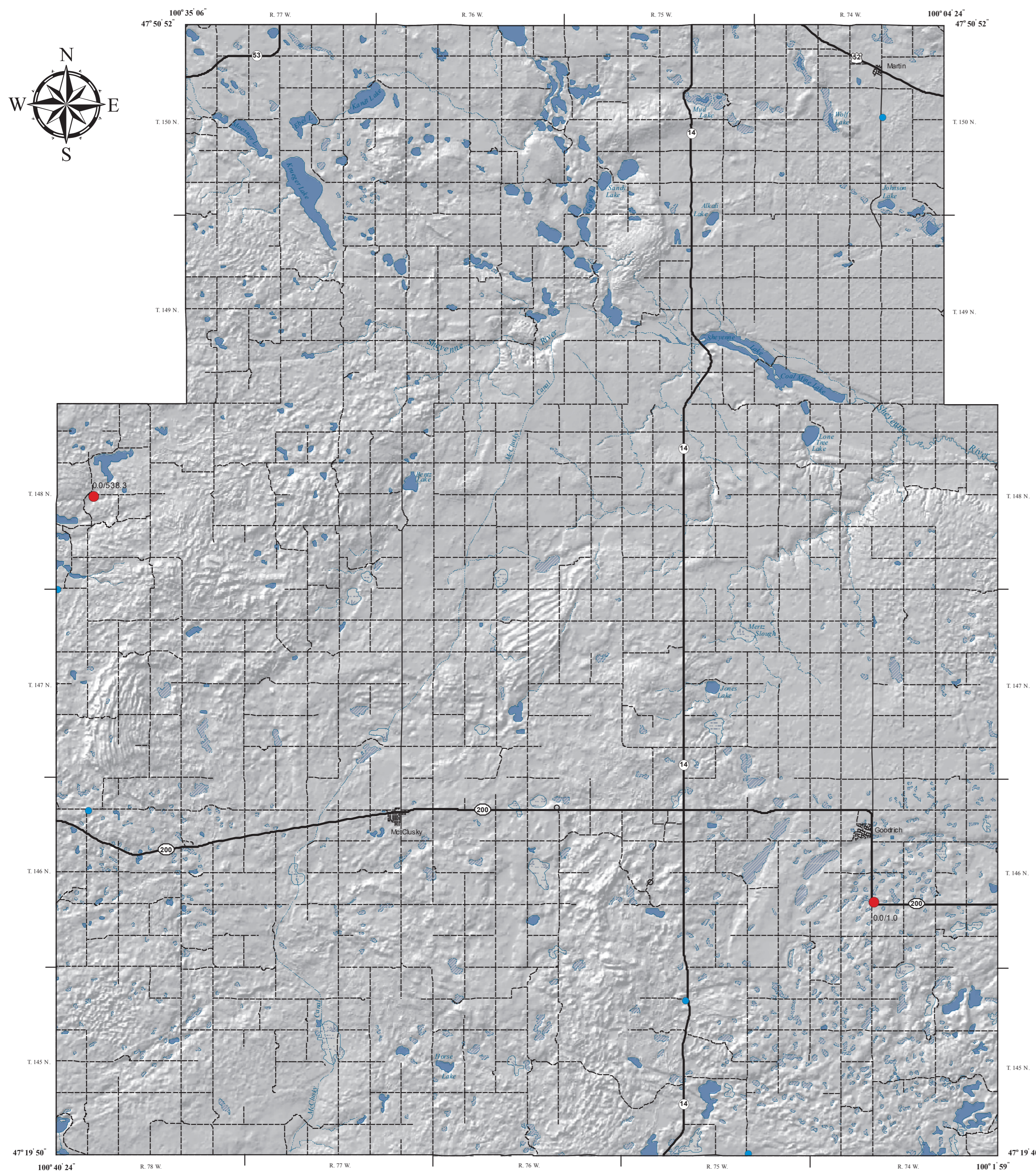


Field Screening for Shallow Gas in Sheridan County, North Dakota

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The investigation of shallow natural gas occurrences within existing ground-water observation wells in Sheridan County, North Dakota was conducted on July 24, 2008. A total of 71 observation well sites, consisting of historic and existing ground-water observation wells, drilled in the county for the purposes of ground-water monitoring of unconsolidated and shallow bedrock aquifers, were reviewed prior to the field component of this investigation. Nine of these observation well sites were selected to be visited in the field. The remaining 62 well locations were of undetermined status (likely to be destroyed or abandoned) and were not visited in the field. Observation well locations were visited in the field in order to (1) determine the actual existence of the well, (2) to verify its location, and (3) perform flame-ionization detector (FID) field screening for possible shallow natural gas occurrences. Seven observation well site locations were verified to have a ground-water observation well at their prescribed point and were subsequently field screened. Two wells were not found and were presumed abandoned or destroyed.

Each of the wells were field screened for the presence of combustible gasses using a portable FID calibrated to methane (101 ppm low-span or 10,000 ppm high-span) in air. The FID was used solely for field screening on all wells. Instrument response was collected at the top of well casing (TOC) and just above the ground-water/air interface (GWI). After field screening a water level reading within the well was collected using an electric well tape. Of the existing wells field screened, two wells (146-74-21CCC & 148-78-20BBA) returned positive FID responses of 1.0 and 538.3 ppm as methane, respectively; five of the wells showed no response (i.e., a 0.0 ppm as methane instrument reading) during field screening at both the TOC and GWI. No wells were found to have a detectable concentration of methane emanating from the TOC. It has been observed in the field that it is more likely to detect methane at the GWI or higher in the air column within a given well. It has been less typical to actually detect methane emanating from the TOC.

The occurrence of FID responses are located in the eastern and westernmost portions of the county. This is due, in part, to the spatial distribution of monitoring points in the county. Stock wells and individual private, irrigation, or municipal water supply wells were not considered as a part of this investigation. FID field screening is not a stand-alone analytical tool. It must be used in conjunction with additional analytical methods and procedures. A positive FID instrument response indicates that the presence of methane is highly likely at the well since the instrument is selectively sensitive to methane and is calibrated specifically to a predetermined concentration of methane in air. However, excessive moisture and low oxygen levels or high values of carbon dioxide can influence FID response. A confirmatory gas analysis is required to determine and quantify the absolute presence and concentration of methane and other hydrocarbons that may be present in conjunction with FID field screening results. The reconnaissance level field screening results presented here are intended to aid in the selection of future candidate observation well locations and or areas to conduct additional sampling and analysis and potentially focus future field investigative and exploration efforts.

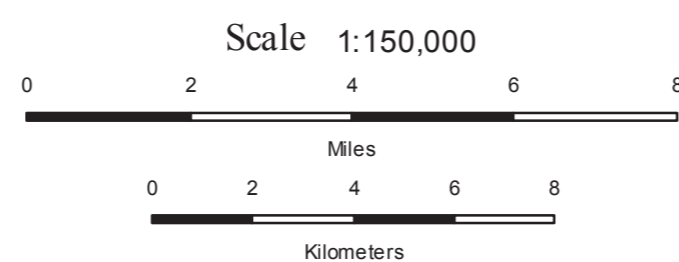
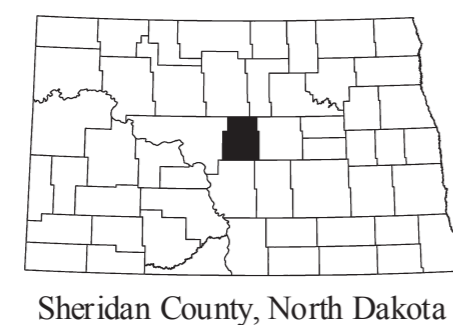
Explanation

Geologic Symbols

- Existing observation well with a positive numerical FID instrument response in parts per million (ppm) as methane, at the top of casing (TOC) and/or the ground-water/air interface (GWI).
0.0/538.3 (TOC/GWI)
- Existing observation well, no FID response at TOC and/or the GWI.
- Historical observation well location. No existing well at well site location visited. Well presumed abandoned or destroyed.

Other Features

- Water
- Water - Intermittent
- Marsh
- River/Stream - Perennial
- Stream - Intermittent
- State Highway
- Paved Road
- Unpaved Road



Merator Projection 1983 North American Datum
Standard parallel 47° 37' 30" Central meridian 100° 22' 30"
USGS NED Shaded Relief - Vertical Exaggeration 9x

