API MPMS Ch. 20.5
Recommended Practice for Application of Production Well Testing in Measurement and Allocation
Matt Zimmerman, BP
Topics

• Ch. 20.5 overview
• Production well testing in upstream measurement and allocation
• Conducting a production well test
• Calculating production well test volumes and rates
• Applying production well test data for use in allocation
• Annexes

Ch. 20.5 overview – Ch. 20

API Committee on Petroleum Measurement (COPM)
- Administers the Manual of Petroleum Measurement Standards (MPMS)

API Sub-Committee on Production Measurement and Allocation (CPMA)
- MPMS Ch. 20.1 Allocation Measurement (1993)
- MPMS Ch. 20.1 Production Measurement and Allocation Systems (under revision)
- MPMS Ch. 20.2 Production Allocation Measurement Using Single-phase Devices (2016)
- MPMS Ch. 20.3 Measurement of Multiphase Flow (2013)
- MPMS Ch. 20.5 Recommended Practice for Application of Production Well Testing in Measurement and Allocation (2017)
Ch. 20.5 overview – Introduction

“This document establishes a framework to conduct and apply production well testing for well rate determination in measurement and allocation. Production well testing addressed in this document refers to measurement of gas, oil, and water quantities from a single well during a specified length of time under controlled operational conditions. The intent of this document is to provide operators with a consistent and transparent approach for conducting, applying, and managing production well testing within an upstream measurement and allocation system. It is not intended to prescribe a particular production well test method, or particular application of production well test data use in allocation. Allocation methodologies are addressed in API MPMS Ch. 20.1.”
Ch. 20.5 overview – Scope

“This document provides recommendations and guidelines for the application of production well testing in production measurement and allocation. The recommendations and guidelines apply to conducting a production well test, calculating production well test volumes and rates, and the application of production well test data for use in measurement and allocation. This includes production well test preparation, initiation, measurement, validation, and volume and rate calculations for separator, multiphase flow meter, and tank production well test systems. Additionally, this document addresses the proration of production well test results for use in allocation, the application of production well tests for validation and update of well flow models and virtual metering, and the adjustment of gas well continuous measurement results with production well test data. This document also provides recommendations and guidelines for the application of well flow modeling and virtual flow metering in production measurement and allocation."

Production well testing in upstream measurement and allocation

• Describes a production well test
• Provides reasons for production well testing
  – Regulatory, economic, production and reservoir management
• Introduces well rate determination methods and applicability of production well testing

Figure 1—Well Rate Determination Tree

Conducting a production well test

- Preparation
  - Requirements, objectives, documentation, acceptance criteria, contingencies

- Initiation and measurement

- Validation
  - Controlled operational conditions, production signature

- Special case: continuous measurement

- Special case: production well test by-difference

Calculating production well test volumes and rates

- Produced gas, oil (condensate), and water corrected to standard conditions
- Phase behavior (production well testing PVT application)
  - $B_o$, $B_g$, $B_w$, $R_s$, $r_s$
- Separator measurement systems
- Multiphase measurement systems
- Tank measurement systems

Figure 4—Two-phase and Three-phase Separator Measurement System Process Flow Diagram
Applying production well test data for use in allocation

- Production well test rate assumed constant
- Production well test rate with applied downtime
- Production well test rate validation and updating of well flow models and VFMs
  - Describes well flow models, and provides design and operational assurance recommendations for VFMs
- Production well test volume adjustment of gas well continuous measurement with single-phase meters
- Special case: continuous measurement

Annexes

• Types of oil and gas well tests
• Description of the production well test system

Annexes

• Example analysis for establishing production well test duration during nonstable flow conditions
• Example production well test report
• Field determination of oil volume correction factor
• Calculation of water volume correction factor
• Example calculations of production well test rates
• Example calculations of production well test use in allocation