

US ROCKIES REGION PLANNING

COLORADO NORTHERN ZONE - 83

WELD_CROWDER 27-18HZ PAD

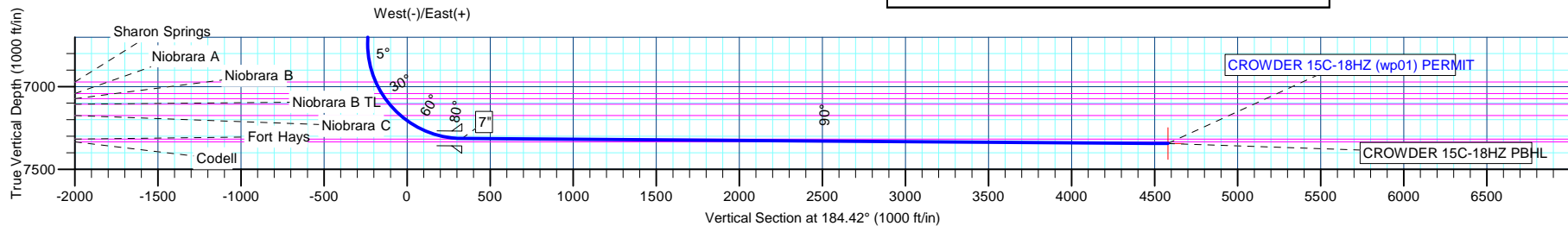
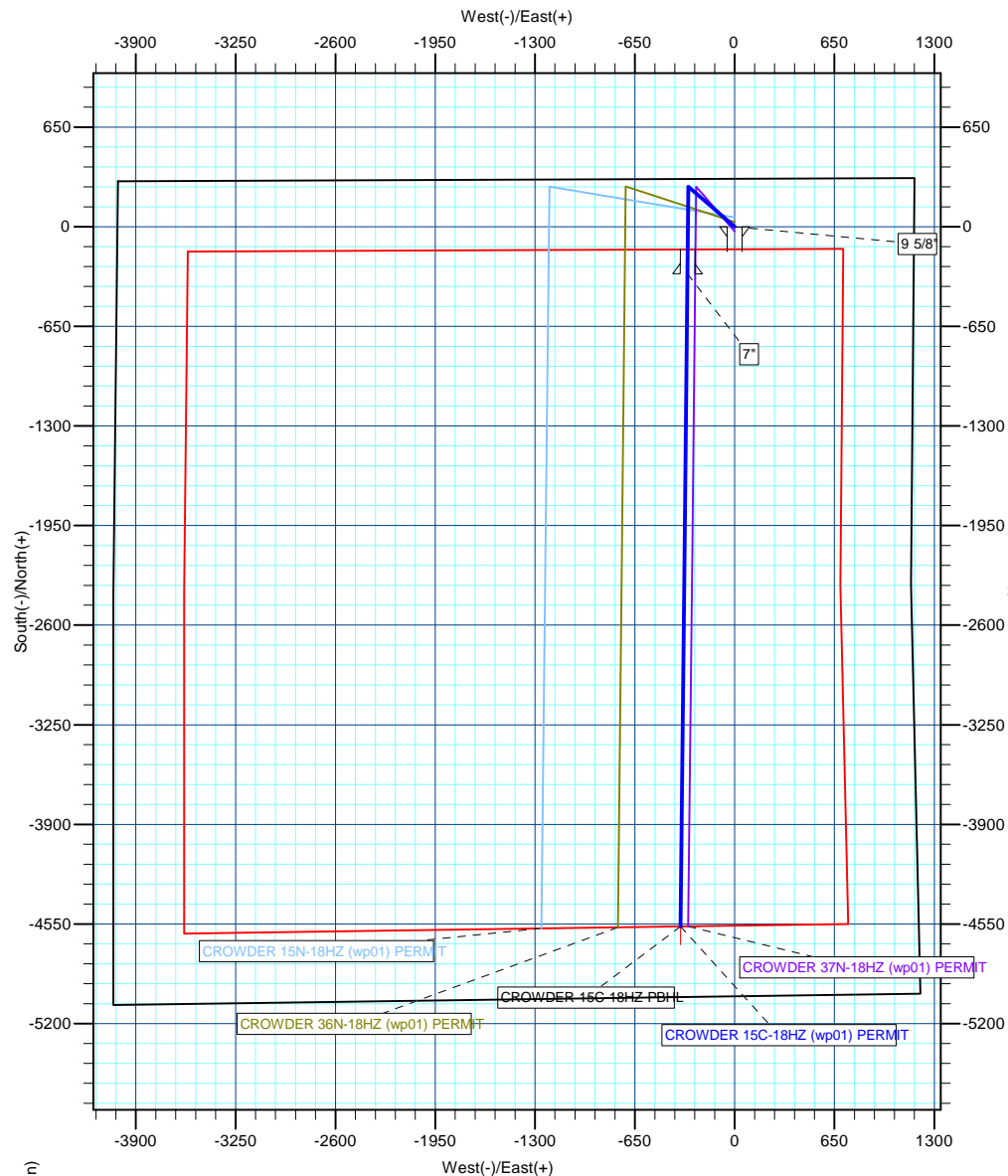
CROWDER 15C-18HZ

CROWDER 15C-18HZ

Plan: CROWDER 15C-18HZ (wp01) PERMIT

Standard Planning Report

05 October, 2012



Azimuths to True North
Magnetic North: 8.63°

Magnetic Field
Strength: 52866.1nT
Dip Angle: 66.81°
Date: 10/2/2012
Model: IGRF2010



Project: COLORADO NORTHERN ZONE - 83
Site: WELD_CROWDER 27-18HZ PAD
Well: CROWDER 15C-18HZ
Wellbore: CROWDER 15C-18HZ
Section:
SHL:
Design: CROWDER 15C-18HZ (wp01) PERMIT
Latitude: 40.145088
Longitude: -104.701457
GL: 4957.00
KB: 17' RKB+4957' GL @ 4974.00ft

WELL DETAILS: CROWDER 15C-18HZ						
+N/-S	+E/-W	Northing	Ground Level: Easting	4957.00 Latitude	Longitude	Slot
0.00	0.00	1296704.17	3223235.72	40.145088	-104.701457	

SECTION DETAILS								
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	0.00
1413.85	4.28	310.93	1413.65	5.23	-6.03	2.00	310.93	-4.75
6541.89	4.28	310.93	6527.41	255.77	-294.97	0.00	0.00	-232.31
6755.74	0.00	0.00	6741.06	261.00	-301.00	2.00	180.00	-237.05
7651.70	89.60	180.61	7314.00	-307.89	-307.08	10.00	180.61	330.62
1910.77	89.60	180.61	7344.00	-4566.61	-352.59	0.00	0.00	4580.20

WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)						
Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
CROWDER 15C-18HZ PBHL	7344.00	-4566.61	-352.59	40.132552	-104.702718	Point

FORMATION TOP DETAILS		
TVDPath	MDPath	Formation
3976.00	3983.35	Parkman
4570.00	4579.01	Sussex
6972.00	6993.44	Sharon Springs
7042.00	7072.58	Niobrara A
7073.00	7109.78	Niobrara B
7106.00	7151.38	Niobrara B TL
7175.00	7248.07	Niobrara C
7317.00	8077.01	Fort Hays
7334.00	10490.86	Codell

CASING DETAILS			
TVD	MD	Name	Size
1040.00	1040.00	9 5/8"	9-5/8
7314.00	7651.70	7"	7

Andarko Petroleum Corporation

Planning Report

Database:	edmp	Local Co-ordinate Reference:	Well CROWDER 15C-18HZ
Company:	US ROCKIES REGION PLANNING	TVD Reference:	17' RKB+4957' GL @ 4974.00ft
Project:	COLORADO NORTHERN ZONE - 83	MD Reference:	17' RKB+4957' GL @ 4974.00ft
Site:	WELD_CROWDER 27-18HZ PAD	North Reference:	True
Well:	CROWDER 15C-18HZ	Survey Calculation Method:	Minimum Curvature
Wellbore:	CROWDER 15C-18HZ		
Design:	CROWDER 15C-18HZ (wp01) PERMIT		

Project	COLORADO NORTHERN ZONE - 83		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		WELD_CROWDER 27-18HZ PAD			
Site Position:		Northing:	1,296,764.29 usft	Latitude:	40.145253
From:	Lat/Long	Easting:	3,223,235.74 usft	Longitude:	-104.701455
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.52 °

Well	CROWDER 15C-18HZ					
Well Position	+N/-S	-60.12 ft	Northing:	1,296,704.17 usft	Latitude:	40.145088
	+E/-W	-0.56 ft	Easting:	3,223,235.72 usft	Longitude:	-104.701457
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	4,957.00 ft

Wellbore	CROWDER 15C-18HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/2/2012	8.63	66.81	52,866

Design	CROWDER 15C-18HZ (wp01) PERMIT			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	184.42

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,413.85	4.28	310.93	1,413.65	5.23	-6.03	2.00	2.00	0.00	310.93	
6,541.89	4.28	310.93	6,527.41	255.77	-294.97	0.00	0.00	0.00	0.00	
6,755.74	0.00	0.00	6,741.06	261.00	-301.00	2.00	-2.00	0.00	180.00	
7,651.70	89.60	180.61	7,314.00	-307.89	-307.08	10.00	10.00	0.00	180.61	
11,910.77	89.60	180.61	7,344.00	-4,566.61	-352.59	0.00	0.00	0.00	0.00	CROWDER 15C-18H

Andarko Petroleum Corporation

Planning Report

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Project:	COLORADO NORTHERN ZONE - 83	MD Reference:	17' RKB+4957' GL @ 4974.00ft
Site:	WELD_CROWDER 27-18HZ PAD	North Reference:	True
Well:	CROWDER 15C-18HZ	Survey Calculation Method:	Minimum Curvature
Wellbore:	CROWDER 15C-18HZ		
Design:	CROWDER 15C-18HZ (wp01) PERMIT		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,040.00	0.00	0.00	1,040.00	0.00	0.00	0.00	0.00	0.00	0.00
9 5/8"									
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
1,300.00	2.00	310.93	1,299.98	1.14	-1.32	-1.04	2.00	2.00	0.00
1,400.00	4.00	310.93	1,399.84	4.57	-5.27	-4.15	2.00	2.00	0.00
1,413.85	4.28	310.93	1,413.65	5.23	-6.03	-4.75	2.00	2.00	0.00
Start 5128.03 hold at 1413.85 MD									
1,500.00	4.28	310.93	1,499.56	9.44	-10.88	-8.57	0.00	0.00	0.00
1,600.00	4.28	310.93	1,599.28	14.32	-16.52	-13.01	0.00	0.00	0.00
1,700.00	4.28	310.93	1,699.00	19.21	-22.15	-17.45	0.00	0.00	0.00
1,800.00	4.28	310.93	1,798.73	24.09	-27.79	-21.88	0.00	0.00	0.00
1,900.00	4.28	310.93	1,898.45	28.98	-33.42	-26.32	0.00	0.00	0.00
2,000.00	4.28	310.93	1,998.17	33.86	-39.05	-30.76	0.00	0.00	0.00
2,100.00	4.28	310.93	2,097.89	38.75	-44.69	-35.20	0.00	0.00	0.00
2,200.00	4.28	310.93	2,197.61	43.64	-50.32	-39.63	0.00	0.00	0.00
2,300.00	4.28	310.93	2,297.33	48.52	-55.96	-44.07	0.00	0.00	0.00
2,400.00	4.28	310.93	2,397.06	53.41	-61.59	-48.51	0.00	0.00	0.00
2,500.00	4.28	310.93	2,496.78	58.29	-67.23	-52.95	0.00	0.00	0.00
2,600.00	4.28	310.93	2,596.50	63.18	-72.86	-57.38	0.00	0.00	0.00
2,700.00	4.28	310.93	2,696.22	68.07	-78.50	-61.82	0.00	0.00	0.00
2,800.00	4.28	310.93	2,795.94	72.95	-84.13	-66.26	0.00	0.00	0.00
2,900.00	4.28	310.93	2,895.66	77.84	-89.77	-70.70	0.00	0.00	0.00
3,000.00	4.28	310.93	2,995.38	82.72	-95.40	-75.13	0.00	0.00	0.00
3,100.00	4.28	310.93	3,095.11	87.61	-101.04	-79.57	0.00	0.00	0.00
3,200.00	4.28	310.93	3,194.83	92.49	-106.67	-84.01	0.00	0.00	0.00
3,300.00	4.28	310.93	3,294.55	97.38	-112.30	-88.45	0.00	0.00	0.00
3,400.00	4.28	310.93	3,394.27	102.27	-117.94	-92.88	0.00	0.00	0.00
3,500.00	4.28	310.93	3,493.99	107.15	-123.57	-97.32	0.00	0.00	0.00
3,600.00	4.28	310.93	3,593.71	112.04	-129.21	-101.76	0.00	0.00	0.00
3,700.00	4.28	310.93	3,693.43	116.92	-134.84	-106.20	0.00	0.00	0.00
3,800.00	4.28	310.93	3,793.16	121.81	-140.48	-110.63	0.00	0.00	0.00
3,900.00	4.28	310.93	3,892.88	126.70	-146.11	-115.07	0.00	0.00	0.00
3,983.35	4.28	310.93	3,976.00	130.77	-150.81	-118.77	0.00	0.00	0.00
Parkman									
4,000.00	4.28	310.93	3,992.60	131.58	-151.75	-119.51	0.00	0.00	0.00
4,100.00	4.28	310.93	4,092.32	136.47	-157.38	-123.95	0.00	0.00	0.00
4,200.00	4.28	310.93	4,192.04	141.35	-163.02	-128.38	0.00	0.00	0.00
4,300.00	4.28	310.93	4,291.76	146.24	-168.65	-132.82	0.00	0.00	0.00
4,400.00	4.28	310.93	4,391.49	151.12	-174.29	-137.26	0.00	0.00	0.00
4,500.00	4.28	310.93	4,491.21	156.01	-179.92	-141.70	0.00	0.00	0.00
4,579.01	4.28	310.93	4,570.00	159.87	-184.37	-145.20	0.00	0.00	0.00

Andarko Petroleum Corporation

Planning Report

Database:	edmp	Local Co-ordinate Reference:	Well CROWDER 15C-18HZ
Company:	US ROCKIES REGION PLANNING	TVD Reference:	17' RKB+4957' GL @ 4974.00ft
Project:	COLORADO NORTHERN ZONE - 83	MD Reference:	17' RKB+4957' GL @ 4974.00ft
Site:	WELD_CROWDER 27-18HZ PAD	North Reference:	True
Well:	CROWDER 15C-18HZ	Survey Calculation Method:	Minimum Curvature
Wellbore:	CROWDER 15C-18HZ		
Design:	CROWDER 15C-18HZ (wp01) PERMIT		

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)
Sussex									
4,600.00	4.28	310.93	4,590.93	160.90	-185.55	-146.13	0.00	0.00	0.00
4,700.00	4.28	310.93	4,690.65	165.78	-191.19	-150.57	0.00	0.00	0.00
4,800.00	4.28	310.93	4,790.37	170.67	-196.82	-155.01	0.00	0.00	0.00
4,900.00	4.28	310.93	4,890.09	175.55	-202.46	-159.45	0.00	0.00	0.00
5,000.00	4.28	310.93	4,989.81	180.44	-208.09	-163.88	0.00	0.00	0.00
5,100.00	4.28	310.93	5,089.54	185.33	-213.73	-168.32	0.00	0.00	0.00
5,200.00	4.28	310.93	5,189.26	190.21	-219.36	-172.76	0.00	0.00	0.00
5,300.00	4.28	310.93	5,288.98	195.10	-225.00	-177.20	0.00	0.00	0.00
5,400.00	4.28	310.93	5,388.70	199.98	-230.63	-181.64	0.00	0.00	0.00
5,500.00	4.28	310.93	5,488.42	204.87	-236.27	-186.07	0.00	0.00	0.00
5,600.00	4.28	310.93	5,588.14	209.75	-241.90	-190.51	0.00	0.00	0.00
5,700.00	4.28	310.93	5,687.87	214.64	-247.54	-194.95	0.00	0.00	0.00
5,800.00	4.28	310.93	5,787.59	219.53	-253.17	-199.39	0.00	0.00	0.00
5,900.00	4.28	310.93	5,887.31	224.41	-258.80	-203.82	0.00	0.00	0.00
6,000.00	4.28	310.93	5,987.03	229.30	-264.44	-208.26	0.00	0.00	0.00
6,100.00	4.28	310.93	6,086.75	234.18	-270.07	-212.70	0.00	0.00	0.00
6,200.00	4.28	310.93	6,186.47	239.07	-275.71	-217.14	0.00	0.00	0.00
6,300.00	4.28	310.93	6,286.19	243.96	-281.34	-221.57	0.00	0.00	0.00
6,400.00	4.28	310.93	6,385.92	248.84	-286.98	-226.01	0.00	0.00	0.00
6,500.00	4.28	310.93	6,485.64	253.73	-292.61	-230.45	0.00	0.00	0.00
6,541.89	4.28	310.93	6,527.41	255.77	-294.97	-232.31	0.00	0.00	0.00
Start Drop -2.00									
6,600.00	3.11	310.93	6,585.40	258.23	-297.80	-234.54	2.00	-2.00	0.00
6,700.00	1.11	310.93	6,685.33	260.64	-300.59	-236.73	2.00	-2.00	0.00
6,755.74	0.00	0.00	6,741.06	261.00	-301.00	-237.05	2.00	-2.00	0.00
Start Build 10.00									
6,800.00	4.43	180.61	6,785.28	259.29	-301.02	-235.35	10.00	10.00	0.00
6,850.00	9.43	180.61	6,834.90	253.26	-301.08	-229.33	10.00	10.00	0.00
6,900.00	14.43	180.61	6,883.80	242.94	-301.19	-219.03	10.00	10.00	0.00
6,950.00	19.43	180.61	6,931.62	228.38	-301.35	-204.51	10.00	10.00	0.00
6,993.44	23.77	180.61	6,972.00	212.40	-301.52	-188.56	10.00	10.00	0.00
Sharon Springs									
7,000.00	24.43	180.61	6,977.99	209.72	-301.55	-185.88	10.00	10.00	0.00
7,050.00	29.43	180.61	7,022.56	187.09	-301.79	-163.30	10.00	10.00	0.00
7,072.58	31.68	180.61	7,042.00	175.61	-301.91	-151.85	10.00	10.00	0.00
Niobrara A									
7,100.00	34.43	180.61	7,064.98	160.66	-302.07	-136.92	10.00	10.00	0.00
7,109.78	35.40	180.61	7,073.00	155.06	-302.13	-131.34	10.00	10.00	0.00
Niobrara B									
7,150.00	39.43	180.61	7,104.94	130.63	-302.39	-106.96	10.00	10.00	0.00
7,151.38	39.56	180.61	7,106.00	129.75	-302.40	-106.09	10.00	10.00	0.00
Niobrara B TL									
7,200.00	44.43	180.61	7,142.12	97.23	-302.75	-73.64	10.00	10.00	0.00
7,248.07	49.23	180.61	7,175.00	62.19	-303.12	-38.67	10.00	10.00	0.00
Niobrara C									
7,250.00	49.43	180.61	7,176.26	60.72	-303.14	-37.21	10.00	10.00	0.00
7,300.00	54.43	180.61	7,207.09	21.38	-303.56	2.06	10.00	10.00	0.00
7,350.00	59.43	180.61	7,234.36	-20.51	-304.01	43.85	10.00	10.00	0.00
7,400.00	64.43	180.61	7,257.89	-64.61	-304.48	87.86	10.00	10.00	0.00
7,450.00	69.43	180.61	7,277.48	-110.59	-304.97	133.74	10.00	10.00	0.00
7,500.00	74.43	180.61	7,292.98	-158.11	-305.48	181.15	10.00	10.00	0.00
7,550.00	79.43	180.61	7,304.29	-206.79	-306.00	229.73	10.00	10.00	0.00

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Company:	US ROCKIES REGION PLANNING	TVD Reference:	17' RKB+4957' GL @ 4974.00ft
Project:	COLORADO NORTHERN ZONE - 83	MD Reference:	17' RKB+4957' GL @ 4974.00ft
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Design:	CROWDER 15C-18HZ (wp01) PERMIT		

Planned Survey									
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7,600.00	84.43	180.61	7,311.31	-256.28	-306.53	279.11	10.00	10.00	0.00
7,651.70	89.60	180.61	7,314.00	-307.89	-307.08	330.61	10.00	10.00	0.00
Start 4259.07 hold at 7651.70 MD - 7"									
7,700.00	89.60	180.61	7,314.35	-356.18	-307.60	378.80	0.00	0.00	0.00
7,800.00	89.60	180.61	7,315.05	-456.17	-308.66	478.58	0.00	0.00	0.00
7,900.00	89.60	180.61	7,315.75	-556.17	-309.73	578.36	0.00	0.00	0.00
8,000.00	89.60	180.61	7,316.46	-656.16	-310.80	678.14	0.00	0.00	0.00
8,077.01	89.60	180.61	7,317.00	-733.16	-311.62	754.97	0.00	0.00	0.00
Fort Hays									
8,100.00	89.60	180.61	7,317.16	-756.15	-311.87	777.91	0.00	0.00	0.00
8,200.00	89.60	180.61	7,317.87	-856.14	-312.94	877.69	0.00	0.00	0.00
8,300.00	89.60	180.61	7,318.57	-956.13	-314.01	977.47	0.00	0.00	0.00
8,400.00	89.60	180.61	7,319.27	-1,056.13	-315.07	1,077.25	0.00	0.00	0.00
8,500.00	89.60	180.61	7,319.98	-1,156.12	-316.14	1,177.02	0.00	0.00	0.00
8,600.00	89.60	180.61	7,320.68	-1,256.11	-317.21	1,276.80	0.00	0.00	0.00
8,700.00	89.60	180.61	7,321.39	-1,356.10	-318.28	1,376.58	0.00	0.00	0.00
8,800.00	89.60	180.61	7,322.09	-1,456.09	-319.35	1,476.36	0.00	0.00	0.00
8,900.00	89.60	180.61	7,322.80	-1,556.08	-320.42	1,576.13	0.00	0.00	0.00
9,000.00	89.60	180.61	7,323.50	-1,656.08	-321.49	1,675.91	0.00	0.00	0.00
9,100.00	89.60	180.61	7,324.20	-1,756.07	-322.55	1,775.69	0.00	0.00	0.00
9,200.00	89.60	180.61	7,324.91	-1,856.06	-323.62	1,875.46	0.00	0.00	0.00
9,300.00	89.60	180.61	7,325.61	-1,956.05	-324.69	1,975.24	0.00	0.00	0.00
9,400.00	89.60	180.61	7,326.32	-2,056.04	-325.76	2,075.02	0.00	0.00	0.00
9,500.00	89.60	180.61	7,327.02	-2,156.04	-326.83	2,174.80	0.00	0.00	0.00
9,600.00	89.60	180.61	7,327.73	-2,256.03	-327.90	2,274.57	0.00	0.00	0.00
9,700.00	89.60	180.61	7,328.43	-2,356.02	-328.97	2,374.35	0.00	0.00	0.00
9,800.00	89.60	180.61	7,329.13	-2,456.01	-330.03	2,474.13	0.00	0.00	0.00
9,900.00	89.60	180.61	7,329.84	-2,556.00	-331.10	2,573.91	0.00	0.00	0.00
10,000.00	89.60	180.61	7,330.54	-2,655.99	-332.17	2,673.68	0.00	0.00	0.00
10,100.00	89.60	180.61	7,331.25	-2,755.99	-333.24	2,773.46	0.00	0.00	0.00
10,200.00	89.60	180.61	7,331.95	-2,855.98	-334.31	2,873.24	0.00	0.00	0.00
10,300.00	89.60	180.61	7,332.66	-2,955.97	-335.38	2,973.02	0.00	0.00	0.00
10,400.00	89.60	180.61	7,333.36	-3,055.96	-336.45	3,072.79	0.00	0.00	0.00
10,490.86	89.60	180.61	7,334.00	-3,146.81	-337.42	3,163.45	0.00	0.00	0.00
Codell									
10,500.00	89.60	180.61	7,334.06	-3,155.95	-337.51	3,172.57	0.00	0.00	0.00
10,600.00	89.60	180.61	7,334.77	-3,255.95	-338.58	3,272.35	0.00	0.00	0.00
10,700.00	89.60	180.61	7,335.47	-3,355.94	-339.65	3,372.13	0.00	0.00	0.00
10,800.00	89.60	180.61	7,336.18	-3,455.93	-340.72	3,471.90	0.00	0.00	0.00
10,900.00	89.60	180.61	7,336.88	-3,555.92	-341.79	3,571.68	0.00	0.00	0.00
11,000.00	89.60	180.61	7,337.59	-3,655.91	-342.86	3,671.46	0.00	0.00	0.00
11,100.00	89.60	180.61	7,338.29	-3,755.90	-343.92	3,771.23	0.00	0.00	0.00
11,200.00	89.60	180.61	7,338.99	-3,855.90	-344.99	3,871.01	0.00	0.00	0.00
11,300.00	89.60	180.61	7,339.70	-3,955.89	-346.06	3,970.79	0.00	0.00	0.00
11,400.00	89.60	180.61	7,340.40	-4,055.88	-347.13	4,070.57	0.00	0.00	0.00
11,500.00	89.60	180.61	7,341.11	-4,155.87	-348.20	4,170.34	0.00	0.00	0.00
11,600.00	89.60	180.61	7,341.81	-4,255.86	-349.27	4,270.12	0.00	0.00	0.00
11,700.00	89.60	180.61	7,342.52	-4,355.86	-350.34	4,369.90	0.00	0.00	0.00
11,800.00	89.60	180.61	7,343.22	-4,455.85	-351.40	4,469.68	0.00	0.00	0.00
11,900.00	89.60	180.61	7,343.92	-4,555.84	-352.47	4,569.45	0.00	0.00	0.00
11,910.77	89.60	180.61	7,344.00	-4,566.61	-352.59	4,580.20	0.00	0.00	0.00
TD at 11910.77 - CROWDER 15C-18HZ PBHL									

Andarko Petroleum Corporation

Planning Report

Database:	edmp	Local Co-ordinate Reference:	Well CROWDER 15C-18HZ
Company:	US ROCKIES REGION PLANNING	TVD Reference:	17' RKB+4957' GL @ 4974.00ft
Project:	COLORADO NORTHERN ZONE - 83	MD Reference:	17' RKB+4957' GL @ 4974.00ft
Site:	WELD_CROWDER 27-18HZ PAD	North Reference:	True
Well:	CROWDER 15C-18HZ	Survey Calculation Method:	Minimum Curvature
Wellbore:	CROWDER 15C-18HZ		
Design:	CROWDER 15C-18HZ (wp01) PERMIT		

Design Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(usft)	(usft)		
- Shape									
CROWDER 15C-18HZ F	0.00	0.00	7,344.00	-4,566.61	-352.59	1,292,134.59	3,222,924.27	40.132552	-104.702718
- plan hits target center									
- Point									

Casing Points					
Measured Depth	Vertical Depth	Name		Casing Diameter	Hole Diameter
(ft)	(ft)			(")	(")
1,040.00	1,040.00	9 5/8"		9-5/8	12-1/4
7,651.70	7,314.00	7"		7	7-1/2

Formations						
Measured Depth	Vertical Depth	Name		Lithology	Dip	Dip Direction
(ft)	(ft)				(°)	(°)
3,983.35	3,976.00	Parkman				
4,579.01	4,570.00	Sussex				
6,993.44	6,972.00	Sharon Springs				
7,072.58	7,042.00	Niobrara A				
7,109.78	7,073.00	Niobrara B				
7,151.38	7,106.00	Niobrara B TL				
7,248.07	7,175.00	Niobrara C				
8,077.01	7,317.00	Fort Hays				
10,490.86	7,334.00	Codell			0.00	

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
1,200.00	1,200.00	0.00	0.00	Start Build 2.00
1,413.85	1,413.65	5.23	-6.03	Start 5128.03 hold at 1413.85 MD
6,541.89	6,527.41	255.77	-294.97	Start Drop -2.00
6,755.74	6,741.06	261.00	-301.00	Start Build 10.00
7,651.70	7,314.00	-307.89	-307.08	Start 4259.07 hold at 7651.70 MD
11,910.77	7,344.00	-4,566.61	-352.59	TD at 11910.77