

# **US ROCKIES REGION PLANNING**

**COLORADO NORTHERN ZONE - 83**

**WELD\_UNDERHILL 15-17HZ PAD**

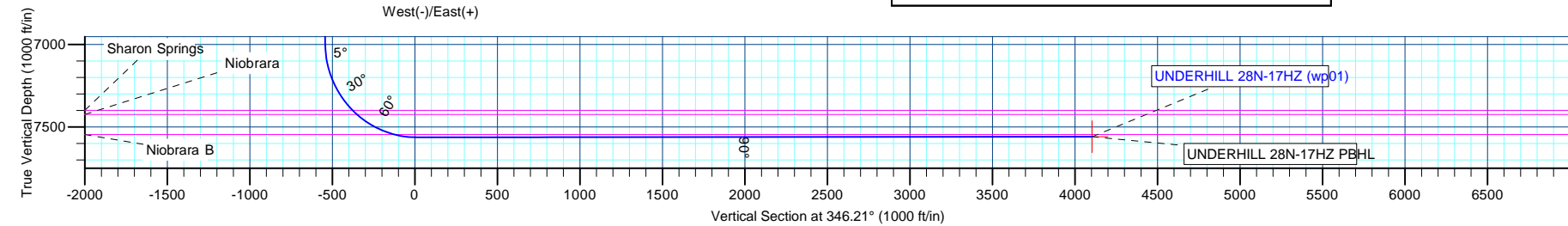
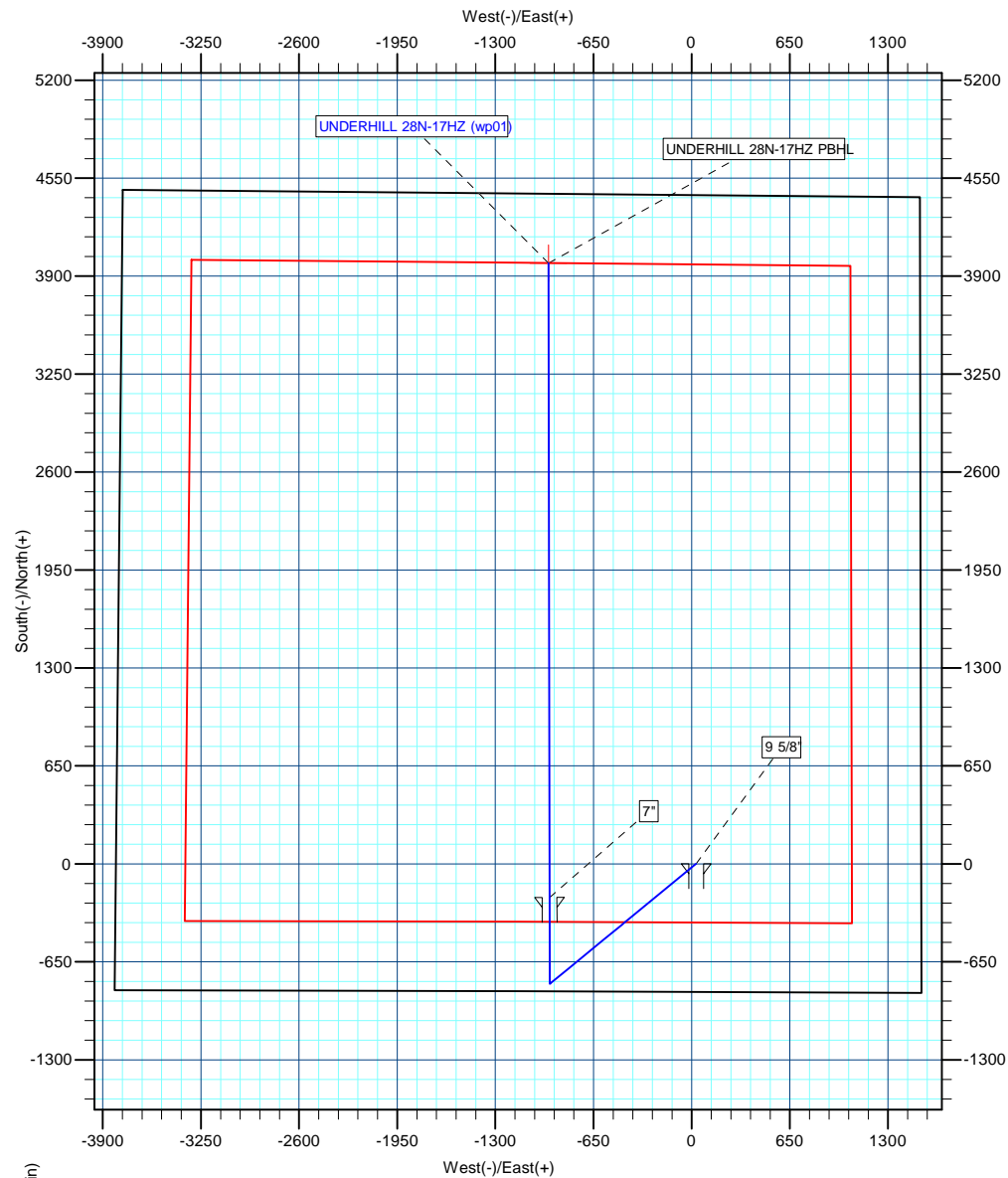
**UNDERHILL 28N-17HZ**

**UNDERHILL 28N-17HZ**

**Plan: UNDERHILL 28N-17HZ (wp01)**

## **Standard Planning Report**

**05 November, 2012**



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Azimuths to True North

Magnetic North: 8.72°

Magnetic Field

Strength: 52781.8snT

Dip Angle: 66.69°

Date: 10/31/2012

Model: IGRF2010



Project: COLORADO NORTHERN ZONE - 83

Site: WELD UNDERHILL 15-17HZ PAD

Well: UNDERHILL 28N-17HZ

Wellbore: UNDERHILL 28N-17HZ

Section: SEC. 17 T1N R67W

SHL: 851' FSL 1490' FEL Sec. 17

Design: UNDERHILL 28N-17HZ (wp01)

Latitude: 40.046125

Longitude: -104.910382

GL: 5112.00

KB: 17' RKB + 5112' GL @ 5129.00ft

WELL DETAILS: UNDERHILL 28N-17HZ						
+N/-S	+E/-W	Northing	Ground Level: Easting	5112.00 Latitude	Longitude	Slot
1.44	29.96	1260197.79	3165070.66	40.046125	-104.910382	

SECTION DETAILS								
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
0.00	0.00	0.00	0.00	1.44	29.96	0.00	0.00	0.00
1050.00	0.00	0.00	1050.00	1.44	29.96	0.00	0.00	0.00
1836.73	15.73	230.56	1826.88	-66.76	-52.94	2.00	230.56	-46.47
5676.87	15.73	230.56	5523.12	-728.36	-857.14	0.00	0.00	-497.24
6463.60	0.00	0.00	6300.00	-796.56	-940.04	2.00	180.00	-543.71
6963.60	0.00	0.00	6800.00	-796.56	-940.04	0.00	0.00	-543.71
7154.64	0.00	0.00	6991.04	-796.56	-940.04	0.00	0.00	-543.71
8055.34	90.07	359.90	7564.00	-222.90	-941.05	10.00	359.90	13.64
8089.57	90.07	359.90	7563.96	-188.66	-941.10	0.01	170.77	46.90
2264.54	90.07	359.90	7559.00	3986.30	-948.37	0.00	0.00	4103.19

WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)						
Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
UNDERHILL 28N-17HZ PBHL	7559.00	3986.30	-948.37	40.057064	-104.913877	Point

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
4654.00	4773.91	Sussex
5263.00	5406.62	Shannon
7399.00	7608.64	Sharon Springs
7424.00	7645.47	Niobrara
7546.00	7910.65	Niobrara B

CASING DETAILS			
TVD	MD	Name	Size
917.00	917.00	9 5/8"	9-5/8
7564.00	8055.34	7"	7

# Andarko Petroleum Corporation

## Planning Report

<b>Database:</b>	edmp	<b>Local Co-ordinate Reference:</b>	Site WELD_UNDERHILL 15-17HZ PAD
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Site:</b>	WELD_UNDERHILL 15-17HZ PAD	<b>North Reference:</b>	True
<b>Well:</b>	UNDERHILL 28N-17HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	UNDERHILL 28N-17HZ		
<b>Design:</b>	UNDERHILL 28N-17HZ (wp01)		

<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_UNDERHILL 15-17HZ PAD, SEC. 17 T1N R67W			
Site Position:		Northing:	1,260,196.14 usft	Latitude:	40.046121
From:	Lat/Long	Easting:	3,165,040.72 usft	Longitude:	-104.910489
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.38 °

Well	UNDERHILL 28N-17HZ					
Well Position	+N/-S	1.44 ft	Northing:	1,260,197.79 usft	Latitude:	40.046125
	+E/-W	29.96 ft	Easting:	3,165,070.66 usft	Longitude:	-104.910382
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	5,112.00 ft

<b>Wellbore</b>	UNDERHILL 28N-17HZ				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	10/31/2012	8.73	66.69	52,782

<b>Design</b>	UNDERHILL 28N-17HZ (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) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>
	0.00	1.44	29.96	346.21

<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	1.44	29.96	0.00	0.00	0.00	0.00	
1,050.00	0.00	0.00	1,050.00	1.44	29.96	0.00	0.00	0.00	0.00	
1,836.73	15.73	230.56	1,826.88	-66.76	-52.94	2.00	2.00	0.00	230.56	
5,676.87	15.73	230.56	5,523.12	-728.36	-857.14	0.00	0.00	0.00	0.00	
6,463.60	0.00	0.00	6,300.00	-796.56	-940.04	2.00	-2.00	0.00	180.00	
6,963.60	0.00	0.00	6,800.00	-796.56	-940.04	0.00	0.00	0.00	0.00	
7,154.64	0.00	0.00	6,991.04	-796.56	-940.04	0.00	0.00	0.00	0.00	
8,055.34	90.07	359.90	7,564.00	-222.90	-941.05	10.00	10.00	0.00	359.90	
8,089.57	90.07	359.90	7,563.96	-188.66	-941.10	0.01	-0.01	0.00	170.77	
12,264.54	90.07	359.90	7,559.00	3,986.30	-948.37	0.00	0.00	0.00	0.00	UNDERHILL 28N-17H

# Andarko Petroleum Corporation

## Planning Report

<b>Database:</b>	edmp	<b>Local Co-ordinate Reference:</b>	Site WELD_UNDERHILL 15-17HZ PAD
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Site:</b>	WELD_UNDERHILL 15-17HZ PAD	<b>North Reference:</b>	True
<b>Well:</b>	UNDERHILL 28N-17HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	UNDERHILL 28N-17HZ		
<b>Design:</b>	UNDERHILL 28N-17HZ (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	1.44	29.96	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	1.44	29.96	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	1.44	29.96	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	1.44	29.96	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	1.44	29.96	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	1.44	29.96	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	1.44	29.96	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	1.44	29.96	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	1.44	29.96	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	1.44	29.96	0.00	0.00	0.00	0.00
917.00	0.00	0.00	917.00	1.44	29.96	0.00	0.00	0.00	0.00
9 5/8"									
1,000.00	0.00	0.00	1,000.00	1.44	29.96	0.00	0.00	0.00	0.00
1,050.00	0.00	0.00	1,050.00	1.44	29.96	0.00	0.00	0.00	0.00
Start Build 2.00									
1,100.00	1.00	230.56	1,100.00	1.17	29.62	-0.19	2.00	2.00	0.00
1,200.00	3.00	230.56	1,199.93	-1.05	26.92	-1.70	2.00	2.00	0.00
1,300.00	5.00	230.56	1,299.68	-5.48	21.54	-4.72	2.00	2.00	0.00
1,400.00	7.00	230.56	1,399.13	-12.12	13.47	-9.24	2.00	2.00	0.00
1,500.00	9.00	230.56	1,498.15	-20.96	2.72	-15.27	2.00	2.00	0.00
1,600.00	11.00	230.56	1,596.63	-31.99	-10.69	-22.78	2.00	2.00	0.00
1,700.00	13.00	230.56	1,694.44	-45.20	-26.75	-31.78	2.00	2.00	0.00
1,800.00	15.00	230.56	1,791.46	-60.57	-45.43	-42.25	2.00	2.00	0.00
1,836.73	15.73	230.56	1,826.88	-66.76	-52.94	-46.47	2.00	2.00	0.00
Start 3840.14 hold at 1836.73 MD									
1,900.00	15.73	230.56	1,887.78	-77.66	-66.19	-53.89	0.00	0.00	0.00
2,000.00	15.73	230.56	1,984.03	-94.88	-87.14	-65.63	0.00	0.00	0.00
2,100.00	15.73	230.56	2,080.28	-112.11	-108.08	-77.37	0.00	0.00	0.00
2,200.00	15.73	230.56	2,176.54	-129.34	-129.02	-89.11	0.00	0.00	0.00
2,300.00	15.73	230.56	2,272.79	-146.57	-149.96	-100.85	0.00	0.00	0.00
2,400.00	15.73	230.56	2,369.04	-163.80	-170.90	-112.59	0.00	0.00	0.00
2,500.00	15.73	230.56	2,465.29	-181.03	-191.85	-124.33	0.00	0.00	0.00
2,600.00	15.73	230.56	2,561.55	-198.26	-212.79	-136.06	0.00	0.00	0.00
2,700.00	15.73	230.56	2,657.80	-215.48	-233.73	-147.80	0.00	0.00	0.00
2,800.00	15.73	230.56	2,754.05	-232.71	-254.67	-159.54	0.00	0.00	0.00
2,900.00	15.73	230.56	2,850.31	-249.94	-275.61	-171.28	0.00	0.00	0.00
3,000.00	15.73	230.56	2,946.56	-267.17	-296.56	-183.02	0.00	0.00	0.00
3,100.00	15.73	230.56	3,042.81	-284.40	-317.50	-194.76	0.00	0.00	0.00
3,200.00	15.73	230.56	3,139.06	-301.63	-338.44	-206.49	0.00	0.00	0.00
3,300.00	15.73	230.56	3,235.32	-318.86	-359.38	-218.23	0.00	0.00	0.00
3,400.00	15.73	230.56	3,331.57	-336.08	-380.32	-229.97	0.00	0.00	0.00
3,500.00	15.73	230.56	3,427.82	-353.31	-401.27	-241.71	0.00	0.00	0.00
3,600.00	15.73	230.56	3,524.08	-370.54	-422.21	-253.45	0.00	0.00	0.00
3,700.00	15.73	230.56	3,620.33	-387.77	-443.15	-265.19	0.00	0.00	0.00
3,800.00	15.73	230.56	3,716.58	-405.00	-464.09	-276.93	0.00	0.00	0.00
3,900.00	15.73	230.56	3,812.83	-422.23	-485.03	-288.66	0.00	0.00	0.00
4,000.00	15.73	230.56	3,909.09	-439.46	-505.97	-300.40	0.00	0.00	0.00
4,100.00	15.73	230.56	4,005.34	-456.68	-526.92	-312.14	0.00	0.00	0.00
4,200.00	15.73	230.56	4,101.59	-473.91	-547.86	-323.88	0.00	0.00	0.00
4,300.00	15.73	230.56	4,197.85	-491.14	-568.80	-335.62	0.00	0.00	0.00
4,400.00	15.73	230.56	4,294.10	-508.37	-589.74	-347.36	0.00	0.00	0.00
4,500.00	15.73	230.56	4,390.35	-525.60	-610.68	-359.09	0.00	0.00	0.00
4,600.00	15.73	230.56	4,486.61	-542.83	-631.63	-370.83	0.00	0.00	0.00

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## Planning Report

<b>Database:</b>	edmp	<b>Local Co-ordinate Reference:</b>	Site WELD_UNDERHILL 15-17HZ PAD
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Site:</b>	WELD_UNDERHILL 15-17HZ PAD	<b>North Reference:</b>	True
<b>Well:</b>	UNDERHILL 28N-17HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	UNDERHILL 28N-17HZ		
<b>Design:</b>	UNDERHILL 28N-17HZ (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)	
4,700.00	15.73	230.56	4,582.86	-560.06	-652.57	-382.57	0.00	0.00	0.00	
4,773.91	15.73	230.56	4,654.00	-572.79	-668.05	-391.25	0.00	0.00	0.00	
<b>Sussex</b>										
4,800.00	15.73	230.56	4,679.11	-577.28	-673.51	-394.31	0.00	0.00	0.00	
4,900.00	15.73	230.56	4,775.36	-594.51	-694.45	-406.05	0.00	0.00	0.00	
5,000.00	15.73	230.56	4,871.62	-611.74	-715.39	-417.79	0.00	0.00	0.00	
5,100.00	15.73	230.56	4,967.87	-628.97	-736.34	-429.53	0.00	0.00	0.00	
5,200.00	15.73	230.56	5,064.12	-646.20	-757.28	-441.26	0.00	0.00	0.00	
5,300.00	15.73	230.56	5,160.38	-663.43	-778.22	-453.00	0.00	0.00	0.00	
5,400.00	15.73	230.56	5,256.63	-680.65	-799.16	-464.74	0.00	0.00	0.00	
5,406.62	15.73	230.56	5,263.00	-681.80	-800.55	-465.52	0.00	0.00	0.00	
<b>Shannon</b>										
5,500.00	15.73	230.56	5,352.88	-697.88	-820.10	-476.48	0.00	0.00	0.00	
5,600.00	15.73	230.56	5,449.13	-715.11	-841.05	-488.22	0.00	0.00	0.00	
5,676.87	15.73	230.56	5,523.12	-728.36	-857.14	-497.24	0.00	0.00	0.00	
<b>Start Drop -2.00</b>										
5,700.00	15.27	230.56	5,545.41	-732.28	-861.92	-499.92	2.00	-2.00	0.00	
5,800.00	13.27	230.56	5,642.32	-747.94	-880.96	-510.59	2.00	-2.00	0.00	
5,900.00	11.27	230.56	5,740.03	-761.45	-897.37	-519.79	2.00	-2.00	0.00	
6,000.00	9.27	230.56	5,838.42	-772.78	-911.14	-527.51	2.00	-2.00	0.00	
6,100.00	7.27	230.56	5,937.38	-781.92	-922.25	-533.73	2.00	-2.00	0.00	
6,200.00	5.27	230.56	6,036.77	-788.86	-930.69	-538.46	2.00	-2.00	0.00	
6,300.00	3.27	230.56	6,136.49	-793.59	-936.44	-541.69	2.00	-2.00	0.00	
6,400.00	1.27	230.56	6,236.41	-796.11	-939.50	-543.40	2.00	-2.00	0.00	
6,463.60	0.00	0.00	6,300.00	-796.56	-940.04	-543.71	2.00	-2.00	0.00	
<b>Start 500.00 hold at 6463.60 MD</b>										
6,500.00	0.00	0.00	6,336.40	-796.56	-940.04	-543.71	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,436.40	-796.56	-940.04	-543.71	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,536.40	-796.56	-940.04	-543.71	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,636.40	-796.56	-940.04	-543.71	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,736.40	-796.56	-940.04	-543.71	0.00	0.00	0.00	
6,963.60	0.00	0.00	6,800.00	-796.56	-940.04	-543.71	0.00	0.00	0.00	
<b>Start 191.04 hold at 6963.60 MD</b>										
7,000.00	0.00	0.00	6,836.40	-796.56	-940.04	-543.71	0.00	0.00	0.00	
7,100.00	0.00	0.00	6,936.40	-796.56	-940.04	-543.71	0.00	0.00	0.00	
7,154.64	0.00	0.00	6,991.04	-796.56	-940.04	-543.71	0.00	0.00	0.00	
<b>Start Build 10.00</b>										
7,200.00	4.54	359.90	7,036.35	-794.76	-940.05	-541.96	10.00	10.00	0.00	
7,250.00	9.54	359.90	7,085.96	-788.64	-940.06	-536.02	10.00	10.00	0.00	
7,300.00	14.54	359.90	7,134.85	-778.21	-940.08	-525.89	10.00	10.00	0.00	
7,350.00	19.54	359.90	7,182.64	-763.57	-940.10	-511.66	10.00	10.00	0.00	
7,400.00	24.54	359.90	7,228.97	-744.82	-940.13	-493.44	10.00	10.00	0.00	
7,450.00	29.54	359.90	7,273.49	-722.10	-940.17	-471.37	10.00	10.00	0.00	
7,500.00	34.54	359.90	7,315.87	-695.58	-940.22	-445.61	10.00	10.00	0.00	
7,550.00	39.54	359.90	7,355.77	-665.48	-940.27	-416.35	10.00	10.00	0.00	
7,600.00	44.54	359.90	7,392.89	-632.01	-940.33	-383.84	10.00	10.00	0.00	
7,608.64	45.40	359.90	7,399.00	-625.90	-940.34	-377.91	10.00	10.00	0.00	
<b>Sharon Springs</b>										
7,645.47	49.08	359.90	7,424.00	-598.87	-940.39	-351.64	10.00	10.00	0.00	
<b>Niobrara</b>										
7,650.00	49.54	359.90	7,426.96	-595.43	-940.39	-348.30	10.00	10.00	0.00	
7,700.00	54.54	359.90	7,457.70	-556.02	-940.46	-310.01	10.00	10.00	0.00	
7,750.00	59.54	359.90	7,484.90	-514.09	-940.54	-269.27	10.00	10.00	0.00	

# Andarko Petroleum Corporation

## Planning Report

<b>Database:</b>	edmp	<b>Local Co-ordinate Reference:</b>	Site WELD_UNDERHILL 15-17HZ PAD
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Site:</b>	WELD_UNDERHILL 15-17HZ PAD	<b>North Reference:</b>	True
<b>Well:</b>	UNDERHILL 28N-17HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	UNDERHILL 28N-17HZ		
<b>Design:</b>	UNDERHILL 28N-17HZ (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)
7,800.00	64.54	359.90	7,508.34	-469.94	-940.61	-226.37	10.00	10.00	0.00
7,850.00	69.54	359.90	7,527.84	-423.91	-940.69	-181.66	10.00	10.00	0.00
7,900.00	74.54	359.90	7,543.26	-376.37	-940.78	-135.46	10.00	10.00	0.00
7,910.65	75.60	359.90	7,546.00	-366.08	-940.80	-125.47	10.00	10.00	0.00
<b>Niobrara B</b>									
7,950.00	79.54	359.90	7,554.47	-327.66	-940.86	-88.14	10.00	10.00	0.00
8,000.00	84.54	359.90	7,561.40	-278.15	-940.95	-40.04	10.00	10.00	0.00
8,050.00	89.54	359.90	7,563.98	-228.24	-941.04	8.46	10.00	10.00	0.00
8,055.34	90.07	359.90	7,564.00	-222.90	-941.05	13.64	10.00	10.00	0.00
<b>Start DLS 0.01 TFO 168.92 - 7"</b>									
8,089.57	90.07	359.90	7,563.96	-188.66	-941.10	46.90	0.01	-0.01	0.00
8,089.77	90.07	359.90	7,563.96	-188.46	-941.11	47.10	0.00	0.00	0.00
<b>Start 4174.77 hold at 8089.77 MD</b>									
8,100.00	90.07	359.90	7,563.95	-178.24	-941.12	57.03	0.00	0.00	0.00
8,200.00	90.07	359.90	7,563.83	-78.24	-941.30	154.19	0.00	0.00	0.00
8,300.00	90.07	359.90	7,563.71	21.76	-941.47	251.35	0.00	0.00	0.00
8,400.00	90.07	359.90	7,563.59	121.76	-941.64	348.51	0.00	0.00	0.00
8,500.00	90.07	359.90	7,563.47	221.76	-941.82	445.66	0.00	0.00	0.00
8,600.00	90.07	359.90	7,563.35	321.76	-941.99	542.82	0.00	0.00	0.00
8,700.00	90.07	359.90	7,563.23	421.76	-942.17	639.98	0.00	0.00	0.00
8,800.00	90.07	359.90	7,563.11	521.76	-942.34	737.14	0.00	0.00	0.00
8,900.00	90.07	359.90	7,563.00	621.76	-942.51	834.29	0.00	0.00	0.00
9,000.00	90.07	359.90	7,562.88	721.76	-942.69	931.45	0.00	0.00	0.00
9,100.00	90.07	359.90	7,562.76	821.76	-942.86	1,028.61	0.00	0.00	0.00
9,200.00	90.07	359.90	7,562.64	921.76	-943.04	1,125.76	0.00	0.00	0.00
9,300.00	90.07	359.90	7,562.52	1,021.76	-943.21	1,222.92	0.00	0.00	0.00
9,400.00	90.07	359.90	7,562.40	1,121.76	-943.38	1,320.08	0.00	0.00	0.00
9,500.00	90.07	359.90	7,562.28	1,221.76	-943.56	1,417.24	0.00	0.00	0.00
9,600.00	90.07	359.90	7,562.16	1,321.76	-943.73	1,514.39	0.00	0.00	0.00
9,700.00	90.07	359.90	7,562.05	1,421.76	-943.91	1,611.55	0.00	0.00	0.00
9,800.00	90.07	359.90	7,561.93	1,521.76	-944.08	1,708.71	0.00	0.00	0.00
9,900.00	90.07	359.90	7,561.81	1,621.76	-944.25	1,805.86	0.00	0.00	0.00
10,000.00	90.07	359.90	7,561.69	1,721.76	-944.43	1,903.02	0.00	0.00	0.00
10,100.00	90.07	359.90	7,561.57	1,821.76	-944.60	2,000.18	0.00	0.00	0.00
10,200.00	90.07	359.90	7,561.45	1,921.76	-944.78	2,097.34	0.00	0.00	0.00
10,300.00	90.07	359.90	7,561.33	2,021.76	-944.95	2,194.49	0.00	0.00	0.00
10,400.00	90.07	359.90	7,561.21	2,121.76	-945.12	2,291.65	0.00	0.00	0.00
10,500.00	90.07	359.90	7,561.10	2,221.76	-945.30	2,388.81	0.00	0.00	0.00
10,600.00	90.07	359.90	7,560.98	2,321.76	-945.47	2,485.97	0.00	0.00	0.00
10,700.00	90.07	359.90	7,560.86	2,421.76	-945.65	2,583.12	0.00	0.00	0.00
10,800.00	90.07	359.90	7,560.74	2,521.76	-945.82	2,680.28	0.00	0.00	0.00
10,900.00	90.07	359.90	7,560.62	2,621.76	-945.99	2,777.44	0.00	0.00	0.00
11,000.00	90.07	359.90	7,560.50	2,721.76	-946.17	2,874.59	0.00	0.00	0.00
11,100.00	90.07	359.90	7,560.38	2,821.76	-946.34	2,971.75	0.00	0.00	0.00
11,200.00	90.07	359.90	7,560.26	2,921.76	-946.52	3,068.91	0.00	0.00	0.00
11,300.00	90.07	359.90	7,560.15	3,021.76	-946.69	3,166.07	0.00	0.00	0.00
11,400.00	90.07	359.90	7,560.03	3,121.76	-946.86	3,263.22	0.00	0.00	0.00
11,500.00	90.07	359.90	7,559.91	3,221.75	-947.04	3,360.38	0.00	0.00	0.00
11,600.00	90.07	359.90	7,559.79	3,321.75	-947.21	3,457.54	0.00	0.00	0.00
11,700.00	90.07	359.90	7,559.67	3,421.75	-947.39	3,554.69	0.00	0.00	0.00
11,800.00	90.07	359.90	7,559.55	3,521.75	-947.56	3,651.85	0.00	0.00	0.00
11,900.00	90.07	359.90	7,559.43	3,621.75	-947.73	3,749.01	0.00	0.00	0.00
12,000.00	90.07	359.90	7,559.31	3,721.75	-947.91	3,846.17	0.00	0.00	0.00

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<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	17' RKB + 5112' GL @ 5129.00ft
<b>Site:</b>	WELD_UNDERHILL 15-17HZ PAD	<b>North Reference:</b>	True
<b>Well:</b>	UNDERHILL 28N-17HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	UNDERHILL 28N-17HZ		
<b>Design:</b>	UNDERHILL 28N-17HZ (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)	
12,100.00	90.07	359.90	7,559.20	3,821.75	-948.08	3,943.32	0.00	0.00	0.00	
12,200.00	90.07	359.90	7,559.08	3,921.75	-948.26	4,040.48	0.00	0.00	0.00	
12,264.54	90.07	359.90	7,559.00	3,986.30	-948.37	4,103.19	0.00	0.00	0.00	
TD at 12264.54 - UNDERHILL 28N-17HZ PBHL										

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
UNDERHILL 28N-17HZ	0.00	0.00	7,559.00	3,986.30	-948.37	1,264,176.04	3,164,065.87	40.057064	-104.913877
- plan hits target center									
- Point									

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
917.00	917.00	9 5/8"	9-5/8	12-1/4	
8,055.34	7,564.00	7"	7	7-1/2	

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
4,773.91	4,652.00	Sussex				
5,406.62	5,261.00	Shannon				
7,608.64	7,397.00	Sharon Springs				
7,645.47	7,422.00	Niobrara				
7,910.65	7,544.00	Niobrara B				

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
1,050.00	1,050.00	1.44	29.96	Start Build 2.00	
1,836.73	1,826.88	-66.76	-52.94	Start 3840.14 hold at 1836.73 MD	
5,676.87	5,523.12	-728.36	-857.14	Start Drop -2.00	
6,463.60	6,300.00	-796.56	-940.04	Start 500.00 hold at 6463.60 MD	
6,963.60	6,800.00	-796.56	-940.04	Start 191.04 hold at 6963.60 MD	
7,154.64	6,991.04	-796.56	-940.04	Start Build 10.00	
8,055.34	7,564.00	-222.90	-941.05	Start DLS 0.01 TFO 168.92	
8,089.77	7,563.96	-188.46	-941.11	Start 4174.77 hold at 8089.77 MD	
12,264.54	7,559.00	3,986.30	-948.37	TD at 12264.54	