

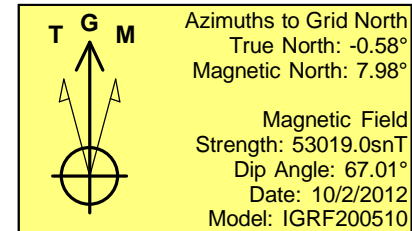
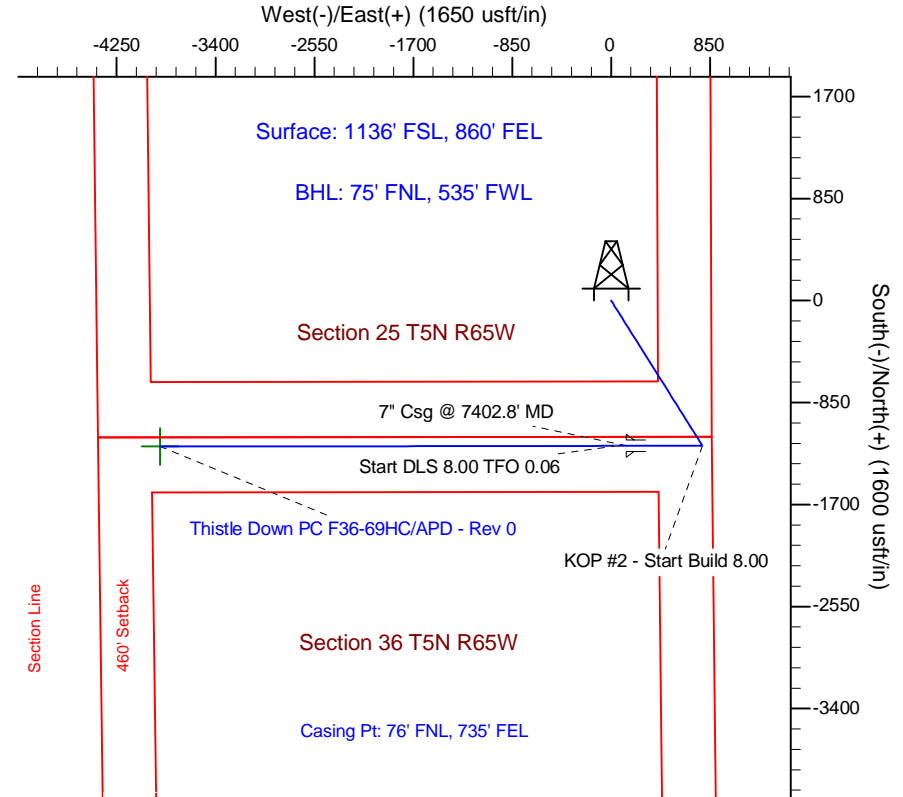
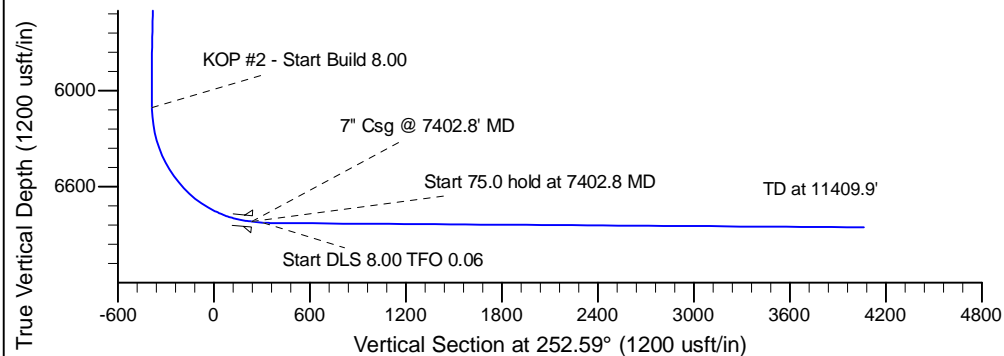
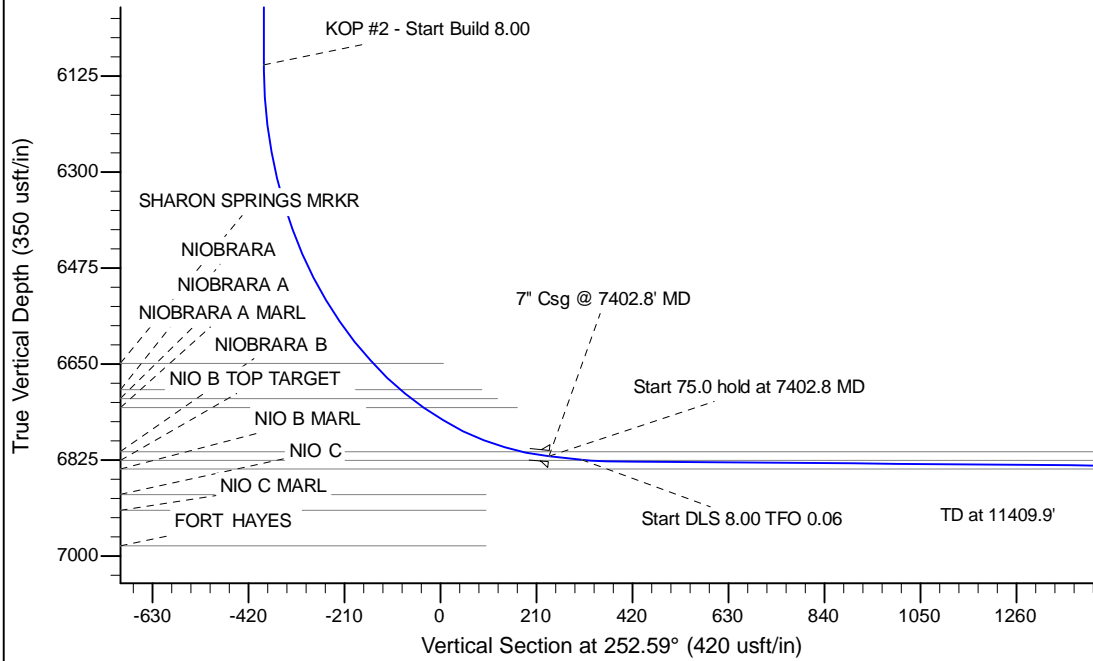
Project: Wattenberg Field
Site: F (Sec.25-T05N-R65W) Weld County, CO
Well: Thistle Down PC F36-69HC
Wellbore: Original Drilling
Design: APD - Rev 0

Northern Region Drilling

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone
System Datum: Mean Sea Level

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	1000.0	0.00	0.00	1000.0	0.0	0.0	0.00	0.00	0.0	
3	1789.9	19.75	147.05	1774.3	-113.1	73.3	2.50	147.05	-36.1	
4	5263.5	19.75	147.05	5043.7	-1097.9	711.7	0.00	0.00	-350.5	
5	6053.4	0.00	0.00	5818.0	-1211.0	785.0	2.50	180.00	-386.6	
6	6340.3	0.00	0.00	6104.9	-1211.0	785.0	0.00	0.00	-386.6	
7	7402.8	85.00	269.94	6818.4	-1211.7	131.2	8.00	269.94	237.4	
8	7477.8	85.00	269.94	6824.9	-1211.8	56.5	0.00	0.00	308.7	
9	7535.4	89.60	269.94	6827.7	-1211.8	-1.0	8.00	0.06	363.6	
10	11409.9	89.60	269.94	6854.4	-1215.6	-3875.4	0.00	0.00	4061.6	Thistle Down PC G36-69HC BHL 75'FNL, 535'FWL



WELL DETAILS: Thistle Down PC F36-69HC

Ground Level: 4723.0	Latitude	Longitude
Northing	Easting	
1377428.93	3249356.93	40.365990
		-104.605110

Plan: APD - Rev 0 (Thistle Down PC F36-69HC/Original Drilling)

Created By: Carrie Willers	Date: 12:40, October 02 2012
Checked: _____	Date: _____
Reviewed: _____	Date: _____
Approved: _____	Date: _____



Northern Region Drilling

Wattenberg Field

F (05N-65W)

Thistle Down PC F36-69HC

Original Drilling

Plan: APD - Rev 0

Standard Planning Report

02 October, 2012

Database:	EDM Production	Local Co-ordinate Reference:	Well Thistle Down PC F36-69HC
Company:	Northern Region Drilling	TVD Reference:	WELL @ 4739.0usft (Original Well Elev)
Project:	Wattenberg Field	MD Reference:	WELL @ 4739.0usft (Original Well Elev)
Site:	F (05N-65W)	North Reference:	Grid
Well:	Thistle Down PC F36-69HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Drilling		
Design:	APD - Rev 0		

Project	Wattenberg Field, Weld County CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site		F (05N-65W)			
Site Position:		Northing:	1,378,410.99 usft	Latitude:	40.369240
From:	Lat/Long	Easting:	3,228,470.50 usft	Longitude:	-104.680030
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.53

Well	Thistle Down PC F36-69HC					
Well Position	+N/-S	-982.1 usft	Northing:	1,377,428.94 usft	Latitude:	40.365990
	+E/-W	20,887.3 usft	Easting:	3,249,356.94 usft	Longitude:	-104.605110
Position Uncertainty		0.0 usft	Wellhead Elevation:		Ground Level:	4,723.0 usft

Wellbore	Original Drilling				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	10/2/2012	8.55	67.01	53,019

Design	APD - Rev 0			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	252.59

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,789.9	19.75	147.05	1,774.3	-113.1	73.3	2.50	2.50	0.00	147.05	
5,263.5	19.75	147.05	5,043.7	-1,097.9	711.7	0.00	0.00	0.00	0.00	
6,053.4	0.00	0.00	5,818.0	-1,211.0	785.0	2.50	-2.50	0.00	180.00	
6,340.3	0.00	0.00	6,104.9	-1,211.0	785.0	0.00	0.00	0.00	0.00	
7,402.8	85.00	269.94	6,818.4	-1,211.7	131.2	8.00	8.00	0.00	269.94	
7,477.8	85.00	269.94	6,824.9	-1,211.8	56.5	0.00	0.00	0.00	0.00	
7,535.4	89.60	269.94	6,827.7	-1,211.8	-1.0	8.00	8.00	0.01	0.06	
11,409.9	89.60	269.94	6,854.4	-1,215.6	-3,875.4	0.00	0.00	0.00	0.00	Thistle Down PC G36

Database:	EDM Production	Local Co-ordinate Reference:	Well Thistle Down PC F36-69HC
Company:	Northern Region Drilling	TVD Reference:	WELL @ 4739.0usft (Original Well Elev)
Project:	Wattenberg Field	MD Reference:	WELL @ 4739.0usft (Original Well Elev)
Site:	F (05N-65W)	North Reference:	Grid
Well:	Thistle Down PC F36-69HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Drilling		
Design:	APD - Rev 0		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
50.0	0.00	0.00	50.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
150.0	0.00	0.00	150.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
250.0	0.00	0.00	250.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
350.0	0.00	0.00	350.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
450.0	0.00	0.00	450.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
550.0	0.00	0.00	550.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
650.0	0.00	0.00	650.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
750.0	0.00	0.00	750.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
850.0	0.00	0.00	850.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
950.0	0.00	0.00	950.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP - Start Build 2.50									
1,050.0	1.25	147.05	1,050.0	-0.5	0.3	-0.1	2.50	2.50	0.00
1,100.0	2.50	147.05	1,100.0	-1.8	1.2	-0.6	2.50	2.50	0.00
1,150.0	3.75	147.05	1,149.9	-4.1	2.7	-1.3	2.50	2.50	0.00
1,200.0	5.00	147.05	1,199.7	-7.3	4.7	-2.3	2.50	2.50	0.00
1,250.0	6.25	147.05	1,249.5	-11.4	7.4	-3.6	2.50	2.50	0.00
1,300.0	7.50	147.05	1,299.1	-16.5	10.7	-5.3	2.50	2.50	0.00
1,350.0	8.75	147.05	1,348.6	-22.4	14.5	-7.1	2.50	2.50	0.00
1,400.0	10.00	147.05	1,398.0	-29.2	18.9	-9.3	2.50	2.50	0.00
1,450.0	11.25	147.05	1,447.1	-37.0	24.0	-11.8	2.50	2.50	0.00
1,500.0	12.50	147.05	1,496.0	-45.6	29.5	-14.6	2.50	2.50	0.00
1,550.0	13.75	147.05	1,544.7	-55.1	35.7	-17.6	2.50	2.50	0.00
1,600.0	15.00	147.05	1,593.2	-65.5	42.5	-20.9	2.50	2.50	0.00
1,650.0	16.25	147.05	1,641.3	-76.8	49.8	-24.5	2.50	2.50	0.00
1,700.0	17.50	147.05	1,689.2	-89.0	57.7	-28.4	2.50	2.50	0.00
1,750.0	18.75	147.05	1,736.7	-102.1	66.2	-32.6	2.50	2.50	0.00
1,789.9	19.75	147.05	1,774.3	-113.1	73.3	-36.1	2.50	2.50	0.00
1,800.0	19.75	147.05	1,783.9	-116.0	75.2	-37.0	0.00	0.00	0.00
1,850.0	19.75	147.05	1,830.9	-130.1	84.4	-41.5	0.00	0.00	0.00
1,900.0	19.75	147.05	1,878.0	-144.3	93.5	-46.1	0.00	0.00	0.00
1,950.0	19.75	147.05	1,925.0	-158.5	102.7	-50.6	0.00	0.00	0.00
2,000.0	19.75	147.05	1,972.1	-172.7	111.9	-55.1	0.00	0.00	0.00
2,050.0	19.75	147.05	2,019.2	-186.8	121.1	-59.6	0.00	0.00	0.00
2,100.0	19.75	147.05	2,066.2	-201.0	130.3	-64.2	0.00	0.00	0.00
2,150.0	19.75	147.05	2,113.3	-215.2	139.5	-68.7	0.00	0.00	0.00
2,200.0	19.75	147.05	2,160.3	-229.4	148.7	-73.2	0.00	0.00	0.00
2,250.0	19.75	147.05	2,207.4	-243.5	157.9	-77.7	0.00	0.00	0.00
2,300.0	19.75	147.05	2,254.5	-257.7	167.1	-82.3	0.00	0.00	0.00
2,350.0	19.75	147.05	2,301.5	-271.9	176.2	-86.8	0.00	0.00	0.00
2,400.0	19.75	147.05	2,348.6	-286.1	185.4	-91.3	0.00	0.00	0.00
2,450.0	19.75	147.05	2,395.6	-300.2	194.6	-95.8	0.00	0.00	0.00
2,500.0	19.75	147.05	2,442.7	-314.4	203.8	-100.4	0.00	0.00	0.00
2,550.0	19.75	147.05	2,489.8	-328.6	213.0	-104.9	0.00	0.00	0.00

Database:	EDM Production	Local Co-ordinate Reference:	Well Thistle Down PC F36-69HC
Company:	Northern Region Drilling	TVD Reference:	WELL @ 4739.0usft (Original Well Elev)
Project:	Wattenberg Field	MD Reference:	WELL @ 4739.0usft (Original Well Elev)
Site:	F (05N-65W)	North Reference:	Grid
Well:	Thistle Down PC F36-69HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Drilling		
Design:	APD - Rev 0		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,600.0	19.75	147.05	2,536.8	-342.8	222.2	-109.4	0.00	0.00	0.00
2,650.0	19.75	147.05	2,583.9	-356.9	231.4	-113.9	0.00	0.00	0.00
2,700.0	19.75	147.05	2,630.9	-371.1	240.6	-118.5	0.00	0.00	0.00
2,750.0	19.75	147.05	2,678.0	-385.3	249.8	-123.0	0.00	0.00	0.00
2,800.0	19.75	147.05	2,725.1	-399.5	258.9	-127.5	0.00	0.00	0.00
2,850.0	19.75	147.05	2,772.1	-413.7	268.1	-132.0	0.00	0.00	0.00
2,900.0	19.75	147.05	2,819.2	-427.8	277.3	-136.6	0.00	0.00	0.00
2,950.0	19.75	147.05	2,866.2	-442.0	286.5	-141.1	0.00	0.00	0.00
3,000.0	19.75	147.05	2,913.3	-456.2	295.7	-145.6	0.00	0.00	0.00
3,050.0	19.75	147.05	2,960.4	-470.4	304.9	-150.2	0.00	0.00	0.00
3,100.0	19.75	147.05	3,007.4	-484.5	314.1	-154.7	0.00	0.00	0.00
3,150.0	19.75	147.05	3,054.5	-498.7	323.3	-159.2	0.00	0.00	0.00
3,200.0	19.75	147.05	3,101.5	-512.9	332.5	-163.7	0.00	0.00	0.00
3,250.0	19.75	147.05	3,148.6	-527.1	341.7	-168.3	0.00	0.00	0.00
3,300.0	19.75	147.05	3,195.6	-541.2	350.8	-172.8	0.00	0.00	0.00
3,350.0	19.75	147.05	3,242.7	-555.4	360.0	-177.3	0.00	0.00	0.00
3,400.0	19.75	147.05	3,289.8	-569.6	369.2	-181.8	0.00	0.00	0.00
3,450.0	19.75	147.05	3,336.8	-583.8	378.4	-186.4	0.00	0.00	0.00
3,500.0	19.75	147.05	3,383.9	-597.9	387.6	-190.9	0.00	0.00	0.00
3,550.0	19.75	147.05	3,430.9	-612.1	396.8	-195.4	0.00	0.00	0.00
3,600.0	19.75	147.05	3,478.0	-626.3	406.0	-199.9	0.00	0.00	0.00
3,650.0	19.75	147.05	3,525.1	-640.5	415.2	-204.5	0.00	0.00	0.00
3,700.0	19.75	147.05	3,572.1	-654.6	424.4	-209.0	0.00	0.00	0.00
3,750.0	19.75	147.05	3,619.2	-668.8	433.5	-213.5	0.00	0.00	0.00
3,800.0	19.75	147.05	3,666.2	-683.0	442.7	-218.0	0.00	0.00	0.00
3,850.0	19.75	147.05	3,713.3	-697.2	451.9	-222.6	0.00	0.00	0.00
3,900.0	19.75	147.05	3,760.4	-711.3	461.1	-227.1	0.00	0.00	0.00
3,950.0	19.75	147.05	3,807.4	-725.5	470.3	-231.6	0.00	0.00	0.00
4,000.0	19.75	147.05	3,854.5	-739.7	479.5	-236.1	0.00	0.00	0.00
4,050.0	19.75	147.05	3,901.5	-753.9	488.7	-240.7	0.00	0.00	0.00
4,100.0	19.75	147.05	3,948.6	-768.0	497.9	-245.2	0.00	0.00	0.00
4,150.0	19.75	147.05	3,995.7	-782.2	507.1	-249.7	0.00	0.00	0.00
4,200.0	19.75	147.05	4,042.7	-796.4	516.2	-254.2	0.00	0.00	0.00
4,250.0	19.75	147.05	4,089.8	-810.6	525.4	-258.8	0.00	0.00	0.00
4,300.0	19.75	147.05	4,136.8	-824.7	534.6	-263.3	0.00	0.00	0.00
4,350.0	19.75	147.05	4,183.9	-838.9	543.8	-267.8	0.00	0.00	0.00
4,400.0	19.75	147.05	4,231.0	-853.1	553.0	-272.3	0.00	0.00	0.00
4,450.0	19.75	147.05	4,278.0	-867.3	562.2	-276.9	0.00	0.00	0.00
4,500.0	19.75	147.05	4,325.1	-881.4	571.4	-281.4	0.00	0.00	0.00
4,550.0	19.75	147.05	4,372.1	-895.6	580.6	-285.9	0.00	0.00	0.00
4,600.0	19.75	147.05	4,419.2	-909.8	589.8	-290.4	0.00	0.00	0.00
4,650.0	19.75	147.05	4,466.3	-924.0	598.9	-295.0	0.00	0.00	0.00
4,700.0	19.75	147.05	4,513.3	-938.2	608.1	-299.5	0.00	0.00	0.00
4,750.0	19.75	147.05	4,560.4	-952.3	617.3	-304.0	0.00	0.00	0.00
4,800.0	19.75	147.05	4,607.4	-966.5	626.5	-308.5	0.00	0.00	0.00
4,850.0	19.75	147.05	4,654.5	-980.7	635.7	-313.1	0.00	0.00	0.00
4,900.0	19.75	147.05	4,701.6	-994.9	644.9	-317.6	0.00	0.00	0.00
4,950.0	19.75	147.05	4,748.6	-1,009.0	654.1	-322.1	0.00	0.00	0.00
5,000.0	19.75	147.05	4,795.7	-1,023.2	663.3	-326.6	0.00	0.00	0.00
5,050.0	19.75	147.05	4,842.7	-1,037.4	672.5	-331.2	0.00	0.00	0.00
5,100.0	19.75	147.05	4,889.8	-1,051.6	681.6	-335.7	0.00	0.00	0.00
5,150.0	19.75	147.05	4,936.9	-1,065.7	690.8	-340.2	0.00	0.00	0.00
5,200.0	19.75	147.05	4,983.9	-1,079.9	700.0	-344.7	0.00	0.00	0.00
5,250.0	19.75	147.05	5,031.0	-1,094.1	709.2	-349.3	0.00	0.00	0.00

Database:	EDM Production	Local Co-ordinate Reference:	Well Thistle Down PC F36-69HC
Company:	Northern Region Drilling	TVD Reference:	WELL @ 4739.0usft (Original Well Elev)
Project:	Wattenberg Field	MD Reference:	WELL @ 4739.0usft (Original Well Elev)
Site:	F (05N-65W)	North Reference:	Grid
Well:	Thistle Down PC F36-69HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Drilling		
Design:	APD - Rev 0		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,263.5	19.75	147.05	5,043.7	-1,097.9	711.7	-350.5	0.00	0.00	0.00
Start Drop -2.50									
5,300.0	18.83	147.05	5,078.1	-1,108.0	718.3	-353.7	2.50	-2.50	0.00
5,350.0	17.58	147.05	5,125.6	-1,121.1	726.8	-357.9	2.50	-2.50	0.00
5,400.0	16.33	147.05	5,173.5	-1,133.4	734.7	-361.8	2.50	-2.50	0.00
5,450.0	15.08	147.05	5,221.6	-1,144.7	742.0	-365.4	2.50	-2.50	0.00
5,500.0	13.83	147.05	5,270.0	-1,155.2	748.8	-368.8	2.50	-2.50	0.00
5,550.0	12.58	147.05	5,318.7	-1,164.8	755.1	-371.8	2.50	-2.50	0.00
5,600.0	11.33	147.05	5,367.6	-1,173.5	760.7	-374.6	2.50	-2.50	0.00
5,650.0	10.08	147.05	5,416.7	-1,181.3	765.7	-377.1	2.50	-2.50	0.00
5,700.0	8.83	147.05	5,466.0	-1,188.2	770.2	-379.3	2.50	-2.50	0.00
5,750.0	7.58	147.05	5,515.5	-1,194.2	774.1	-381.2	2.50	-2.50	0.00
5,800.0	6.33	147.05	5,565.2	-1,199.3	777.4	-382.8	2.50	-2.50	0.00
5,850.0	5.08	147.05	5,614.9	-1,203.4	780.1	-384.2	2.50	-2.50	0.00
5,900.0	3.83	147.05	5,664.8	-1,206.7	782.2	-385.2	2.50	-2.50	0.00
5,950.0	2.58	147.05	5,714.7	-1,209.0	783.7	-386.0	2.50	-2.50	0.00
6,000.0	1.33	147.05	5,764.6	-1,210.5	784.7	-386.4	2.50	-2.50	0.00
6,050.0	0.08	147.05	5,814.6	-1,211.0	785.0	-386.6	2.50	-2.50	0.00
6,053.4	0.00	0.00	5,818.0	-1,211.0	785.0	-386.6	2.50	-2.50	0.00
6,100.0	0.00	0.00	5,864.6	-1,211.0	785.0	-386.6	0.00	0.00	0.00
6,150.0	0.00	0.00	5,914.6	-1,211.0	785.0	-386.6	0.00	0.00	0.00
6,200.0	0.00	0.00	5,964.6	-1,211.0	785.0	-386.6	0.00	0.00	0.00
6,250.0	0.00	0.00	6,014.6	-1,211.0	785.0	-386.6	0.00	0.00	0.00
6,300.0	0.00	0.00	6,064.6	-1,211.0	785.0	-386.6	0.00	0.00	0.00
6,340.3	0.00	0.00	6,104.9	-1,211.0	785.0	-386.6	0.00	0.00	0.00
KOP #2 - Start Build 8.00									
6,350.0	0.78	269.94	6,114.6	-1,211.0	784.9	-386.5	8.00	8.00	0.00
6,400.0	4.78	269.94	6,164.6	-1,211.0	782.5	-384.2	8.00	8.00	0.00
6,450.0	8.78	269.94	6,214.2	-1,211.0	776.6	-378.6	8.00	8.00	0.00
6,500.0	12.78	269.94	6,263.3	-1,211.0	767.3	-369.7	8.00	8.00	0.00
6,550.0	16.78	269.94	6,311.7	-1,211.0	754.5	-357.5	8.00	8.00	0.00
6,600.0	20.78	269.94	6,359.0	-1,211.0	738.4	-342.1	8.00	8.00	0.00
6,650.0	24.78	269.94	6,405.1	-1,211.1	719.1	-323.7	8.00	8.00	0.00
6,700.0	28.78	269.94	6,449.7	-1,211.1	696.6	-302.2	8.00	8.00	0.00
6,750.0	32.78	269.94	6,492.7	-1,211.1	671.0	-277.8	8.00	8.00	0.00
6,800.0	36.78	269.94	6,533.7	-1,211.1	642.5	-250.5	8.00	8.00	0.00
6,850.0	40.78	269.94	6,572.7	-1,211.2	611.2	-220.7	8.00	8.00	0.00
6,900.0	44.78	269.94	6,609.4	-1,211.2	577.2	-188.3	8.00	8.00	0.00
6,950.0	48.78	269.94	6,643.6	-1,211.3	540.8	-153.5	8.00	8.00	0.00
6,958.2	49.43	269.94	6,649.0	-1,211.3	534.6	-147.6	8.00	8.00	0.00
SHARON SPRINGS MRKR									
7,000.0	52.78	269.94	6,675.2	-1,211.3	502.1	-116.5	8.00	8.00	0.00
7,037.3	55.76	269.94	6,697.0	-1,211.3	471.8	-87.6	8.00	8.00	0.00
NIOBRARA									
7,050.0	56.78	269.94	6,704.1	-1,211.3	461.2	-77.5	8.00	8.00	0.00
7,066.6	58.10	269.94	6,713.0	-1,211.4	447.2	-64.2	8.00	8.00	0.00
NIOBRARA A									
7,100.0	60.78	269.94	6,730.0	-1,211.4	418.4	-36.7	7.99	7.99	0.00
NIOBRARA A MARL									
7,150.0	64.78	269.94	6,752.8	-1,211.4	374.0	5.7	8.01	8.01	0.00
7,200.0	68.78	269.94	6,772.6	-1,211.5	328.1	49.5	8.00	8.00	0.00
7,250.0	72.78	269.94	6,789.0	-1,211.5	280.9	94.6	8.00	8.00	0.00
7,300.0	76.78	269.94	6,802.1	-1,211.6	232.6	140.6	8.00	8.00	0.00

Database:	EDM Production	Local Co-ordinate Reference:	Well Thistle Down PC F36-69HC
Company:	Northern Region Drilling	TVD Reference:	WELL @ 4739.0usft (Original Well Elev)
Project:	Wattenberg Field	MD Reference:	WELL @ 4739.0usft (Original Well Elev)
Site:	F (05N-65W)	North Reference:	Grid
Well:	Thistle Down PC F36-69HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Drilling		
Design:	APD - Rev 0		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,338.8	79.88	269.94	6,810.0	-1,211.6	194.6	176.9	8.00	8.00	0.00
NIOBRARA B									
7,350.0	80.78	269.94	6,811.9	-1,211.6	183.6	187.4	8.00	8.00	0.00
7,400.0	84.78	269.94	6,818.2	-1,211.7	134.0	234.8	8.00	8.00	0.00
7,402.8	85.00	269.94	6,818.4	-1,211.7	131.2	237.4	8.00	8.00	0.00
Start 75.0 hold at 7402.8 MD - 7" Csg @ 7402.8' MD									
7,450.0	85.00	269.94	6,822.5	-1,211.7	84.2	282.3	0.00	0.00	0.00
7,477.8	85.00	269.94	6,824.9	-1,211.8	56.5	308.7	0.00	0.00	0.00
Start DLS 8.00 TFO 0.06									
7,491.4	86.08	269.94	6,826.0	-1,211.8	43.0	321.6	8.00	8.00	0.01
NIO B TOP TARGET									
7,500.0	86.78	269.94	6,826.5	-1,211.8	34.4	329.9	8.00	8.00	0.01
7,535.4	89.60	269.94	6,827.7	-1,211.8	-1.0	363.6	8.00	8.00	0.01
7,550.0	89.60	269.94	6,827.8	-1,211.8	-15.6	377.6	0.00	0.00	0.00
7,600.0	89.60	269.94	6,828.1	-1,211.9	-65.6	425.3	0.00	0.00	0.00
7,650.0	89.60	269.94	6,828.4	-1,211.9	-115.6	473.0	0.00	0.00	0.00
7,700.0	89.60	269.94	6,828.8	-1,212.0	-165.6	520.7	0.00	0.00	0.00
7,750.0	89.60	269.94	6,829.1	-1,212.0	-215.6	568.5	0.00	0.00	0.00
7,800.0	89.60	269.94	6,829.5	-1,212.1	-265.6	616.2	0.00	0.00	0.00
7,850.0	89.60	269.94	6,829.8	-1,212.1	-315.6	663.9	0.00	0.00	0.00
7,900.0	89.60	269.94	6,830.2	-1,212.2	-365.6	711.6	0.00	0.00	0.00
7,950.0	89.60	269.94	6,830.5	-1,212.2	-415.6	759.4	0.00	0.00	0.00
8,000.0	89.60	269.94	6,830.9	-1,212.3	-465.6	807.1	0.00	0.00	0.00
8,050.0	89.60	269.94	6,831.2	-1,212.3	-515.6	854.8	0.00	0.00	0.00
8,100.0	89.60	269.94	6,831.6	-1,212.4	-565.6	902.5	0.00	0.00	0.00
8,150.0	89.60	269.94	6,831.9	-1,212.4	-615.6	950.2	0.00	0.00	0.00
8,200.0	89.60	269.94	6,832.2	-1,212.5	-665.6	998.0	0.00	0.00	0.00
8,250.0	89.60	269.94	6,832.6	-1,212.5	-715.6	1,045.7	0.00	0.00	0.00
8,300.0	89.60	269.94	6,832.9	-1,212.6	-765.6	1,093.4	0.00	0.00	0.00
8,350.0	89.60	269.94	6,833.3	-1,212.6	-815.6	1,141.1	0.00	0.00	0.00
8,400.0	89.60	269.94	6,833.6	-1,212.7	-865.6	1,188.8	0.00	0.00	0.00
8,450.0	89.60	269.94	6,834.0	-1,212.7	-915.6	1,236.6	0.00	0.00	0.00
8,500.0	89.60	269.94	6,834.3	-1,212.8	-965.6	1,284.3	0.00	0.00	0.00
8,550.0	89.60	269.94	6,834.7	-1,212.8	-1,015.6	1,332.0	0.00	0.00	0.00
8,600.0	89.60	269.94	6,835.0	-1,212.9	-1,065.6	1,379.7	0.00	0.00	0.00
8,650.0	89.60	269.94	6,835.3	-1,212.9	-1,115.6	1,427.5	0.00	0.00	0.00
8,700.0	89.60	269.94	6,835.7	-1,212.9	-1,165.6	1,475.2	0.00	0.00	0.00
8,750.0	89.60	269.94	6,836.0	-1,213.0	-1,215.6	1,522.9	0.00	0.00	0.00
8,800.0	89.60	269.94	6,836.4	-1,213.0	-1,265.6	1,570.6	0.00	0.00	0.00
8,850.0	89.60	269.94	6,836.7	-1,213.1	-1,315.6	1,618.3	0.00	0.00	0.00
8,900.0	89.60	269.94	6,837.1	-1,213.1	-1,365.6	1,666.1	0.00	0.00	0.00
8,950.0	89.60	269.94	6,837.4	-1,213.2	-1,415.6	1,713.8	0.00	0.00	0.00
9,000.0	89.60	269.94	6,837.8	-1,213.2	-1,465.6	1,761.5	0.00	0.00	0.00
9,050.0	89.60	269.94	6,838.1	-1,213.3	-1,515.6	1,809.2	0.00	0.00	0.00
9,100.0	89.60	269.94	6,838.5	-1,213.3	-1,565.6	1,856.9	0.00	0.00	0.00
9,150.0	89.60	269.94	6,838.8	-1,213.4	-1,615.6	1,904.7	0.00	0.00	0.00
9,200.0	89.60	269.94	6,839.1	-1,213.4	-1,665.6	1,952.4	0.00	0.00	0.00
9,250.0	89.60	269.94	6,839.5	-1,213.5	-1,715.6	2,000.1	0.00	0.00	0.00
9,300.0	89.60	269.94	6,839.8	-1,213.5	-1,765.6	2,047.8	0.00	0.00	0.00
9,350.0	89.60	269.94	6,840.2	-1,213.6	-1,815.6	2,095.6	0.00	0.00	0.00
9,400.0	89.60	269.94	6,840.5	-1,213.6	-1,865.6	2,143.3	0.00	0.00	0.00
9,450.0	89.60	269.94	6,840.9	-1,213.7	-1,915.6	2,191.0	0.00	0.00	0.00
9,500.0	89.60	269.94	6,841.2	-1,213.7	-1,965.6	2,238.7	0.00	0.00	0.00

Database:	EDM Production	Local Co-ordinate Reference:	Well Thistle Down PC F36-69HC
Company:	Northern Region Drilling	TVD Reference:	WELL @ 4739.0usft (Original Well Elev)
Project:	Wattenberg Field	MD Reference:	WELL @ 4739.0usft (Original Well Elev)
Site:	F (05N-65W)	North Reference:	Grid
Well:	Thistle Down PC F36-69HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Drilling		
Design:	APD - Rev 0		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,550.0	89.60	269.94	6,841.6	-1,213.8	-2,015.6	2,286.4	0.00	0.00	0.00
9,600.0	89.60	269.94	6,841.9	-1,213.8	-2,065.6	2,334.2	0.00	0.00	0.00
9,613.5	89.60	269.94	6,842.0	-1,213.8	-2,079.1	2,347.1	0.00	0.00	0.00
NIO B MARL									
9,650.0	89.60	269.94	6,842.3	-1,213.9	-2,115.6	2,381.9	0.00	0.00	0.00
9,700.0	89.60	269.94	6,842.6	-1,213.9	-2,165.6	2,429.6	0.00	0.00	0.00
9,750.0	89.60	269.94	6,842.9	-1,214.0	-2,215.6	2,477.3	0.00	0.00	0.00
9,800.0	89.60	269.94	6,843.3	-1,214.0	-2,265.6	2,525.0	0.00	0.00	0.00
9,850.0	89.60	269.94	6,843.6	-1,214.1	-2,315.6	2,572.8	0.00	0.00	0.00
9,900.0	89.60	269.94	6,844.0	-1,214.1	-2,365.6	2,620.5	0.00	0.00	0.00
9,950.0	89.60	269.94	6,844.3	-1,214.2	-2,415.6	2,668.2	0.00	0.00	0.00
10,000.0	89.60	269.94	6,844.7	-1,214.2	-2,465.6	2,715.9	0.00	0.00	0.00
10,050.0	89.60	269.94	6,845.0	-1,214.3	-2,515.6	2,763.7	0.00	0.00	0.00
10,100.0	89.60	269.94	6,845.4	-1,214.3	-2,565.5	2,811.4	0.00	0.00	0.00
10,150.0	89.60	269.94	6,845.7	-1,214.4	-2,615.5	2,859.1	0.00	0.00	0.00
10,200.0	89.60	269.94	6,846.0	-1,214.4	-2,665.5	2,906.8	0.00	0.00	0.00
10,250.0	89.60	269.94	6,846.4	-1,214.5	-2,715.5	2,954.5	0.00	0.00	0.00
10,300.0	89.60	269.94	6,846.7	-1,214.5	-2,765.5	3,002.3	0.00	0.00	0.00
10,350.0	89.60	269.94	6,847.1	-1,214.5	-2,815.5	3,050.0	0.00	0.00	0.00
10,400.0	89.60	269.94	6,847.4	-1,214.6	-2,865.5	3,097.7	0.00	0.00	0.00
10,450.0	89.60	269.94	6,847.8	-1,214.6	-2,915.5	3,145.4	0.00	0.00	0.00
10,500.0	89.60	269.94	6,848.1	-1,214.7	-2,965.5	3,193.1	0.00	0.00	0.00
10,550.0	89.60	269.94	6,848.5	-1,214.7	-3,015.5	3,240.9	0.00	0.00	0.00
10,600.0	89.60	269.94	6,848.8	-1,214.8	-3,065.5	3,288.6	0.00	0.00	0.00
10,650.0	89.60	269.94	6,849.2	-1,214.8	-3,115.5	3,336.3	0.00	0.00	0.00
10,700.0	89.60	269.94	6,849.5	-1,214.9	-3,165.5	3,384.0	0.00	0.00	0.00
10,750.0	89.60	269.94	6,849.8	-1,214.9	-3,215.5	3,431.8	0.00	0.00	0.00
10,800.0	89.60	269.94	6,850.2	-1,215.0	-3,265.5	3,479.5	0.00	0.00	0.00
10,850.0	89.60	269.94	6,850.5	-1,215.0	-3,315.5	3,527.2	0.00	0.00	0.00
10,900.0	89.60	269.94	6,850.9	-1,215.1	-3,365.5	3,574.9	0.00	0.00	0.00
10,950.0	89.60	269.94	6,851.2	-1,215.1	-3,415.5	3,622.6	0.00	0.00	0.00
11,000.0	89.60	269.94	6,851.6	-1,215.2	-3,465.5	3,670.4	0.00	0.00	0.00
11,050.0	89.60	269.94	6,851.9	-1,215.2	-3,515.5	3,718.1	0.00	0.00	0.00
11,100.0	89.60	269.94	6,852.3	-1,215.3	-3,565.5	3,765.8	0.00	0.00	0.00
11,150.0	89.60	269.94	6,852.6	-1,215.3	-3,615.5	3,813.5	0.00	0.00	0.00
11,200.0	89.60	269.94	6,853.0	-1,215.4	-3,665.5	3,861.3	0.00	0.00	0.00
11,250.0	89.60	269.94	6,853.3	-1,215.4	-3,715.5	3,909.0	0.00	0.00	0.00
11,300.0	89.60	269.94	6,853.6	-1,215.5	-3,765.5	3,956.7	0.00	0.00	0.00
11,350.0	89.60	269.94	6,854.0	-1,215.5	-3,815.5	4,004.4	0.00	0.00	0.00
11,400.0	89.60	269.94	6,854.3	-1,215.6	-3,865.5	4,052.1	0.00	0.00	0.00
11,409.9	89.60	269.94	6,854.4	-1,215.6	-3,875.4	4,061.6	0.00	0.00	0.00
TD at 11409.9 - Thistle Down PC G36-69HC BHL 75'FNL, 535'FWL									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Thistle Down PC G36-69HC - hit/miss target - Shape - Point	0.00	0.00	6,854.4	-1,215.6	-3,875.4	1,376,213.41	3,245,481.65	40.362760	-104.619060

Database:	EDM Production	Local Co-ordinate Reference:	Well Thistle Down PC F36-69HC
Company:	Northern Region Drilling	TVD Reference:	WELL @ 4739.0usft (Original Well Elev)
Project:	Wattenberg Field	MD Reference:	WELL @ 4739.0usft (Original Well Elev)
Site:	F (05N-65W)	North Reference:	Grid
Well:	Thistle Down PC F36-69HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	Original Drilling		
Design:	APD - Rev 0		

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
7,402.8	6,818.4	7" Csg @ 7402.8' MD	7	8-3/4	

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
6,958.2	6,649.0	SHARON SPRINGS MRKR		0.00	
7,037.3	6,697.0	NIOBRARA		0.00	
7,066.6	6,713.0	NIOBRARA A		0.00	
7,100.0	6,730.0	NIOBRARA A MARL		0.00	
7,338.8	6,810.0	NIOBRARA B		0.00	
7,491.4	6,826.0	NIO B TOP TARGET		0.00	
9,613.5	6,842.0	NIO B MARL		0.00	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,000.0	1,000.0	0.0	0.0	KOP - Start Build 2.50	
5,263.5	5,043.7	-1,097.9	711.7	Start Drop -2.50	
6,340.3	6,104.9	-1,211.0	785.0	KOP #2 - Start Build 8.00	
7,402.8	6,818.4	-1,211.7	131.2	Start 75.0 hold at 7402.8 MD	
7,477.8	6,824.9	-1,211.8	56.5	Start DLS 8.00 TFO 0.06	
11,409.9	6,854.4	-1,215.6	-3,875.4	TD at 11409.9	