Manual of Petroleum Measurement Standards Chapter 20.2

Production Allocation Measurement Using Single-phase Devices

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Foreword

This edition of API *Manual of Petroleum Measurement Standards* (*MPMS*) Chapter 20.2 supersedes the below-listed sections of API *MPMS* Chapter 20.1, *Allocation Measurement*, First Edition, 1993:

— Section 1.5 Liquid Quantity Measurement (subsections not superseded by *MPMS* Chapter 20.2 include 1.5.2.4 Tanks and 1.5.2.5.2 Indirect Mass Measurement);

— Section 1.7.2.2.3 Flow Meters;

— Section 1.8 Liquid Proving and Calibration Techniques;

— Section 1.10 Gas Quantity Measurement;

— Section 1.11.4 Meter Calibration;

— Section 1.14 Gas Calibration and Proving Techniques.

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Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Contents

Introduction

This standard covers the application of production allocation (determination of flow quantities and rates of oil, gas, water, and other constituents) using single-phase measurement devices in combination with a two- or three-phase production separator.

When fluid flow from different wells' production streams are commingled into a single processing facility or flow line, it is preferred to measure the flow from each production stream separately, either continuously or on a specified interval, before it enters the common processing facility or flow line. Periodic measurement at a specified interval is the common practice since continuous measurement of an individual well production stream is normally not an available option.

On a production facility, it is common to have multiple production separators continuously measuring multiple combined production streams. Normally, these production separators (bulk separators) are dedicated to the same production streams.

The measurement of these well production streams (both combined and individual) is used in the process of allocating the facility production quantities (gas, oil, and water) back to the producing wells.

The traditional method of measuring multiphase flow has been to separate the flow into multiple single-phase streams (two- or three-phase separation). Single-phase flow meters are then applied to measure the flow of these separated streams.

Factors that can impact measurement include, but are not limited to, the following:

— varying fluid properties,

— varying operating conditions,

— varying flow rates,

— well flow dynamics,

— varying flow line lengths,

— separator and process design,

— piping configuration.

Measurement error, due to these characteristics, can result in inaccurate measurement of production streams and can cause inequitable allocation of the commingled streams.

This document provides guidance with respect to the major factors that could contribute to measurement uncertainty for single-phase devices used in production allocation. It is not intended to prescribe a particular meter type or allocation method. Allocation methodologies are addressed in API *MPMS* Chapter 20.1.

Production Allocation Measurement Using Single-phase Devices

1 Scope

This standard is applicable to single-phase measurement techniques upstream of the custody transfer points where custody transfer conditions are not possible. The standard presents single-phase flow measurement used in the allocation process and located downstream of the first stage of separation on a production facility.

This standard addresses common allocation single-phase flow measurement devices for liquid hydrocarbons, water, and gas including ancillary flow measurement systems such as fuel, flare, and recirculation.

This standard discusses configuration and operation of flow measurement equipment, fluid properties, production processing, associated flow conditions, and their effects on the quality of the flow measurement results. This standard discusses the possible impacts on these devices during inefficient and/or ineffective separation.

2 Normative References

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API *Manual of Petroleum Measurement Standards* (*MPMS*) Chapter 4 (all sections), *Proving Systems*

API *MPMS* Chapter 4.5, *Master Meter Provers*

API *MPMS* Chapter 5.2-2005, *Measurement of Liquid Hydrocarbons by Displacement Meters*

API *MPMS* Chapter 5.3-2005 (including Addendum 1-2009), *Measurement of Liquid Hydrocarbons by Turbine Meters*

API *MPMS* Chapter 5.6-2002, *Measurement of Liquid Hydrocarbons by Coriolis Meters*

API *MPMS* Chapter 7-2001 (including Addendum 1-2011), *Temperature Determination*

API *MPMS* Chapter 11 (all parts), *Physical Properties Data*

API *MPMS* Chapter 12.2 (all parts), *Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors*

API *MPMS* Chapter 12.2.3-1998, *Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Corrections Factors, Part 3—Proving Reports*

API *MPMS* Chapter 13.2-1994, *Methods of Evaluating Meter Proving Data*

API *MPMS* Chapter 14.2/AGA Report No. 8 [1], *Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases*

API *MPMS* Chapter 14.3 (all parts), *Concentric Square-edged Orifice Meters*

API *MPMS* Chapter 14.9, *Measurement of Natural Gas by Coriolis Meter*

API *MPMS* Chapter 20.1, *Allocation Measurement*

[1] American Gas Association, 400 N. Capitol St., NW, Suite 450, Washington, DC 20001, www.aga.org.