Exploration for Shallow Natural Gas in North Dakota by FID Field Screening of Ground-Water Wells

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Field exploration for shallow natural gas occurrences in ground-water wells in North Dakota was conducted over a 21 non-consecutive month period during the 2006 to 2010 field seasons. A total of 4,325 ground-water wells, located within 52 of North Dakota's 53 counties, were field screened for the occurrence of methane (C1) using a portable flame-ionization-detector (FID) calibrated to C1. A total of 905 gas shows (21% of wells tested) were discovered, ranging in concentration from just above instrument detection limits at 0.1 ppm to 50,000 ppm (5%) as C1 with 95% of the occurrences being within the range of 0.1 ppm to 1,000 ppm as C1 in air. The concentration and distribution of these occurrences suggest C1 sourcing from: 1) organic detritus laden within glacial sediments, 2) the underlying Cretaceous marine shales of the Montana and Colorado Groups that subcrop these wells, particularly on the eastern flank of the Williston Basin in eastern North Dakota, and 3) shallow, bedded lignite coals of the Fort Union Group (Paleocene) in western North Dakota.