

## DISCUSSION

**Roland O. Cox<sup>4</sup>**

This paper represents a valuable contribution to the subject of orifice metering. The long period covered by the data, the several types of fluids measured, and the close tolerance achieved in field practice give further confidence in the orifice metering method. The paper is well organized and the information is presented in a precise and easily read form. Two minor questions arose in my reading, however.

1 The last sentence in the first full paragraph at the top of p. 301 reads "None of the manometers had restricting valves in the mercury lines to provide damping action, yet very few flow records had any broad 'painted' lines which would have been evidence of pulsating flow or pressure." Pulses in flow streams caused by reciprocating pumps are usually so rapid that mercury manometers cannot respond quickly enough to record the pulses, and a smooth record is no guarantee that pulsating flow does not exist. "Painted" lines indicate a rhythmic variation in flow rate sometimes called "surging" flow to differentiate from pulsating flow. The author does not make clear whether or not any pumps

<sup>4</sup> Lone Star Gas Company, Dallas, Texas. Assoc. Mem. ASME.

are involved in the flow system which might cause a pulsating flow through a metering orifice that would not be evident in the chart record.

2 The first paragraph under "Maintenance of Metering Installations" contains the statement "Three times a week each meter was shut off and checked for zero reading." It is not clear whether or not the pressure was taken off the meter when "shut off." It is customary to check the zero position on gas meters while under operating pressure, since release of the pressure changes the zero position slightly on mercury manometers.

### Author's Closure

In answer to Mr. Cox's first question, "surging" flow rather than "pulsating" flow was intended. No reciprocating pumps were used for any of these streams. Some reciprocating compressors were used with two of the gas streams, but heat exchangers, knockout drums, and packed diethanolamine absorption towers separated them from the meters and damped out any true pulsation.

In answer to question two, the meters were always checked under full operating pressure. The term "shut off" was intended to mean that the differential pressure was shut off.