786.92		
Point 3				0.00	-364.43	442.37	1,312,819.24	3,228,811.44		
Point 4				0.00	-355.98	-473.63	1,312,819.24	3,227,895.44		
Point 5				0.00	2,287.84	-473.78	1,315,462.84	3,227,870.92		
Point 6				0.00	4,944.00	-472.90	1,318,118.78	3,227,847.32		

### Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,316.00	7,002.69	7" Intermediate Casing	7	8-3/4

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
116.00	116.00	0.70	0.16	First Gyro Survey @ 116.00ft
891.00	890.98	4.20	0.22	Final Gyro Survey @ 891.00ft
891.00	890.98	4.20	0.22	Tie-On to Gyro Surveys @ 891.00ft

# Halliburton Company

## Survey Report - Geographic

<b>Company:</b>	Anadarko Petroleum Corp.	<b>Local Co-ordinate Reference:</b>	Well Wardell 27N-29HZ
<b>Project:</b>	Weld County, CO (NAD 83)	<b>TVD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Site:</b>	Sec. 29 T3N-R65W	<b>MD Reference:</b>	RKB=16ft @ 4886.00ft (Xtreme 22)
<b>Well:</b>	Wardell 27N-29HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Plan B Rev 2	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual Field Surveys	<b>Database:</b>	EDM 2003.16 Single User Db

### Targets

Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N-S (ft)	+E-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Wardell 27N-29HZ_SI	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
Wardell 27N-29HZ_Si	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	-372.35	1,299.37	1,312,819.22	3,229,668.44		
Point 2				0.00	2,271.48	1,299.22	1,315,462.82	3,229,643.92		
Point 3				0.00	4,927.64	1,300.10	1,318,118.76	3,229,620.32		
Point 4				0.00	4,908.49	-1,335.67	1,318,075.32	3,226,984.95		
Point 5				0.00	4,889.19	-3,971.45	1,318,031.72	3,224,349.57		
Point 6				0.00	2,251.40	-3,962.90	1,315,394.24	3,224,382.43		
Point 7				0.00	-362.77	-3,954.40	1,312,780.37	3,224,415.03		
Point 8				0.00	-368.22	-1,327.77	1,312,799.13	3,227,041.48		
Point 9				0.00	-372.35	1,299.37	1,312,819.22	3,229,668.44		
Wardell 27N-29HZ_Si	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	88.40	839.32	1,313,275.69	3,229,204.18		
Point 2				0.00	2,271.54	839.20	1,315,458.64	3,229,183.94		
Point 3				0.00	4,464.26	839.93	1,317,651.18	3,229,164.46		
Point 4				0.00	4,448.49	-1,332.32	1,317,615.39	3,226,992.54		
Point 5				0.00	4,432.54	-3,509.95	1,317,579.37	3,224,815.24		
Point 6				0.00	2,252.90	-3,502.89	1,315,399.98	3,224,842.39		
Point 7				0.00	96.30	-3,495.87	1,313,243.63	3,224,869.29		
Point 8				0.00	91.80	-1,326.93	1,313,259.12	3,227,038.08		
Point 9				0.00	88.40	839.32	1,313,275.69	3,229,204.18		
Wardell 27N-29HZ_BI	- actual wellpath misses target center by 36.93ft at 11485.00ft MD (7012.87 TVD, 4427.81 N, -191.56 E)	0.00	0.00	6,991.00	4,456.88	-185.20	317,634.351564	228,139.482398	40.202419	-104.683227
Wardell 27N-29HZ_Li	- actual wellpath hits target center	0.00	0.00	0.00	0.01	0.00	313,179.568167	228,365.747717	40.190185	-104.682564
- Polygon										
Point 1				0.00	4,935.55	443.10	1,318,118.77	3,228,763.32		
Point 2				0.00	2,279.40	442.22	1,315,462.84	3,228,786.92		
Point 3				0.00	-364.43	442.37	1,312,819.24	3,228,811.44		
Point 4				0.00	-355.98	-473.63	1,312,819.24	3,227,895.44		
Point 5				0.00	2,287.84	-473.78	1,315,462.84	3,227,870.92		
Point 6				0.00	4,944.00	-472.90	1,318,118.78	3,227,847.32		

### Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,316.00	7,002.69	7" Intermediate Casing	7	8-3/4
967.00	966.98	3.57	-0.47	First Sperry MWD Survey @ 967.00ft
11,444.00	7,014.46	4,386.84	-191.74	Final Sperry MWD Survey @ 11444.00ft
11,485.00	7,012.87	4,427.81	-191.56	Straight Line Projection to TD @ 11485.00ft

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