Manual of Petroleum Measurement Standards Chapter 19.1

Evaporative Loss From Fixed-Roof Tanks

FOURTH EDITION, OCTOBER 2012

AMERICAN PETROLEUM INSTITUTE

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Measurement Coordination

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Summary of Changes to API MPMS Chapters 19.1, 19.2 and 19.4

The third edition of API Manual of Petroleum Measurement Standards (*MPMS*) Chapter 19.4 was published following a revision that was carried out concurrently with revisions to Chapter 19.1, published as the fourth edition, and Chapter 19.2, published as the third edition. Primary changes are:

1) Consolidation of common material in Chapter 19.4. Material that had previously been included in both Chapters 19.1 and 19.2 has been moved to Chapter 19.4. Chapter 19.4, which was previously *Recommended Practice for Speciation of Evaporative Losses*, now has the title *Evaporative Loss Reference Information and Speciation Methodology.* This Chapter had already contained reference information on the properties of chemicals and typical petroleum liquids, and this information has now been removed from Chapters 19.1 and 19.2. In addition, meteorological data have been moved from Chapters 19.1 and 19.2 to Chapter 19.4. In the revised documents:

   a) Meteorological data are found in Chapter 19.4,

   b) Calculation of storage tank temperatures is found in Chapters 19.1 and 19.2 (in that fixed-roof tanks involve calculation of the vapor space temperature in order to determine vapor density, whereas this step is not involved in estimating emissions from floating-roof tanks), and

   c) Calculation of true vapor pressure is found in Chapter 19.4 (in that this is now calculated in the same manner for both fixed- and floating-roof tanks).

2) Reconciliation of nomenclature. Chapters 19.1 and 19.2 previously had different nomenclature for the same variables. These revisions adopt a common set of symbols for both chapters.

3) Reorganization of the formats. In addition to common material having been removed from Chapters 19.1 and 19.2, the remaining text has been edited to remove unnecessarily verbose or repetitive language. The summary tables were deemed redundant, and have been deleted.

4) Appendices. Appendices have been redesignated as annexes.

5) SI units. An annex has been added to each chapter to address SI units.

Chapter 19.1, fourth edition

In addition to common reference material being deleted from Chapter 19.1, the following changes have been made:

1) Reference to API Technical Reports. References to API TR 2568 (cleaning storage tanks) and API TR 2569 (closed vent IFRTs) have been added.

2) Terminology. The following terminology has been revised:

   a) “Standing storage loss” has been changed to “standing loss.”

   b) “Solar insolation” has been changed to “insolation.”

3) Effective Throughput. An expression has been added for the sum of changes in liquid level, designated ΣH_Q, for calculating effective throughput.

4) Normal operating pressure. An expression has been added for calculating the normal operating pressure, as the average of the maximum and minimum vent settings.

5) Vapor density from vapor space temperature. The temperature used in the calculation of vapor density has been changed from the liquid surface temperature to the vapor space temperature, and an equation has been added for determining the vapor space temperature.

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Chapter 19.1—Evaporative Loss From Fixed-Roof Tanks

1 Scope

This standard contains methodologies for estimating the total evaporative losses of hydrocarbons from fixed-roof tanks. The methodologies provide loss estimates for general equipment types based on laboratory, test-tank and field-tank data.

Types of fixed-roof tanks and roof fittings described are for information only.

The equations estimate average annual losses from uninsulated fixed-roof tanks for various liquid stocks, stock vapor pressures, tank sizes, meteorological conditions, and operating conditions.

The following special cases are addressed:

a) Horizontal tanks.

b) Higher volatility stocks (true vapor pressure greater than 0.1 psia).

c) Vent settings higher than 0.03 psia (0.5 oz/in^2).

The estimation may be improved by using detailed field information, including climatic data and operational data for the appropriate time period.

The equations are not intended to be used in the following applications:

a) To estimate losses from unstable or boiling stocks or from petroleum liquids or petrochemicals for which the vapor pressure is not known or cannot readily be predicted (to calculate emissions from tanks that contain material at or above their boiling point or the point at which material starts to flash, the API model E&P Tank (API Publication 4697) can be used).

b) To estimate losses from fixed-roof tanks which have an internal floating roof. API *MPMS* Ch. 19.2[4] and API TR 2569[13] address these.

c) To estimate losses from fixed-roof tanks which have either roof or shell insulation.

d) To estimate losses from cleaning fixed-roof tanks. API TR 2568[12] addresses this.

The estimation procedures were developed to provide estimates of typical losses from fixed-roof tanks that are properly maintained and in normal working condition. Losses from poorly maintained tanks may be greater. Because the loss equations are based on equipment conditions that represent a large population of tanks, a loss estimate for a group of fixed-roof tanks may be more representative than a loss estimate for an individual tank.

Evaporative loss considerations are not the only criteria for equipment selection. Many other factors not addressed in this standard, such as tank operation, maintenance, and safety, are important in designing and selecting tank equipment for a given application.

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 referenced document (including any amendments) applies.

API *Manual of Petroleum Measurement Standards* (*MPMS)* Chapter 19.4, *Recommended Practice for Speciation of Evaporative Losses*, 3rd Edition, 2012