Manual of Petroleum Measurement Standards Chapter 14—Natural Gas Fluids Measurement

Section 4—Converting Mass of Natural Gas Liquids and Vapors to Equivalent Liquid Volumes

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Standard for Converting Mass of Natural Gas Liquids or Vapors to Equivalent Liquid Volumes

1 Scope

This standard prescribes a method for calculating liquid volumes at equilibrium pressures and at temperatures of 60 °F, 15 °C, and 20 °C from the mass of a natural gas fluid (liquid or vapor) measured at operating conditions, in conjunction with a representative compositional analysis and published values for each component's molar mass and absolute density.

2 Summary of Method

2.1 General

2.1.1 The total mass of a natural gas liquid or natural gas vapor is determined at operating pressure and temperature using a mass measurement system. The total mass is converted to individual component volumes using a representative component analysis.

2.1.2 The absolute density of pure hydrocarbons in pounds mass per gallon and in kilograms per cubic meter at 60 °F and 15 °C, respectively, as stated in GPA 2145, *Table of Physical Properties for Hydrocarbons and Other Compounds of Interest to Natural Gas and Natural Gas Liquids Industries*, shall be used.

The absolute density of pure hydrocarbons in kilograms per cubic meter at 20 °C, as generated from REFPROP, NIST Standard Reference Database 23, shall be used until such time as GPA 2145 includes this data set. An exception is made for methane, which has a critical temperature of -82.59 °C (190.56 K). The absolute density of 270 kg/m^3 for methane at 20 °C has been extrapolated from GPA 2145-09 and shall be used for methane at 20 °C until GPA 2145 is updated to include a dataset of absolute densities at 20 °C. Absolute densities at conditions other than those stated in GPA 2145 should be generated from REFPROP, NIST Standard Database 23, or other source(s) as agreed upon by interested parties.

2.1.3 The examples in this publication illustrate typical components. In actual practice, all the components detected that are representative of the measured product stream should be included in the conversion to equivalent liquid volumes.

3 Normative References

GPA 2145, *Table of Physical Properties for Hydrocarbons and Other Compounds of Interest to the Natural Gas Industry*

REFPROP, *Reference Fluid Thermodynamic and Transport Properties*, NIST Standard Reference Database 23