

ALLOCATION MEASUREMENT – API CHAPTER 20.1

Class No. 7010.1

Mark Davis
Staff Measurement Engineer
Shell Exploration & Production
200 North Dairy Ashford
Houston, TX 77079

History and Overview:

The current and still in force API Chapter 20.1 Standard was last revised in 1993. This document was a very specific document on upstream allocation measurement procedures. That document will be superseded by the development of a suite of Standards and Recommended Practices being developed by the API Committee on Production Measurement and Allocation (CPMA). CPMA is a recently formed Sub-Committee under Committee on Production Measurement (COPM) with CPMA currently expanding the Chapter 20 into to a host of Sections, each with individual Working Groups writing either Recommended Practices or Standards in the Upstream Measurement and Allocation area. Once the newly revised Chapter 20 is balloted and approved by API, the existing Chapter 20.1 Standard document will be incorporated into the applicable Section of the new suite of Chapter 20 Standards / Documents, followed by “sun-setting” the existing Chapter 20.1 Document.

API Chapter 20 Scopes of work by Proposed Section:

20.1 - Overview of Production Measurement and Allocation

This section designation (20.1) pre-exists with the current document (1993). Once the other subject area specific sections are completed, the intent of the working group will be to transform the existing 20.1 document into more of an introductory document where all the subsequent subject areas within the production measurement arena are touched upon in an overview fashion. Some subjects that truly apply to many or all of the specific areas may be housed in further detail within the revised 20.1 section. For example defined terms and computational procedures from measured quantities to standard quantities may be addressed in section 20.1 due to the general applicability of these particular subjects.

20.2 - Production Allocation Measurement Using Single Phase Devices

The Chapter 20.2 document addresses single-phase measurement techniques upstream of the custody transfer points where custody transfer conditions are not possible. The document discusses measurement devices used in the allocation process and located downstream of the first stage of separation on a production facility. This document addresses the common allocation measurement devices for liquid hydrocarbons, water, and gas including sampling and ancillary systems such as fuel, flare, and recirculation. This document discusses configuration and operation of measurement equipment as well as discusses the production fluid processing and associated flow conditions and their affects on the quality of the measurement results. This document provides methods for determining separator efficiencies and recommends corrective practices. This document incorporates by reference any applicable standards.

20.3 - Multiphase Flow Measurement

The 20.3 WG will address multiphase flow measurement in the production environment, upstream of the custody transfer (single-phase) measurement point. These applications include but are not limited to: measurement for reservoir management, well tests, and flow allocation from downstream reference measurements including onshore, off shore or subsea production systems. The document will provide practical standards and processes concerning multiphase flow measurement for regulatory authority, users and manufactures. The WG will refer to existing documents (worldwide) and recommended practices to supplement the guidance it provides in this subject area and in drafting this document. This document will address certain processes involved in selecting and operating multiphase measurement solutions and the requirements surrounding assessing expected performance. Due to the nature of multiphase flow, the document will not necessarily set minimum discrete performance targets. However, the principle of requiring an assessment of expected performance will be prevalent throughout the document. Specifically, the document will provide descriptions of the principles used in multiphase flow measurement and multiphase metering types/ classifications along with related terminology. In addition, processes to determine flow measurement performance and uncertainty together with meter operational minimum requirements or primary process steps will be described. Operational requirements or constraints to be addressed include expectations for flow meter acceptance and calibration criteria, flow loop and in-situ

verifications, and other guidance specific to different multiphase flow metering applications. The document will not address specific meter manufacturers' configurations, but will provide minimum general requirements for field deployed multiphase flow meters and metering systems.

20.4 - Draft Standard for Phase Behavior Application in Upstream Measurement & Allocation

This draft standard will provide a guideline on the proper application of phase behavior in upstream production measurement and allocation. While production measurement system and allocation processes could vary, there are base commonalities across the board in terms of phase behavior application. These commonalities will be the subject of this draft standard. The draft standard scope will include minimum PVT data set requirements, fluid sample planning, PVT studies specific to production allocation, PVT data uncertainty, PVT model development, PVT model validation and PVT model maintenance. The draft standard will be published for a period of two years in order for industry to gain experience with the standard and collect data on the subject.

20.5 - Well Rate Determination

This document addresses the use of production facilities and associated measurement systems in order to determine the production rates (commonly called well test results) of oil and gas wells. Well Test information will be used to determine production quantities. This document will discuss the various reasons for performing periodic well tests and the various production operational scenarios associated with well testing. This document will specifically address the well test operation resulting in the observed production rate of oil, gas, and water. Subsequently, the well testing results are used for the determination of theoretical production quantities in production measurement and allocation systems. This document will address well testing relative to typical production operations and various scenarios such as high pressure and temperature formations for onshore, offshore and subsea applications as well as full well stream and separation, low volume/high watercut and heavy oil. This document discusses the application of the results of metering, sampling and calculations in order to determine an observed production rate and the resulting theoretical production quantity. It does not specifically address metering, sampling, PVT calculation, or other procedures as fully described in other MPMS (20.2, 20.3, 20.4) chapters. Alternative methods of rate determination such as predictive flow models will not be discussed in detail in this chapter. This document incorporates by reference any applicable API MPMS standards.

20.6 - Recommended Practice for Allocation of Commingled Production Quantities

This document will address the issues and give consideration for the allocation of commingled production quantities as it relates to the process of attributing the final (end-of-process, normally custody transfer) measured quantities of oil, gas, and produced water, back to the individual production sources and/or production wells. The range of operations will include production, upstream area gathering systems, and certain pipeline operations where phase change is inherent to the operation. Primarily the RP will describe industry accepted allocation algorithms that recognize the various methodologies currently in use in major theaters of operation. The document will describe the integration of uncertainty terms in the allocation formulation (uncertainty based allocation) and address measurement system and commingling scenarios where uncertainty based allocation is appropriate. Standard volume, mass, energy, and component-mass based allocation systems will all be described. Single-tiered, multi-tiered, mixed systems, and nodal allocation structures as well as cases for allocation by difference will be addressed in this document. Ancillary production processes such as gas lift, fuel and flare consumption, pigging, water injection, and other allocation impacting operations will also be addressed on a general approach basis. The quality assurance of data capture and archiving will be addressed as well as the effect of measurement uncertainty on the allocation results.

Current Status Chapter 20 by Section: (Note this work is dynamic and during the presentation I will update the audience of the progress as of that timing at ISHM.

API Chapter 20.1 (New) Chairman - Roy Meyer (Exxon)

As this Section will contain an introduction, definitions, and a glossary of terms for all the other Sections, it will be last Section to be completed in the Suite of Chapter 20 Sections.

API Chapter 20.2 Chairman – Chad Simonton (Innovative Technical Solutions)

Section's Scope and funding has been approved (\$45 K) by API. The liquid measurement portion has been completed and the overall draft standard is slated to be completed and balloted by October 31, 2011.

API Chapter 20.3 Chairman – Frank Ting (Chevron)

The draft standard will be balloted to API in March 2011.

API Chapter 20.4 Chairman – Patrick Malone (Shell)

Some Sections of the existing draft standard are being revised by a Ad Hoc Drafting Group with the timeline for balloting still being dynamic.

API Chapter 20.5 Chairman – Mark Davis (Shell)

Section's Scope and funding has been approved (\$50 K) by API. A draft outline has been completed and the Working Group is preparing to hire a Content Specialist. The projected timeline and goal is to have an API "ballotable" standard by Spring 2012.

API Chapter 20.6 Chairman – Michael Donsbach (Shell)

Draft Group currently in Revision No. 4 of a draft Recommended Practice with projected timeline to review with entire Working Group in 2nd quarter and go to Ballot with API prior to end of 3rd quarter 2011.

Committee on Petroleum Measurement



