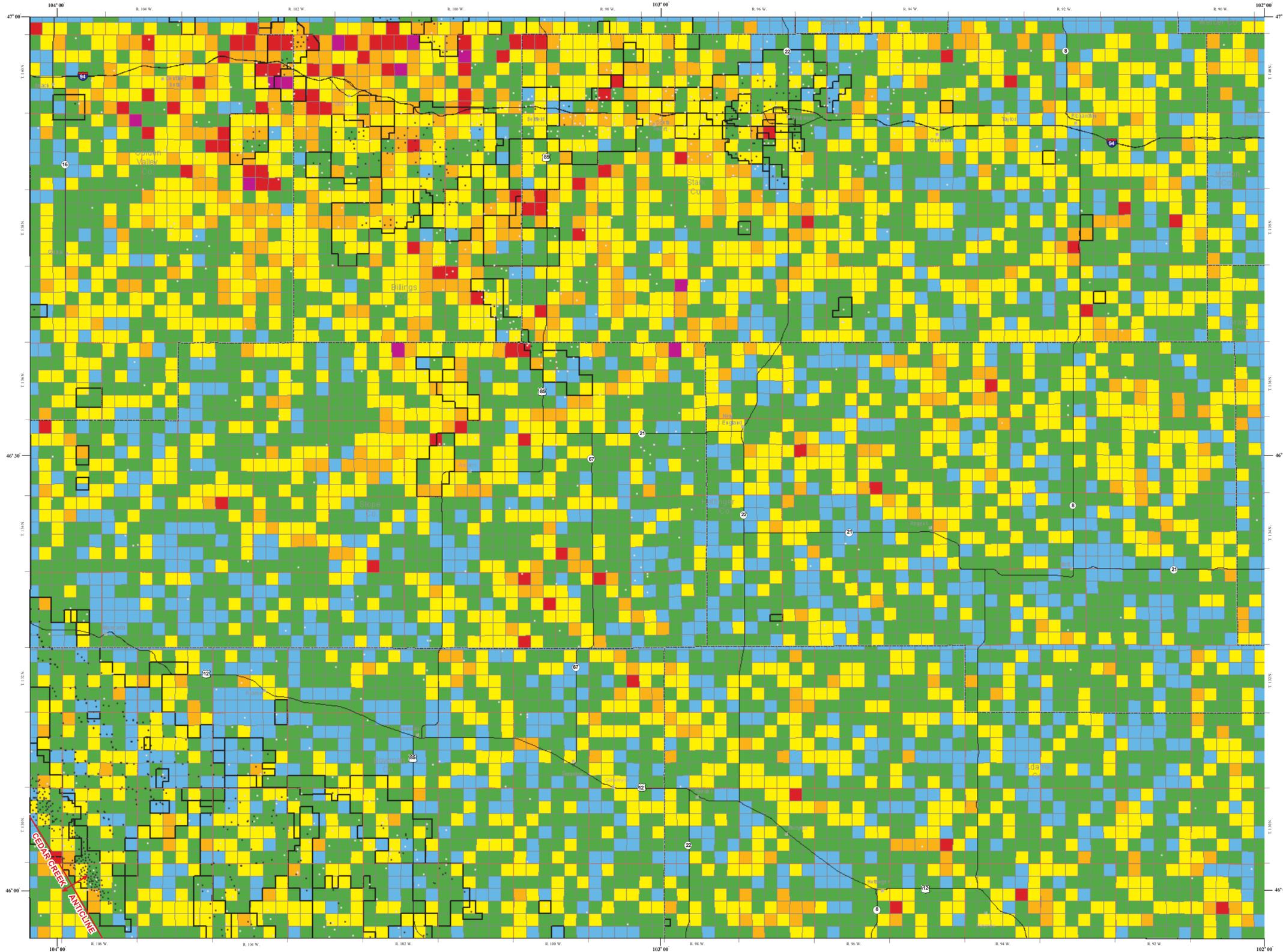# LINEAMENT DENSITY AND GENERALIZED WELL PRODUCTION IN THE DICKINSON 250K SHEET, NORTH DAKOTA

Fred J. Anderson

2011

EXPLANATION

This map presents the results of an evaluation of the relationship between lineament density (Anderson, 2011) and overall generalized well production and success for oil and gas wells found in the Dickinson 1:250k sheet. The Dickinson area is located in the southern portion of the Williston Basin in southwestern North Dakota. Lineament density was calculated across the map area by automated analysis of the sum of all mapped lineament lengths found to occur within a 1 mile x 1 mile grid cell coincident with actual Public Land Survey System (PLSS) sections. Cellular lineament density values (i.e. total lineament line length per unit cell) were assigned to each grid cell. Lineament density classes are depicted on this map as ranging from areas of lower lineament density, shown as cooler colors, to areas of higher lineament density, shown as warmer colors. This map shows area of higher lineament density in the north and southwestern map area, coincident with subsurface structural features such as the Cedar Creek Anticline. Areas of lower lineament density are found in the eastern and southcentral portions of the map. Overall, lineament density appears greatest in areas where producing oil and gas wells (Figure 1) and gas wells (Figure 2) are commonly located, and lower where non-producing wells have been drilled. This suggests a relationship between productive areas and relatively higher lineament density. The distribution of wells found within individual lineament density classes suggest that more dry (oil and gas) wells have been drilled in areas of lower lineament density. Averaged production data suggest that wells located in areas of greater lineament density have generally higher overall average production. In terms of exploration success (i.e. near or greater than 50%), wells drilled in areas of higher lineament density have generally been more successful. Well data considered here, includes information only from wells drilled before 04/20/10.
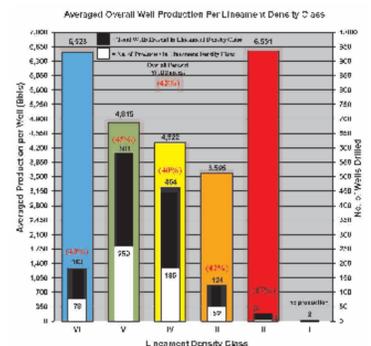

Figure 1. Averaged overall well production, for oil and gas wells, per lineament density class (colored bars) on the primary y-axis shown with the total number of wells occurring within each lineament density class (i.e., producing and non-producing wells) shown on the secondary y-axis. Average production is calculated as the average (Bbls) produced, over the first 12 months of production, divided by the number of producing wells drilled per lineament density class. The overall percent success rate is highlighted in red above each respective lineament class and is defined as the number of producing wells divided by the total number of wells drilled within each lineament density class.
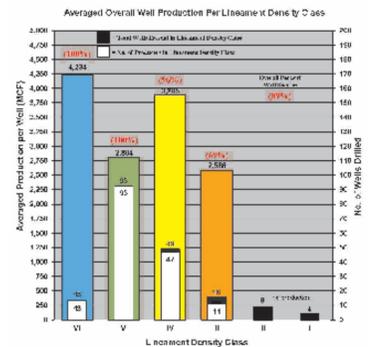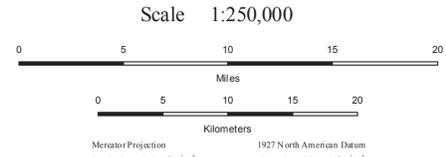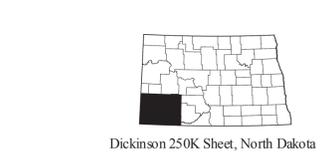

Figure 2. Averaged overall well production, for gas wells, per lineament density class (colored bars) on the primary y-axis shown with the total number of wells occurring within each lineament density class (i.e., producing and non-producing wells) shown on the secondary y-axis. Average production is calculated as the average (MCF) produced, over the first 12 months of production, divided by the number of producing wells drilled per lineament density class. The overall percent success rate is highlighted in red above each respective lineament class and is defined as the number of producing wells divided by the total number of wells drilled within each lineament density class.

Lineament Density (ft/mi²)

- 50,000 - >60,000
- 40,000 - 50,000
- 30,000 - 40,000
- 20,000 - 30,000
- 10,000 - 20,000
- 0 - 10,000

Geologic Features

- • Producing Drill Hole
- Non-Producing Drill Hole
- □ Oil & Gas Fields
- Cedar Creek Anticline

Other Features

- Towns
- Township Boundaries
- County Boundaries
- State and US Highways

The Dickinson 250k sheet was extended into the Miles City, Lemmon and Ekalaka 250k sheets to the North Dakota/Montana and North Dakota/South Dakota borders.

Scale 1:250,000

Miles
Kilometers

Dickinson 250K Sheet, North Dakota

Note: The well locations shown reflect the well surface "collar" locations. The actual locations of horizontal and deviated wells were reviewed and evaluated for the appropriate assignment of lineament density class.

Mercator Projection   1927 North American Datum
Standard parallel 46° 00' 00"   Central meridian 103° 00' 00"

CEDAR CREEK ANTICLINE