**Gas Production Composition Determined With Direct Quadrupole Mass Spectrometer (DQMS) While Drilling**

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**Abstract**

The accuracy and reliability of well data has become crucial in developing oil and gas production. The use of well data ranges from reservoir evaluation to production planning. A useful parameter often overlooked due to a history of poor accuracy and reliability is hydrocarbon composition from mud gas. Hydrocarbon composition can be used as an indicator of thermal maturity and production type (liquid or dry gas). DQMS analysis of mud gas while drilling provides hydrocarbon composition with greater accuracy than other field instrumentation and with faster results than laboratory production analysis. The DQMS hydrocarbon compositions from mud gas were compared to lab analyses of gas production from 8 horizontal shale wells with varying production character (1316-1021 BTU). Results show gas compositions calculated from DQMS reading are accurate and reliable. Hydrocarbon basis BTU calculated from DQMS data for the 8 wells had an average percent error of 1.162 and a standard deviation of 1.021 from hydrocarbon basis BTU lab analysis.

**Website**

INTRODUCTION
The accuracy and reliability of well data has become crucial in developing oil and gas production. The use of well data ranges from reservoir evaluation to production planning. A useful feature of mud gas data often overlooked due to a history of poor accuracy and reliability is hydrocarbon composition from mud gas. Hydrocarbon composition can be used as an indicator of thermal maturity and production type (liquid or dry gas). DQMS analysis of mud gas while drilling provides hydrocarbon composition with greater accuracy than other field instrumentation and with faster results than laboratory production analysis. The DQMS hydrocarbon composition results from mud gas were compared to laboratory analyses of gas production from 8 horizontal shale wells with varying production character (1316-1021 BTU). DQMS derived compositions compare very well with laboratory gas compositions. Hydrocarbon basis BTU calculated from DQMS data for 8 wells had an average error of 1.16% and a standard deviation of 1.02% from hydrocarbon basis BTU lab analysis.

METHODS
Data was collected during the routine drilling of a horizontal well. The first step in determining the composition is to integrate the raw data into an algorithm that reflects the composition of the gas phase production. This step is critical in the calculation since not all analytes are measured at the dominant peak. The accuracy and reliability of well data has become crucial in developing oil and gas production. The use of well data ranges from reservoir evaluation to production planning. A useful feature of mud gas data often overlooked due to a history of poor accuracy and reliability is hydrocarbon composition from mud gas. Hydrocarbon composition can be used as an indicator of thermal maturity and production type (liquid or dry gas). DQMS analysis of mud gas while drilling provides hydrocarbon composition with greater accuracy than other field instrumentation and with faster results than laboratory production analysis. The DQMS hydrocarbon composition results from mud gas were compared to laboratory analyses of gas production from 8 horizontal shale wells with varying production character (1316-1021 BTU). DQMS derived compositions compare very well with laboratory gas compositions. Hydrocarbon basis BTU calculated from DQMS data for 8 wells had an average error of 1.16% and a standard deviation of 1.02% from hydrocarbon basis BTU lab analysis.

RESULTS
Below are the results of the DQMS derived composition compared to laboratory analysis of produced gas. This illustrates that the accuracy and reproducibility of the calculation. The range of tests include mature dry gas only production as well as mixed gas and liquid production. The same algorithm is applied the same way to each data set to derive the composition. The BTU is calculated on a hydrocarbon basis since CO2 readings can be anomalous due to atmospheric and mud chemistry influences. The average error for the 8 well set was 1.16% with a standard deviation of 1.02%.

CONCLUSIONS
DQMS mud gas analysis data collected while drilling provides a very reasonable estimate of hydrocarbon production with respect to composition and hydrocarbon basis BTU. Given the accuracy for the wide range of compositions tested, this analysis technique is suitable for early use in reservoir characterization. Given enough data points over a geographic location, DQMS derived compositions have been shown to be mappable. Further investigation of the data may provide information concerning well characteristics such as bbl/mmcf production rates.