



Field Screening for Shallow Gas in Griggs County, North Dakota



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The investigation of shallow gas occurrences within existing ground-water wells in Griggs County, North Dakota was conducted over a non-consecutive six-day period from May 28 through June 3, 2009. A total of 128 well sites, consisting of historic and existing ground-water observation and stock wells, drilled in the county for the purpose of ground-water monitoring and water supply from unconsolidated and shallow bedrock aquifers, were reviewed prior to the field component of the investigation.

Each of the well sites were selected to be visited in the field 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. 14 well sites were not found during the investigation, suggesting that these wells have either been abandoned, destroyed, or are no longer in use. 90 well site locations were verified to have a ground-water observation or stock well at their prescribed point and were subsequently field screened.

Each well was field screened for the presence of combustible gases using a portable FID calibrated to methane (100 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 groundwater/air interface (GWI). A depth to water level reading was collected within the well after field screening using an electric well tape.

Of the existing wells field screened, 20 returned positive FID responses, ranging from 0.2 to 2,063 ppm as methane (Figure 1); 70 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. It has been observed that it is more likely to detect methane at the GWI or higher up in the air column within a given well. It has been less typical to detect methane at the TOC.

The occurrence of FID responses are distributed primarily in the northwestern portion of the county coincident with the extent of the Spirtwood Aquifer. Individual private, irrigation, or municipal water supply wells were not considered during 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 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 well locations and or areas to conduct additional sampling and analysis and potentially focus future field investigative efforts.

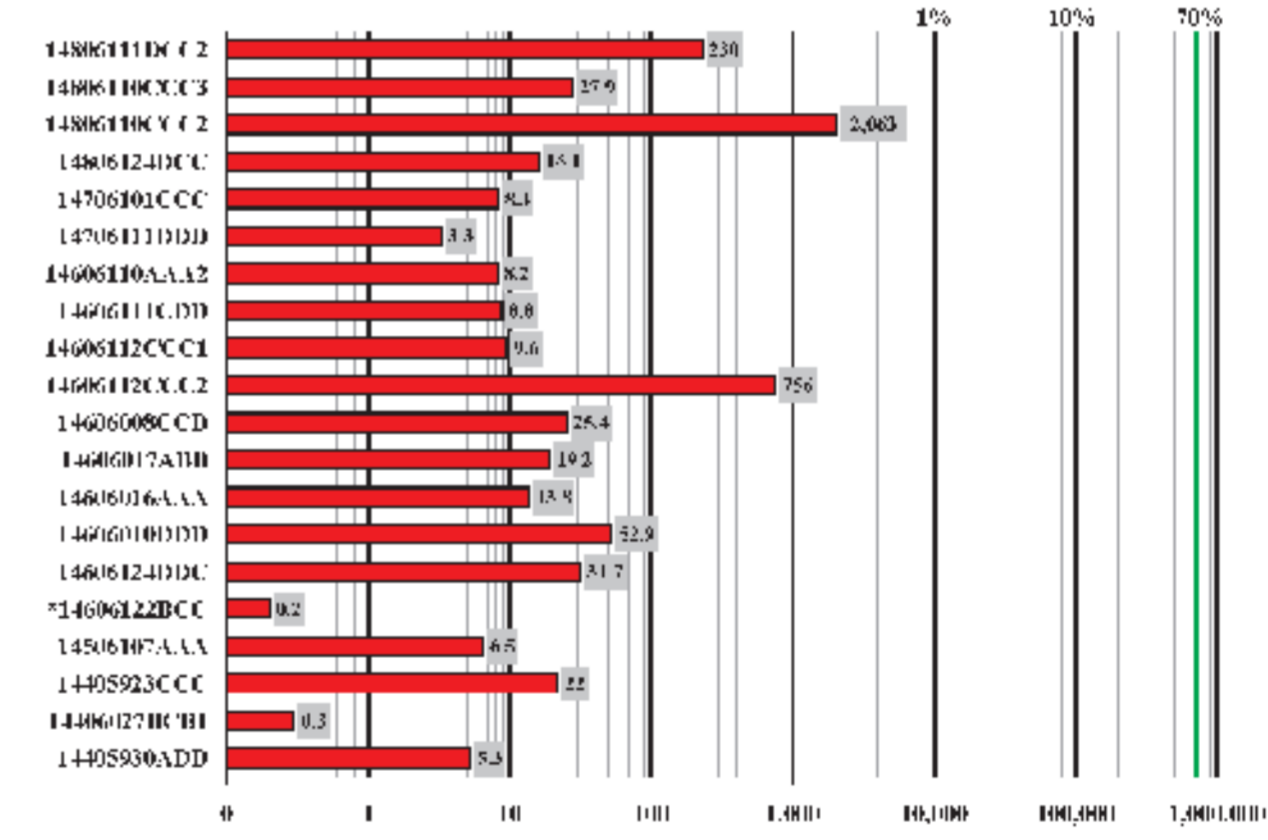
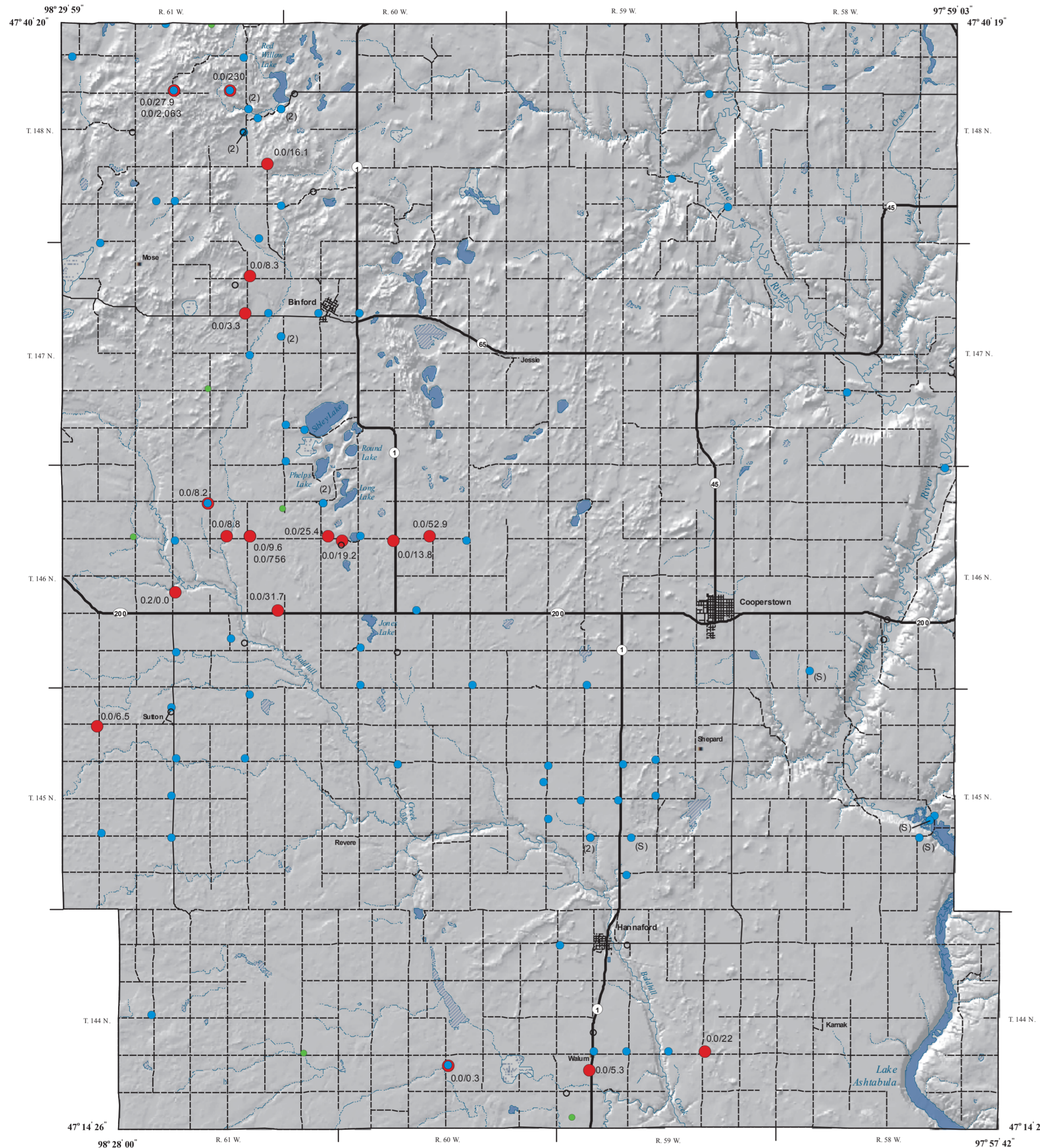


Figure 1. Graph depicting the relative relationship and absolute maximum values of flame-ionization detector (FID) instrument responses from selected wells in Griggs County. FID results for each well are presented in order of field screening occurrence from top to bottom. Values shown are those reported from the groundwater/air interface (GWI) (as CH₄ in ppm). The typical concentration of methane in commercial natural gas is highlighted by the vertical green line at 70%.
* FID instrument response collected from the top of well casing (TOC).

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).
 - (S) Existing observation well, no FID response at TOC and/or the GWI. S notation indicates location of stock well.
 - Historical observation well location. No existing well at well site location visited. Well presumed abandoned or destroyed.
 - Wells sites not visited during this investigation.
 - Nested wells; locations not separable at this scale.
 - (2) Indicates number of wells drilled at same coordinates.
- Other Features**
- Water
 - Marsh
 - Stream - Intermittent
 - Paved Road
 - Water - Intermittent
 - River/Stream - Perennial
 - State Highway
 - Unpaved Road

Scale 1:150,000

