Hydrocarbon management

HM 96

Guidelines for the allocation of fluid streams in oil and gas production

2nd edition

energy institute

HM 96

GUIDELINES FOR THE ALLOCATION OF FLUID STREAMS IN OIL AND GAS PRODUCTION

2nd edition

September 2019

Published by
Energy Institute, London
The Energy Institute is a professional membership body incorporated by Royal Charter 2003
Registered charity number 1097899

The Energy Institute (EI) is the chartered professional membership body for the energy industry, supporting over 20 000 individuals working in or studying energy and 250 energy companies worldwide. The EI provides learning and networking opportunities to support professional development, as well as professional recognition and technical and scientific knowledge resources on energy in all its forms and applications.

The EI's purpose is to develop and disseminate knowledge, skills and good practice towards a safe, secure and sustainable energy system. In fulfilling this mission, the EI addresses the depth and breadth of the energy sector, from fuels and fuels distribution to health and safety, sustainability and the environment. It also informs policy by providing a platform for debate and scientifically-sound information on energy issues.

The EI is licensed by:
– the Engineering Council to award Chartered, Incorporated and Engineering Technician status, and
– the Society for the Environment to award Chartered Environmentalist status.

It also offers its own Chartered Energy Engineer, Chartered Petroleum Engineer, and Chartered Energy Manager titles.

A registered charity, the EI serves society with independence, professionalism and a wealth of expertise in all energy matters.

This publication has been produced as a result of work carried out within the Technical Team of the EI, funded by the EI's Technical Partners. The EI's Technical Work Programme provides industry with cost-effective, value-adding knowledge on key current and future issues affecting those operating in the energy sector, both in the UK and internationally.

For further information, please visit **http://www.energyinst.org**

The EI gratefully acknowledges the financial contributions towards the scientific and technical programme from the following companies

BP Exploration Operating Co Ltd
BP Oil UK Ltd
Centrica
Chevron North Sea Ltd
Chevron Products Company
Chrysaor
CLH
ConocoPhillips Ltd
DCC Energy
EDF Energy
ENI
E. ON UK
Equinor
ExxonMobil International Ltd
Innogy
Kuwait Petroleum International Ltd
Nexen CNOOC
Ørsted
Perenco
Phillips 66
Qatar Petroleum
Repsol Sinopec
RWE npower
Saudi Aramco
Scottish Power
SGS
Shell UK Oil Products Limited
Shell U.K. Exploration and Production Ltd
SSE
TAQA Bratani
Total E&P UK Limited
Total UK Limited
Tullow Oil
Uniper
Valero
Vattenfall
Vitol Energy
Woodside
World Fuel Services

However, it should be noted that the above organisations have not all been directly involved in the development of this publication, nor do they necessarily endorse its content.

ISBN 978 1 78725 100 7

Published by the Energy Institute

Hard copy and electronic access to EI and IP publications is available via our website, **https://publishing.energyinst.org**.
Documents can be purchased online as downloadable pdfs or on an annual subscription for single users and companies.
For more information, contact the EI Publications Team.
e: **pubs@energyinst.org**

CONTENTS

Page

Contents continued

Contents continued

LIST OF FIGURES AND TABLES

Page

Figures

Tables

List of figures and tables continued

Page

FOREWORD

Oil and gas production operations frequently involve well fluids from a variety of sources being carried and processed in a shared pipeline or facility. This means that the individual streams become commingled. At the point where the commingled streams are eventually separated into oil, gas, gas liquids and water, a procedure must be used to divide the quantities between the owners (users) who provided the original fluids. This procedure is referred to as allocation.

Allocation is a key theme for the Energy Institute's (EI) Upstream Hydrocarbon Management Committee (HMC-1), which has overseen the development of this publication, with the aim of providing industry with a common approach to the design and application of allocation systems.

This publication has been compiled for guidance only and whilst reasonable care has been taken to ensure the accuracy and relevance of its contents, the EI, its sponsoring companies, and the contributors to this document cannot accept any responsibility for any action taken, or not taken, on the basis of this information. The EI shall not be liable to any person for any loss or damage which may arise from the use of any of the information contained in any of its publications.

This publication will be reviewed periodically, and it would be of considerable assistance for any future revision if users would send comments or suggestions for improvements to:

The Technical Department
Energy Institute
61 New Cavendish Street
London
W1G 7AR
e: **technical@energyinst.org**

ACKNOWLEDGEMENTS

The EI wishes to record its appreciation of the work carried out by the following individuals:

Martin Basil	SOLV Limited
Alan Elphinstone	Accord ESL
Alick MacGillivray	
Sandy Marshall	CNOOC Limited
Denis Pinto	Premier Oil
Bruce Nicholls	HM Advisor to the EI (editorial)
Kishan Kansara	EI (editorial)

The EI also wishes to recognise the contribution made by the members of the HMC-1 Working Group, who have assisted with steering the project and for providing valuable expertise, as well as those who have provided comments on the Draft document which was issued during an industry consultation period.

1 INTRODUCTION

1.1 GENERAL

Allocation is a term used to describe the system by which the ownership of oil, gas and produced water is determined and tracked from the point of production to a point of sale or discharge. It is important commercially, as owners are paid for the products they are allocated. The allocation system, therefore, has a direct impact on revenue and often involves interaction between several business areas, which may be defined in contracts, operating agreements or by the regulatory authority.

Allocation is also known as hydrocarbon accounting, hydrocarbon value realisation, product measurement and allocation, and production management and reporting.

Allocated quantities will include oil and gas sales streams, fuel gas, gas liquids, vent and flare, and sometimes quantities recycled within the production process. An allocation system may also be applied to the product streams from secondary processing, such as those from onshore terminals.

Although the principles of allocation are straightforward, the detail is often complex. The aim of any allocation development process is to identify the requirements, and to select the most appropriate solutions, taking into account financial, commercial, operational and technical constraints. These vary widely and therefore each system is unique.

However, a set of accepted methods and techniques can be used to develop a system. These are described in the following sections.

1.2 SCOPE

These guidelines describe the processes involved in the development of an allocation system.

The necessary inputs and outputs are defined, and guidance is provided in selecting the calculation method to be used.

Design concepts are presented together with principal factors which need to be considered when designing an allocation system. The management functions which need to be put in place are also described.

These guidelines can be applied to any oil and gas production network.

1.3 DOCUMENT STRUCTURE

These guidelines are in sections, briefly described as follows:

Section 2 – Allocation overview

This section defines allocation, explains why it is needed, and provides a basic summary of the development process. The use of cost-benefit analysis is also discussed.

Section 3 – Development of an allocation system

This section presents a step-by-step procedure for developing an allocation system.

Section 4 – Functions of an allocation system

This section describes the key functions of the allocation system and the aspects that should be considered when developing or evaluating a system.

Section 5 – Allocation methods

This section describes the various methods used in allocation systems, including their features, advantages and disadvantages.

Section 6 – Use of phase behaviour/simulation models

Simulation models and their uses in allocation are described in detail in this section.

Section 7 – Uncertainty of allocation calculations

This section discusses the effects of uncertainty on allocation and describes uncertainty-based allocation.

Note: The term 'allocation system' is commonly used to refer to the computer hardware and software used to perform allocation calculations and store data. These guidelines refer to such hardware/software as an allocation computer system.