Manual of Petroleum Measurement Standards Chapter 13—Statistical Aspects of Measuring and Sampling

Section 2—Methods of Evaluating Meter Proving Data

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Introduction

Minimizing petroleum measurement errors, estimating remaining errors and informing affected parties of errors is important to the petroleum industry. A consistent basis for estimating the size and significance of errors is essential for communication among affected parties. A fundamental source of measurement error is the inaccuracy of the meter factor which is a number that represents the performance of a meter throughout a batch.

Meter factors are monitored to gain confidence in the reported volumes and to detect trends or sudden deviations as indications of when to perform maintenance on or calibration of measurement equipment. The purpose of this standard is to suggest procedures for monitoring variations in meter factors so that uncertainties are understood and consistent with the objectives of parties affected by the measurement operations. The procedures for monitoring meter performance, limits on meter factor variations and actions to take because of these variations are left to the agreement among the parties affected by the measurement operations which can depend on company policy, contract agreements, regulations and laws.

Section 2—Methods of Evaluating Meter Proving Data

1 Scope

This standard establishes the basic concepts and procedures to estimate and report meter performance uncertainty in consistent and comparable ways.

2 Normative References

The following referenced 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 reference document (including any amendments) applies.

API *Manual of Petroleum Measurement Standards* (MPMS) Chapter 1, *Online Terms and Definitions Database*

API *MPMS* Chapter 4, *Proving Systems*

API *MPMS* Chapter 5, *Metering*

API *MPMS* Chapter 12, *Calculation of Petroleum Quantities*

API *MPMS* Chapter 13.3, *Measurement Uncertainty* Quantities

3 Terms, Definitions, and Acronyms

For the purposes of this document, the following terms and definitions apply. Terms of more general use may be found in the API *MPMS* Chapter 1, *Online Terms and Definitions Database*. Acronyms are defined in the text at first use.

3.1
3 standard deviation limit
A control limit equal to 3 standard deviations from the arithmetic mean of the set.

NOTE For a set of normal data this limit is also known as the 3-sigma limit.

3.2
action limits
Horizontal lines found on a run chart or control chart which, if exceeded, suggests that some sort of action is necessary to modify the underlying process or to modify the reports generated from the process. Related terms: tolerance limit, warning limit.

3.3
central line
A line on a control chart or run chart that represents the central value.

3.4
central value
The mean value of the statistic under consideration. Synonym: central tendency.

3.5
control chart
A graphical method for evaluating whether a process is in or out of statistical control.