Manual of Petroleum Measurement Standards
Chapter 20—Allocation Measurement

Section 1—Allocation Measurement

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FOREWORD

The Allocation Measurement Standard, *API Manual of Petroleum Measurement Standards,* Chapter 20.1, was developed in response to an indicated desire by federal and state regulatory agencies to reference API measurement standards. In 1986 various regulatory agencies began requiring the petroleum industry to use the *API Manual of Petroleum Measurement Standards* for allocation measurement on federal and state leased lands. The edition of the manual in place then was written specifically for custody transfer measurement, which was inappropriate for allocation measurement. Although the petroleum industry does a substantial amount of allocation measurement, the industry was being required to use a standard that did not apply.

The API Committee on Petroleum Measurement responded in the spring of 1987 by commissioning a task group to survey the industry and determine if an *allocation standard* was necessary. After determining that the need did actually exist, an API working group was commissioned in the fall of 1987 to develop the scope and the field of application for such a standard.

A second survey in the fall of 1987 was conducted to verify the types of equipment used, the typical design of measurement facilities, and the typical operating procedures used for allocation measurement. This document, Chapter 20.1 of the *API Manual of Petroleum Measurement Standards,* is the result of that industry survey and the efforts of the working group.

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Suggested revisions are invited and should be submitted to Measurement Coordination, Industry Services Department, American Petroleum Institute, 200 Massachusetts Avenue, NW, Washington, DC 20001.

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SECTION 1—ALLOCATION MEASUREMENT

1.1 Introduction

A purpose of industry standards and procedures is to ensure that all parties are treated fairly in a transaction. Another is to ensure uniformity, that is, to provide a fixed method of solving a problem or completing a task that will be repeatable by anyone with the necessary skills or experience. Allocation measurement, properly applied, can ensure fair treatment. Reference to industry standards as the underlying basis of allocation measurement assures uniformity of procedures and practices.

Although allocation measurement may not meet the requirements for custody transfer measurement in all cases, it is still possible to refer to existing custody transfer industry standards for the basis of measurement. Where this allocation standard does not specifically address a measurement related issue, it should be assumed that custody transfer standards apply.

If industry standards were not used as the basis of measurement, contracts would have to include volumes of technical details or the parties would have to refer to their individual company policies. By utilizing the industry standards, we can measure tolerances, design metering systems, determine if an orifice plate is flat enough, gauge a tank level, and so forth without having to address all the issues separately.

Allocation measurement was developed to reduce capital and operating costs without sacrificing the objective of treating all parties fairly and equally. The individual allocation meters determine what fraction of the total production or income from a system is attributable to an individual lease or well. The total production or payments are determined with custody transfer quality systems and procedures, but the associated allocation system may not fully meet industry standards for custody transfer. For example, in an allocation system it may be necessary to meter multiple lease streams rather than require separation equipment at each lease. Allocation metering systems may assume constant flowing temperatures to eliminate the need for temperature recording systems. Other compromises may be made, but they must be applied uniformly throughout the system.

In some fields the streams are very similar in temperature, pressure, flow rate and composition, but most have wide variability in one or more of these areas. For example, to be sure that a lease with lean gas is treated fairly with respect to another lease in the allocation system with rich gas, periodic testing to help better define both the quality and quantity of the stream must be established with either portable or stationary sampling, calibration, separation, and/or proving systems. The net effect of such measures is to greatly reduce capital expenses and operating expenses while still defining a representative quantity and quality for the stream.

The quality and quantity determinations in an allocation system must represent the individual lease contributions.

Allocation measurement provides a sound basis for distributing production or income and is a common practice, contractually agreed to by many different companies and interests. It may allow leases and fields with marginal economics to exist, since requiring custody transfer quality systems and measurements would require more expense than could be supported.

The purpose of this standard is to set appropriate guidelines for implementing allocation measurement.

1.2 Scope

This document provides design and operating guidelines for liquid and gas allocation measurement systems. Included are recommendations for metering, static measurement, sampling, proving, calibrating, and calculating procedures.

1.3 Terms

1.3.1 DEFINITIONS

a. *Allocation measurement* is measurement using metering systems for individual producing leases or wells and specific procedures to determine the percentage of hydrocarbon and associated fluids or energy contents to attribute to a lease, well, or working interest owner, when compared to the total production from the entire affected reservoir, production system or gathering system.

b. *Beta ratio* is the ratio of the orifice bore to the internal diameter of the meter tube.

c. *Commingle* means to combine the hydrocarbon streams from two or more wells or production facilities into a common tank or pipeline.

d. *Full well stream* is the total amount of produced fluids from a hydrocarbon producing well.

e. *Indicated volume* is the difference between opening and closing meter readings.

f. *K Factor* relates the output signal or registration of a meter to a unit of quantity (mass, volume, energy).

g. *Multiphase* is the term used to describe the fluid from a well that is composed of any combination of hydrocarbon gases, hydrocarbon liquids, or produced water.

h. *Oil-continuous emulsion* is an oil and water mixture in which the oil is the major component and the water is in suspension.

i. *Pipeline condensate* is the liquid formed in a pipeline by a phase change from gas to liquid resulting from a change in temperature and/or pressure. Pipeline condensate is occasionally referred to as retrograde condensate in some segments of the industry.

j. *Raw composite volume* is the uncorrected, indicated, multiphase volume determined by a full well stream metering system.

k. *Recoverable liquid hydrocarbon content (GPM)* is the amount of theoretical or actual liquid component products recoverable from a stream.

l. *Residual atmospheric liquid* is the fluid remaining in a stock tank after weathering at atmospheric pressure and ambient temperature.

m. *Shrinkage factor* is the ratio of a liquid volume at stock tank or some defined intermediate conditions to that liquid volume at metering conditions.

n. *Stabilized liquid* is hydrocarbon liquid which has reached equilibrium.

o. *Stock tank* is an atmospheric tank used to store hydrocarbon liquids.

p. *Stock tank conditions* are atmospheric pressure and 60 °F.

q. *Theoretical production* is the volume of crude oil corrected to stock tank conditions.

r. *Three-phase* is the term used to describe the fluid from a well composed of hydrocarbon liquid, gas, and produced water.

s. *Uncorrected totalized volume* is that volume registered on a totalizer to which no adjustments for temperature and pressure have been applied.

t. *Water-continuous emulsion* is a water and oil mixture in which the water is the major component and the oil is in suspension.

u. *Water cut* is the volume percentage of water in a combined hydrocarbon and water stream.