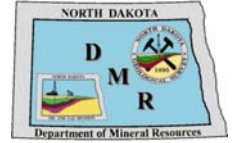




NORTH DAKOTA GEOLOGICAL SURVEY

Geological Information for the State of North Dakota

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SHALLOW GAS EXPLORATION AND PRODUCTION IN NORTH DAKOTA

Title slide from NDGS Geological Investigation No. 72

NDGS GEOLOGICAL INVESTIGATIONS No. 72 (GI-72)

ABSTRACT

Shallow gas production in North Dakota began in 1978 and has continued for 30 years with cumulative production just under 21 MMCF. Current production is from 159 wells penetrating the Pierre Formation along the Cedar Creek Anticline in southwestern North Dakota. Production is from the Cedar Creek-Pierre (10,928,994 cum MCF) and Little Missouri (9,990,616 cum MCF) fields in Bowman County. Relatively recent State tax-incentive legislation has provided a more favorable economic model for continued shallow gas production and development, which resulted in an increase of shallow gas drilling and production from 2003 to 2006. Recent wildcat activity in Emmons and Burleigh counties in south-central North Dakota resulted in three completions of four wells drilled to a chalky interval of the late-Cretaceous Niobrara Formation. Average gas production was 1.5 MCF per day from the two evaluated wells (Welch 1-32 & Tschosik 1-15) with an average of 128 Bbls per day of produced water. Stimulation methods were typical sand-gel-nitrogen foam fracs with nitrogen jetted development over ten foot completion intervals. Survey field screening of shallow ground-water observation wells continued in the summer and fall of 2007 and summer of 2008 with the completion of an additional 12 counties in central and eastern North Dakota. To date, 1,769 observation wells have been field screened for the presence of CH₄ with a portable flame-ionization detector (FID). Potential CH₄ occurrences were found in 326 of the wells tested. Average FID response (per county) ranged from a low of 5 ppm (as CH₄) in Rolette County to a high of 2,352.7 ppm (as CH₄) in Ward County. Current investigations include continued shallow gas field screening and gas composition sampling and testing, investigation of a potential shallow gas source system along the eastern margin of the Williston Basin, subsurface geologic mapping of potential shallow gas sands, and a recently completed study of shallow gas in Cretaceous and Tertiary aquifers in west-central North Dakota. Further study of shallow ground-water geochemistry and CH₄ occurrence continue.

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