



# Weatherford®

Weatherford  
2000 Oil Drive  
Casper, WY 82604

## Survey Certification

Operating Company:	Anadarko Petroleum Corp.
Well Name:	SPARBOE 24N-3HZ
State:	CO
County:	WELD
API Number:	512336239
Datum:	NAD 83
Survey Calculation Method:	Minimum Curvature
North Reference:	True North

I, J. Aaron Underwood, hereby certify the attached  
directional survey run from the measure depth of 1,888.00 feet  
to the measured depth of 14,242.00 feet as accurate and true  
to the best of my knowledge.

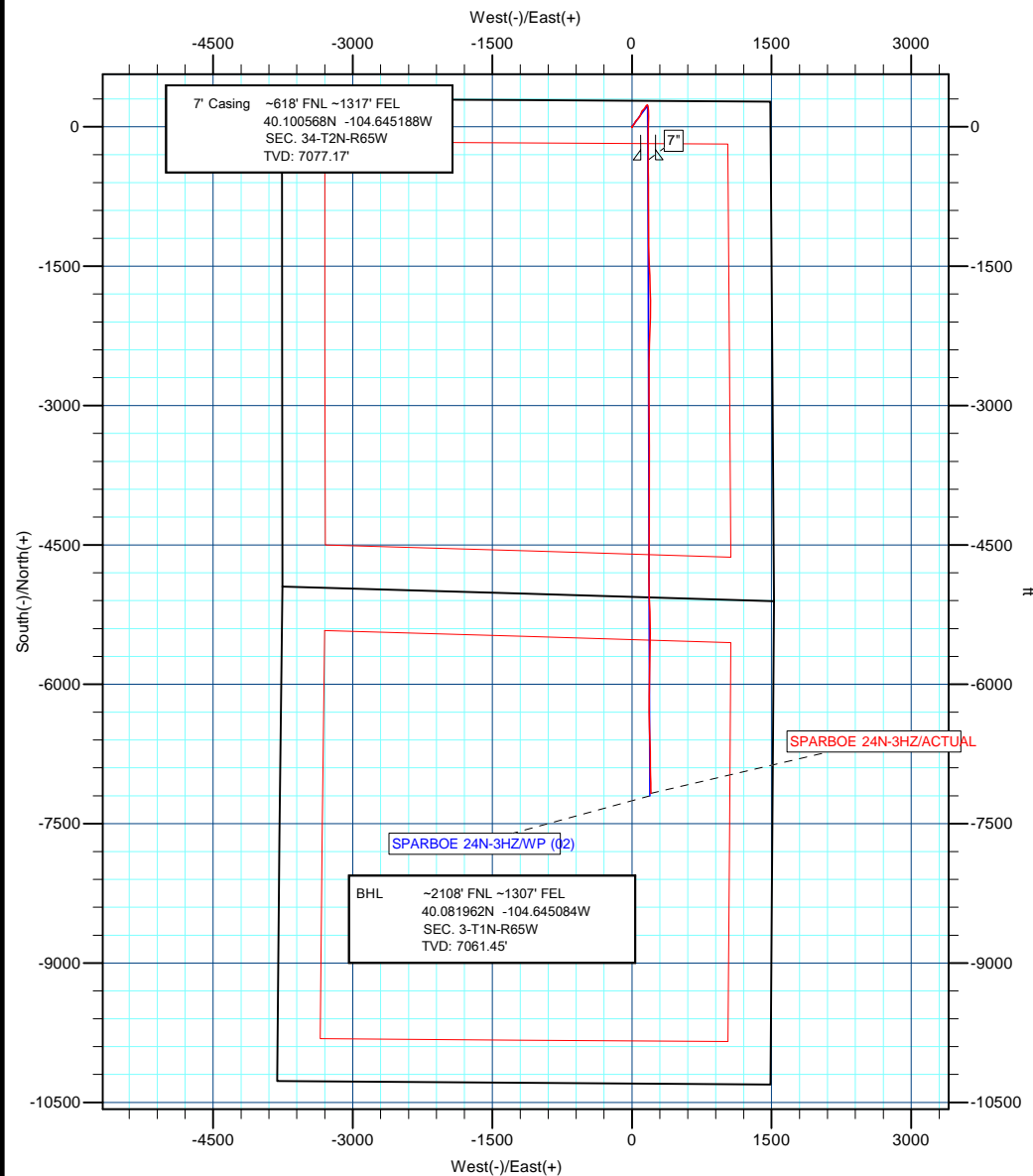
Signature

13-Mar-13

Date

**J. Aaron Underwood**

Directional Planning  
Weatherford - Rockies District



**Azimuths to True North**  
Magnetic North: 8.57°

Magnetic Field  
Strength: 52828.2snT  
Dip Angle: 66.78°  
Date: 12/13/2012  
Model: IGRF2010

**Project:** COLORADO NORTHERN ZONE - 83  
**Site:** WELD SPARBOE 4 PAD  
**Well:** SPARBOE 24N-3HZ  
**Wellbore:** Wellbore #1  
**Design:** ACTUAL  
**Latitude:** 40.101500  
**Longitude:** -104.645813  
**GL:** 4977.00  
**KB:** 16'RKB+4977'GL @ 4993.00ft (XTREME 23)

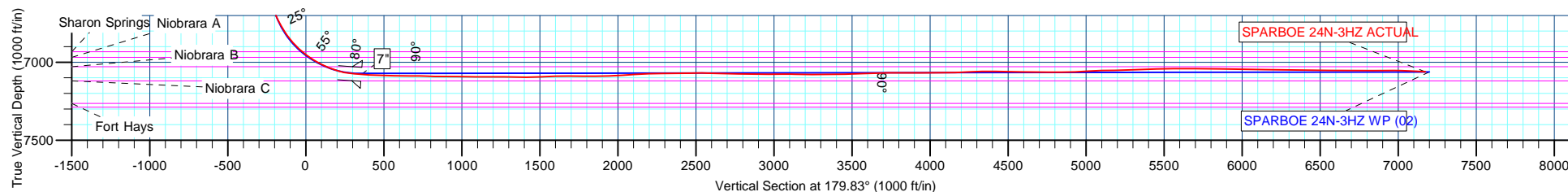
WELL DETAILS: SPARBOE 24N-3HZ						
+N/-S	+E/-W	Northing	Ground Level: Easting	4977.00 Latitude	Longitude	Slot
0.00	0.00	1280971.65	3238943.70	40.101500	-104.645813	

ANNOTATIONS									
TVD	MD	Inc	Azi	+N/-S	+E/-W	Vsect	Departure	Annotation	
1790.99	1791.00	0.13	348.27	0.94	-0.47	-0.94	6.95	TIE ON	
1887.99	1888.00	0.28	224.52	0.88	-0.65	-0.88	7.29	FIRST WFT SURVEY	
7077.17	7404.00	85.44	179.72	-339.56	174.83	340.08	878.45	7 IN. CASING	
7058.45	14185.00	86.98	178.49	-7117.24	202.47	7117.81	7657.39	LAST WFT SURVEY	
7061.45	14242.00	86.98	178.49	-7174.14	203.97	7174.71	7714.31	PROJECTION TO TD	

WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)							
Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape	
SPARBOE 24N-3HZ PBHL	7043.00	-7199.56	191.12	40.081736	-104.645130	Point	
SPARBOE 24N-3HZ PBHL Rev. 1	7063.00	-7199.56	191.12	40.081736	-104.645130	Point	

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
746.00	746.00	Fox Hills
4992.00	4999.84	Sussex
6933.00	7005.62	Sharon Springs
6969.00	7065.33	Niobrara A
7029.00	7190.63	Niobrara B

CASING DETAILS			
TVD	MD	Name	Size
7077.17	7404.00	7"	7"



# **US ROCKIES REGION PLANNING**

**COLORADO NORTHERN ZONE - 83**

**WELD\_SPARBOE 4 PAD**

**SPARBOE 24N-3HZ**

**Wellbore #1**

**Design: ACTUAL**

## **Standard Survey Report**

**13 March, 2013**

# Anadarko Petroleum Corp

## Survey Report

<b>Company:</b>	US ROCKIES REGION PLANNING	<b>Local Co-ordinate Reference:</b>	Well SPARBOE 24N-3HZ
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>TVD Reference:</b>	16'RKB+4977'GL @ 4993.00ft (XTREME 23)
<b>Site:</b>	WELD_SPARBOE 4 PAD	<b>MD Reference:</b>	16'RKB+4977'GL @ 4993.00ft (XTREME 23)
<b>Well:</b>	SPARBOE 24N-3HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	ACTUAL	<b>Database:</b>	edmp

<b>Project</b>	COLORADO NORTHERN 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 Northern Zone		

Site		WELD_SPARBOE 4 PAD			
Site Position:		Northing:	1,280,971.47 usft	Latitude:	40.101501
From:	Lat/Long	Easting:	3,238,883.56 usft	Longitude:	-104.646028
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.55 °

Well		SPARBOE 24N-3HZ				
Well Position	+N/-S	0.00 ft	Northing:	1,280,971.65 usft	Latitude:	40.101500
	+E/-W	0.00 ft	Easting:	3,238,943.70 usft	Longitude:	-104.645813
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	4,977.00 ft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination</b>	<b>Dip Angle</b>	<b>Field Strength</b>
			(°)	(°)	(nT)
	IGRF2010	12/13/2012	8.57	66.78	52,828

<b>Design</b>	ACTUAL				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	16.00
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S</b>	<b>+E/-W</b>	<b>Direction</b>	
	(ft)	(ft)	(ft)	(°)	
	16.00	0.00	0.00	179.83	

<b>Survey Program</b>	<b>Date</b>	3/13/2013			
<b>From</b>	<b>To</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
(ft)	(ft)				
116.00	1,791.00	Survey #1 (Wellbore #1)	NS-GYRO-MS	NORTH SENSING GYROCOMPASSING M/S	
1,888.00	14,242.00	Survey #2 (Wellbore #1)	MWD+IFR	MWD + IFR CORRECTION	

<b>Survey</b>										
<b>Measured</b>	<b>Inclination</b>	<b>Azimuth</b>	<b>Vertical</b>	<b>+N/-S</b>	<b>+E/-W</b>	<b>Vertical</b>	<b>Dogleg</b>	<b>Build</b>	<b>Turn</b>	
<b>Depth</b>	<b>(°)</b>	<b>(°)</b>	<b>Depth</b>	<b>(ft)</b>	<b>(ft)</b>	<b>Section</b>	<b>Rate</b>	<b>Rate</b>	<b>Rate</b>	
<b>(ft)</b>			<b>(ft)</b>			<b>(ft)</b>	<b>(°/100usft)</b>	<b>(°/100usft)</b>	<b>(°/100usft)</b>	
16.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00	0.00	0.00	
116.00	0.22	128.34	116.00	-0.12	0.15	0.12	0.22	0.22	0.00	
216.00	0.21	147.68	216.00	-0.39	0.40	0.39	0.07	-0.01	19.34	
316.00	0.24	122.41	316.00	-0.66	0.67	0.66	0.10	0.03	-25.27	
416.00	0.16	123.10	416.00	-0.85	0.97	0.85	0.08	-0.08	0.69	
516.00	0.27	0.77	516.00	-0.69	1.09	0.69	0.38	0.11	-122.33	
616.00	0.32	56.23	616.00	-0.30	1.32	0.30	0.28	0.05	55.46	
716.00	0.03	136.48	716.00	-0.16	1.57	0.17	0.32	-0.29	80.25	
816.00	0.22	259.07	816.00	-0.22	1.40	0.22	0.24	0.19	122.59	
916.00	0.18	197.62	915.99	-0.40	1.17	0.41	0.21	-0.04	-61.45	

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## Survey Report

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<b>Site:</b>	WELD_SPARBOE 4 PAD	<b>MD Reference:</b>	16'RKB+4977'GL @ 4993.00ft (XTREME 23)
<b>Well:</b>	SPARBOE 24N-3HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	ACTUAL	<b>Database:</b>	edmp

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)
1,016.00	0.18	191.17	1,015.99	-0.71	1.09	0.71	0.02	0.00	-6.45
1,116.00	0.12	120.03	1,115.99	-0.91	1.15	0.92	0.18	-0.06	-71.14
1,216.00	0.34	289.61	1,215.99	-0.87	0.96	0.87	0.46	0.22	169.58
1,316.00	0.35	279.63	1,315.99	-0.72	0.38	0.72	0.06	0.01	-9.98
1,416.00	0.29	328.73	1,415.99	-0.45	-0.05	0.45	0.27	-0.06	49.10
1,516.00	0.19	57.90	1,515.99	-0.14	-0.04	0.14	0.34	-0.10	89.17
1,616.00	0.34	330.82	1,615.99	0.20	-0.05	-0.20	0.38	0.15	-87.08
1,716.00	0.31	327.33	1,715.99	0.69	-0.34	-0.69	0.04	-0.03	-3.49
1,791.00	0.13	348.27	1,790.99	0.94	-0.47	-0.94	0.26	-0.24	27.92
TIE ON									
1,888.00	0.28	224.52	1,887.99	0.88	-0.65	-0.88	0.38	0.15	-127.58
FIRST WFT SURVEY									
1,981.00	0.60	3.28	1,980.99	1.21	-0.79	-1.21	0.89	0.34	149.20
2,074.00	2.17	37.84	2,073.96	3.08	0.32	-3.08	1.84	1.69	37.16
2,168.00	3.43	40.30	2,167.84	6.63	3.23	-6.62	1.35	1.34	2.62
2,261.00	4.43	42.69	2,260.62	11.40	7.47	-11.37	1.09	1.08	2.57
2,354.00	4.20	40.26	2,353.36	16.63	12.10	-16.60	0.32	-0.25	-2.61
2,447.00	4.13	38.09	2,446.11	21.87	16.37	-21.82	0.19	-0.08	-2.33
2,541.00	4.26	35.96	2,539.86	27.36	20.51	-27.30	0.22	0.14	-2.27
2,634.00	3.89	38.31	2,632.63	32.63	24.49	-32.56	0.44	-0.40	2.53
2,727.00	3.18	32.58	2,725.45	37.28	27.84	-37.20	0.85	-0.76	-6.16
2,821.00	3.53	23.20	2,819.29	42.14	30.38	-42.05	0.69	0.37	-9.98
2,906.00	3.75	28.83	2,904.12	46.98	32.75	-46.88	0.49	0.26	6.62
2,991.00	4.56	30.74	2,988.89	52.32	35.82	-52.21	0.97	0.95	2.25
3,077.00	4.39	32.32	3,074.63	58.04	39.33	-57.92	0.24	-0.20	1.84
3,162.00	3.76	37.02	3,159.42	63.01	42.75	-62.88	0.84	-0.74	5.53
3,248.00	4.34	42.51	3,245.20	67.66	46.64	-67.52	0.81	0.67	6.38
3,333.00	4.01	51.10	3,329.98	71.90	51.13	-71.75	0.83	-0.39	10.11
3,419.00	4.18	54.03	3,415.76	75.63	56.00	-75.46	0.31	0.20	3.41
3,504.00	3.89	38.78	3,500.55	79.69	60.32	-79.51	1.30	-0.34	-17.94
3,589.00	3.51	38.63	3,585.37	83.97	63.75	-83.78	0.45	-0.45	-0.18
3,675.00	3.50	34.05	3,671.21	88.21	66.86	-88.01	0.33	-0.01	-5.33
3,760.00	3.68	39.25	3,756.04	92.47	70.04	-92.26	0.44	0.21	6.12
3,846.00	3.83	32.91	3,841.86	97.02	73.35	-96.80	0.51	0.17	-7.37
3,931.00	3.37	34.89	3,926.69	101.45	76.32	-101.22	0.56	-0.54	2.33
4,017.00	3.16	37.02	4,012.55	105.41	79.19	-105.18	0.28	-0.24	2.48
4,102.00	3.89	33.76	4,097.39	109.68	82.20	-109.44	0.89	0.86	-3.84
4,188.00	3.56	31.68	4,183.21	114.38	85.23	-114.13	0.41	-0.38	-2.42
4,273.00	3.99	25.98	4,268.02	119.28	87.91	-119.02	0.67	0.51	-6.71
4,358.00	4.50	25.04	4,352.79	124.96	90.62	-124.69	0.61	0.60	-1.11
4,444.00	3.92	20.52	4,438.56	130.77	93.07	-130.50	0.78	-0.67	-5.26
4,529.00	4.99	18.48	4,523.30	137.00	95.26	-136.72	1.27	1.26	-2.40
4,615.00	6.11	14.90	4,608.90	144.97	97.63	-144.68	1.36	1.30	-4.16

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## Survey Report

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<b>Well:</b>	SPARBOE 24N-3HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	ACTUAL	<b>Database:</b>	edmp

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)
4,700.00	5.79	24.70	4,693.44	153.24	100.58	-152.94	1.25	-0.38	11.53
4,785.00	5.48	27.11	4,778.03	160.75	104.22	-160.44	0.46	-0.36	2.84
4,870.00	5.28	26.16	4,862.66	167.87	107.80	-167.55	0.26	-0.24	-1.12
4,956.00	4.85	45.51	4,948.33	173.97	112.14	-173.64	2.04	-0.50	22.50
5,041.00	5.18	54.92	5,033.00	178.69	117.84	-178.34	1.04	0.39	11.07
5,127.00	3.92	42.51	5,118.73	183.09	123.00	-182.73	1.85	-1.47	-14.43
5,212.00	3.23	39.63	5,203.57	187.08	126.49	-186.70	0.84	-0.81	-3.39
5,298.00	3.53	43.41	5,289.42	190.87	129.86	-190.48	0.43	0.35	4.40
5,383.00	3.44	42.42	5,374.26	194.65	133.38	-194.25	0.13	-0.11	-1.16
5,469.00	2.15	33.75	5,460.15	197.90	136.01	-197.49	1.57	-1.50	-10.08
5,554.00	2.43	41.79	5,545.09	200.57	138.10	-200.16	0.50	0.33	9.46
5,639.00	2.23	11.49	5,630.02	203.53	139.63	-203.11	1.45	-0.24	-35.65
5,724.00	2.50	23.87	5,714.95	206.85	140.71	-206.43	0.68	0.32	14.56
5,810.00	3.22	30.22	5,800.84	210.65	142.68	-210.22	0.91	0.84	7.38
5,895.00	4.04	33.35	5,885.67	215.21	145.53	-214.78	0.99	0.96	3.68
5,981.00	3.46	39.65	5,971.49	219.74	148.85	-219.30	0.83	-0.67	7.33
6,066.00	3.00	34.50	6,056.35	223.55	151.75	-223.10	0.64	-0.54	-6.06
6,152.00	2.96	41.91	6,142.23	227.06	154.51	-226.60	0.45	-0.05	8.62
6,237.00	3.22	52.52	6,227.11	230.14	157.87	-229.67	0.74	0.31	12.48
6,323.00	2.77	47.17	6,312.99	233.02	161.31	-232.54	0.62	-0.52	-6.22
6,422.00	1.78	47.27	6,411.91	235.69	164.19	-235.21	1.00	-1.00	0.10
6,451.00	1.78	49.45	6,440.90	236.29	164.87	-235.80	0.23	0.00	7.52
6,494.00	2.13	135.41	6,483.88	236.16	165.93	-235.66	6.23	0.81	199.91
6,537.00	5.05	160.86	6,526.80	233.80	167.12	-233.30	7.58	6.79	59.19
6,579.00	9.61	169.13	6,568.44	228.61	168.38	-228.11	11.12	10.86	19.69
6,622.00	13.97	168.43	6,610.53	219.99	170.10	-219.49	10.14	10.14	-1.63
6,665.00	17.10	167.99	6,651.95	208.72	172.46	-208.21	7.28	7.28	-1.02
6,707.00	21.22	171.21	6,691.62	195.17	174.91	-194.65	10.12	9.81	7.67
6,750.00	25.94	175.57	6,731.02	178.09	176.82	-177.56	11.70	10.98	10.14
6,793.00	30.21	178.24	6,768.95	157.89	177.88	-157.36	10.35	9.93	6.21
6,835.00	32.70	178.39	6,804.78	135.98	178.53	-135.45	5.93	5.93	0.36
6,878.00	37.49	178.47	6,839.95	111.28	179.20	-110.74	11.14	11.14	0.19
6,921.00	41.53	181.77	6,873.12	83.93	179.11	-83.40	10.59	9.40	7.67
6,964.00	44.44	182.74	6,904.57	54.64	177.95	-54.11	6.94	6.77	2.26
7,006.00	49.42	182.40	6,933.25	24.00	176.58	-23.48	11.87	11.86	-0.81
7,049.00	54.66	181.95	6,959.69	-9.87	175.30	10.39	12.21	12.19	-1.05
7,092.00	57.64	180.17	6,983.64	-45.57	174.65	46.08	7.74	6.93	-4.14
7,135.00	61.87	178.66	7,005.29	-82.70	175.04	83.22	10.29	9.84	-3.51
7,177.00	66.37	180.34	7,023.62	-120.47	175.36	120.99	11.30	10.71	4.00
7,220.00	68.82	181.04	7,040.01	-160.22	174.88	160.74	5.89	5.70	1.63
7,263.00	72.53	180.26	7,054.24	-200.79	174.42	201.31	8.80	8.63	-1.81
7,306.00	78.23	180.13	7,065.09	-242.38	174.28	242.90	13.26	13.26	-0.30
7,348.00	83.47	179.46	7,071.76	-283.83	174.43	284.35	12.58	12.48	-1.60
7,404.00	85.44	179.72	7,077.17	-339.56	174.83	340.08	3.55	3.52	0.47

# Anadarko Petroleum Corp

## Survey Report

<b>Company:</b>	US ROCKIES REGION PLANNING	<b>Local Co-ordinate Reference:</b>	Well SPARBOE 24N-3HZ
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<b>Well:</b>	SPARBOE 24N-3HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	ACTUAL	<b>Database:</b>	edmp

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)
7 IN. CASING									
7,451.00	87.10	179.94	7,080.23	-386.46	174.96	386.98	3.55	3.52	0.46
7,545.00	87.71	179.21	7,084.48	-480.36	175.66	480.88	1.01	0.65	-0.78
7,638.00	88.83	179.25	7,087.29	-573.31	176.91	573.83	1.21	1.20	0.04
7,731.00	90.18	180.06	7,088.09	-666.30	177.47	666.83	1.69	1.45	0.87
7,825.00	88.21	179.47	7,089.41	-760.29	177.86	760.81	2.19	-2.10	-0.63
7,918.00	88.71	179.53	7,091.91	-853.25	178.67	853.78	0.54	0.54	0.06
8,011.00	90.18	180.51	7,092.81	-946.24	178.63	946.77	1.90	1.58	1.05
8,105.00	88.64	180.09	7,093.78	-1,040.23	178.14	1,040.76	1.70	-1.64	-0.45
8,198.00	89.88	179.99	7,094.98	-1,133.22	178.08	1,133.75	1.34	1.33	-0.11
8,291.00	90.31	179.38	7,094.83	-1,226.22	178.59	1,226.75	0.80	0.46	-0.66
8,384.00	88.83	177.53	7,095.53	-1,319.18	181.10	1,319.71	2.55	-1.59	-1.99
8,478.00	90.43	177.88	7,096.13	-1,413.10	184.86	1,413.64	1.74	1.70	0.37
8,571.00	92.10	178.34	7,094.08	-1,506.02	187.93	1,506.57	1.86	1.80	0.49
8,664.00	91.79	178.37	7,090.92	-1,598.93	190.59	1,599.49	0.33	-0.33	0.03
8,750.00	89.51	178.03	7,089.95	-1,684.88	193.30	1,685.44	2.68	-2.65	-0.40
8,835.00	89.38	178.15	7,090.77	-1,769.82	196.13	1,770.40	0.21	-0.15	0.14
8,921.00	90.80	178.51	7,090.64	-1,855.78	198.63	1,856.37	1.70	1.65	0.42
9,006.00	92.34	179.80	7,088.31	-1,940.74	199.89	1,941.32	2.36	1.81	1.52
9,091.00	93.39	181.71	7,084.06	-2,025.62	198.77	2,026.20	2.56	1.24	2.25
9,177.00	93.52	181.80	7,078.88	-2,111.42	196.14	2,112.00	0.18	0.15	0.10
9,262.00	92.22	182.14	7,074.62	-2,196.27	193.22	2,196.83	1.58	-1.53	0.40
9,348.00	90.00	182.47	7,072.96	-2,282.17	189.76	2,282.73	2.61	-2.58	0.38
9,433.00	91.36	181.42	7,071.95	-2,367.12	186.88	2,367.66	2.02	1.60	-1.24
9,519.00	91.23	180.88	7,070.00	-2,453.08	185.15	2,453.61	0.65	-0.15	-0.63
9,604.00	89.26	180.51	7,069.64	-2,538.06	184.12	2,538.60	2.36	-2.32	-0.44
9,689.00	88.21	180.52	7,071.52	-2,623.04	183.36	2,623.57	1.24	-1.24	0.01
9,775.00	89.14	180.24	7,073.50	-2,709.01	182.79	2,709.54	1.13	1.08	-0.33
9,860.00	88.83	179.50	7,075.01	-2,794.00	182.98	2,794.53	0.94	-0.36	-0.87
9,946.00	89.20	179.87	7,076.49	-2,879.99	183.45	2,880.52	0.61	0.43	0.43
10,031.00	90.06	180.20	7,077.04	-2,964.98	183.40	2,965.51	1.08	1.01	0.39
10,117.00	90.62	179.53	7,076.53	-3,050.98	183.61	3,051.51	1.02	0.65	-0.78
10,202.00	88.64	178.39	7,077.08	-3,135.96	185.15	3,136.49	2.69	-2.33	-1.34
10,287.00	89.26	178.73	7,078.63	-3,220.92	187.28	3,221.46	0.83	0.73	0.40
10,373.00	89.75	180.15	7,079.38	-3,306.91	188.12	3,307.45	1.75	0.57	1.65
10,458.00	91.60	181.17	7,078.38	-3,391.89	187.15	3,392.43	2.49	2.18	1.20
10,543.00	91.73	180.44	7,075.91	-3,476.85	185.95	3,477.38	0.87	0.15	-0.86
10,629.00	91.91	180.17	7,073.17	-3,562.80	185.49	3,563.34	0.38	0.21	-0.31
10,714.00	91.73	180.29	7,070.47	-3,647.76	185.15	3,648.29	0.25	-0.21	0.14
10,800.00	90.43	180.69	7,068.85	-3,733.74	184.42	3,734.27	1.58	-1.51	0.47
10,885.00	89.88	179.64	7,068.62	-3,818.73	184.17	3,819.26	1.39	-0.65	-1.24
10,971.00	90.00	179.57	7,068.71	-3,904.73	184.77	3,905.26	0.16	0.14	-0.08
11,056.00	90.55	178.76	7,068.31	-3,989.72	186.00	3,990.26	1.15	0.65	-0.95

# Anadarko Petroleum Corp

## Survey Report

<b>Company:</b>	US ROCKIES REGION PLANNING	<b>Local Co-ordinate Reference:</b>	Well SPARBOE 24N-3HZ
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>TVD Reference:</b>	16'RKB+4977'GL @ 4993.00ft (XTREME 23)
<b>Site:</b>	WELD_SPARBOE 4 PAD	<b>MD Reference:</b>	16'RKB+4977'GL @ 4993.00ft (XTREME 23)
<b>Well:</b>	SPARBOE 24N-3HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	ACTUAL	<b>Database:</b>	edmp

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)
11,141.00	90.31	178.45	7,067.67	-4,074.69	188.07	4,075.23	0.46	-0.28	-0.36
11,227.00	91.91	180.64	7,066.00	-4,160.67	188.76	4,161.21	3.15	1.86	2.55
11,312.00	92.41	180.10	7,062.80	-4,245.60	188.21	4,246.14	0.87	0.59	-0.64
11,398.00	91.48	181.28	7,059.88	-4,331.55	187.17	4,332.08	1.75	-1.08	1.37
11,483.00	89.63	181.69	7,059.06	-4,416.51	184.97	4,417.04	2.23	-2.18	0.48
11,568.00	88.64	180.65	7,060.34	-4,501.48	183.23	4,502.00	1.69	-1.16	-1.22
11,654.00	88.89	181.65	7,062.19	-4,587.44	181.51	4,587.96	1.20	0.29	1.16
11,739.00	89.51	180.05	7,063.38	-4,672.42	180.25	4,672.94	2.02	0.73	-1.88
11,824.00	89.26	179.57	7,064.29	-4,757.42	180.53	4,757.93	0.64	-0.29	-0.56
11,910.00	90.43	179.38	7,064.52	-4,843.41	181.32	4,843.93	1.38	1.36	-0.22
11,996.00	92.90	178.89	7,062.03	-4,929.36	182.62	4,929.88	2.93	2.87	-0.57
12,081.00	93.45	178.12	7,057.32	-5,014.20	184.83	5,014.72	1.11	0.65	-0.91
12,166.00	91.30	178.10	7,053.80	-5,099.07	187.63	5,099.61	2.53	-2.53	-0.02
12,252.00	91.05	178.02	7,052.03	-5,185.00	190.54	5,185.55	0.31	-0.29	-0.09
12,337.00	91.91	178.52	7,049.84	-5,269.94	193.11	5,270.49	1.17	1.01	0.59
12,422.00	91.42	179.41	7,047.37	-5,354.89	194.64	5,355.44	1.19	-0.58	1.05
12,508.00	92.71	179.44	7,044.27	-5,440.82	195.50	5,441.38	1.50	1.50	0.03
12,593.00	90.49	180.53	7,041.90	-5,525.78	195.53	5,526.34	2.91	-2.61	1.28
12,678.00	89.82	180.59	7,041.67	-5,610.78	194.69	5,611.33	0.79	-0.79	0.07
12,764.00	89.81	181.02	7,041.94	-5,696.77	193.49	5,697.32	0.50	-0.01	0.50
12,849.00	89.63	181.17	7,042.36	-5,781.75	191.86	5,782.30	0.28	-0.21	0.18
12,934.00	89.26	181.25	7,043.18	-5,866.73	190.07	5,867.27	0.45	-0.44	0.09
13,019.00	88.52	181.53	7,044.83	-5,951.69	188.01	5,952.22	0.93	-0.87	0.33
13,105.00	89.82	180.57	7,046.07	-6,037.66	186.43	6,038.19	1.88	1.51	-1.12
13,190.00	89.38	180.75	7,046.67	-6,122.65	185.45	6,123.18	0.56	-0.52	0.21
13,276.00	89.14	179.61	7,047.78	-6,208.65	185.18	6,209.17	1.35	-0.28	-1.33
13,361.00	88.89	180.45	7,049.24	-6,293.63	185.14	6,294.15	1.03	-0.29	0.99
13,447.00	88.64	178.97	7,051.09	-6,379.61	185.57	6,380.13	1.74	-0.29	-1.72
13,532.00	89.01	177.45	7,052.84	-6,464.55	188.23	6,465.08	1.84	0.44	-1.79
13,618.00	89.32	178.48	7,054.09	-6,550.48	191.28	6,551.02	1.25	0.36	1.20
13,703.00	89.75	178.72	7,054.78	-6,635.45	193.36	6,636.00	0.58	0.51	0.28
13,788.00	91.42	178.92	7,053.91	-6,720.43	195.11	6,720.98	1.98	1.96	0.24
13,874.00	90.49	178.97	7,052.48	-6,806.40	196.69	6,806.95	1.08	-1.08	0.06
13,959.00	89.69	178.95	7,052.34	-6,891.39	198.23	6,891.94	0.94	-0.94	-0.02
14,045.00	89.01	179.23	7,053.32	-6,977.37	199.60	6,977.93	0.86	-0.79	0.33
14,130.00	87.59	178.71	7,055.84	-7,062.31	201.13	7,062.88	1.78	-1.67	-0.61
14,185.00	86.98	178.49	7,058.45	-7,117.24	202.47	7,117.81	1.18	-1.11	-0.40
LAST WFT SURVEY									
14,242.00	86.98	178.49	7,061.45	-7,174.14	203.97	7,174.71	0.00	0.00	0.00
PROJECTION TO TD									



# Anadarko Petroleum Corp

## Survey Report

<b>Company:</b>	US ROCKIES REGION PLANNING	<b>Local Co-ordinate Reference:</b>	Well SPARBOE 24N-3HZ
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>TVD Reference:</b>	16'RKB+4977'GL @ 4993.00ft (XTREME 23)
<b>Site:</b>	WELD_SPARBOE 4 PAD	<b>MD Reference:</b>	16'RKB+4977'GL @ 4993.00ft (XTREME 23)
<b>Well:</b>	SPARBOE 24N-3HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	ACTUAL	<b>Database:</b>	edmp

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,404.00	7,077.17	7"	7	8-3/4	

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
746.00	746.00	Fox Hills			
4,999.84	4,992.00	Sussex			
7,005.62	6,933.00	Sharon Springs			
7,065.33	6,969.00	Niobrara A			
7,190.63	7,029.00	Niobrara B			

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
1,791.00	1,790.99	0.94	-0.47	TIE ON	
1,888.00	1,887.99	0.88	-0.65	FIRST WFT SURVEY	
7,404.00	7,077.17	-339.56	174.83	7 IN. CASING	
14,185.00	7,058.45	-7,117.24	202.47	LAST WFT SURVEY	
14,242.00	7,061.45	-7,174.14	203.97	PROJECTION TO TD	

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