LINEAMENT DENSITY AND GENERALIZED WELL PRODUCTION IN THE PARshall AREA, NORTH DAKOTA

Fred J. Anderson

2009

EXPLANATION

This map presents the results of an evaluation of the relationship between lineament density (Anderson, 2008) and overall generalized well production and success. The Parshall area is located in the northeastern portion of the Williston Basin and is centered around McCone County in northeastern 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 of the grid cells. 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 western portion of the map area, coincident with major subsurface structural development along the Nesson Anticline and lessened geomorphological influence from Pliocene glaciation. Areas of lower lineament density are found in the eastern and northeastern portions of the map. Overall, lineament density appears greatest in areas where producing oil and gas wells are commonly located, and lower where non-producing wells have been drilled (Figure 1). This suggests a relationship between productive areas and relatively higher lineament density. Lineament density appears artificially lower in the areas covered by Lake Sakakawea as these water covered areas were not included during the original lineament mapping. The distribution of wells found within individual lineament density classes suggests that more dry 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., more or greater than 50%), wells drilled in areas of higher lineament density have potentially been more successful. Well data within the area of investigation and presented here, includes production information only from wells drilled before 09/20/08.

Averaged Overall Well Productivity Per Lineament Density Class

| Lineament Density Class | No. of Wells Drilled | Averaged Production Per Well (Bc/m) | % of Overall Wells
|------------------------|----------------------|------------------------------------|------------------|
| I                      | 20                   | 1,200                              | 30%
| II                     | 35                   | 1,800                              | 40%
| III                    | 50                   | 2,800                              | 50%
| IV                     | 40                   | 3,200                              | 60%

REFERENCES:

Lineament Density (ft/mi)

Geologic Features
- Oil & Gas Fields
- Lineament Density
- Old & New Fields
- Nesson Anticline
- Other Features
- Lake Sakakawea Drainage

The map area is a combined 10th degree Public, Border II, Border III, and Aka-Brunton Fitzgerald center U.S. quadrangles.