

Lineament Mapping and Analysis in the Northeastern Williston Basin of North Dakota

Fred J. Anderson¹

Lineament mapping completed in the northeastern portion of the Williston Basin of North Dakota, centered on Mountrail County, at a scale of 1:250,000, identified 7,916 individual surface lineaments for characterization and examination of potential spatial relationships between mapped lineaments and areas of oil and gas exploration and production. These lineaments include those previously published and new lineaments that are mapped at multiple scales by visual-manual inspection of digital shaded relief data, aerial imagery, and LANDSAT-7 ETM+ data. The resulting data reveal lineament trends in orthogonal NE to SW and NW to SE orientations consistent with previous lineament studies and contemporary understanding of regional tectonic stress fields and fracture development. Observation and comparison of mapped lineament intersections, density, interconnectivity, and directional trends, suggest a relationship between mapped lineaments and areas of current petroleum production. Several areas of higher lineament density in the western and southeastern portions of the map area correspond to areas of current production. Producing wells are common in areas of greater lineament development, whereas non-producing wells are typical in areas with less lineament development. The relatively unexplored areas in the north and south-central portions of Mountrail County contain a high degree of overall lineament development and therefore may be favorable for future exploration.

¹North Dakota Geological Survey, Bismarck, ND

Fred J. Anderson is a geologist with the North Dakota Geological Survey in Bismarck, ND. He is a native of Minot, North Dakota and is currently investigating North Dakota's shallow gas resource potential. Fred has a B.A. in Earth Science (Geology) from Minot State University and a M.Sc. in Geology and Geological Engineering from the South Dakota School of Mines and Technology; he is currently a member of the American Association of Petroleum Geologists. Email: fjanderson@nd.gov