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Multiphase liquid entrainment measurements in high pressure piping AMY MCCLENEY, Southwest Research Institute — A two-phase flow of natural gas and liquid heptane flowing in 3-inch and 6-inch diameter pipes pressurized up to 3,600 psig is characterized using a combination of a novel liquid sampling technique and a flow imaging technique. The results from this new measurement approach show how the phase distribution inside of the piping can be obtained as well as how the liquid entrainment fraction changes with an increase in gas and liquid velocity. In the petroleum industry, multiphase flows are encountered during natural gas production and processing. In two-phase flow scenarios, the amount and distribution of liquid in the gas stream play an important role in the selection and operation of flow measurement devices and the design of gas processing and separation equipment. The improper design of these types of equipment can negatively affect the allocation of petroleum resources. Several experimental tests have been conducted to investigate and characterize two-phase flows in pipes with low liquid levels but are based on experimental data collected at pressures less than 100 psig. This study indicates that the pressure has a significant effect in the distribution and behavior of two-phase flow mixtures, as the natural gas will dissolve in the liquid phase as the pressure increases.

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