Protocol for the estimation of VOC emissions from petroleum refineries and gasoline marketing operations

2nd edition

PROTOCOL FOR THE ESTIMATION OF VOC EMISSIONS FROM PETROLEUM REFINERIES AND GASOLINE MARKETING OPERATIONS

January 2010

2nd edition

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 leading chartered professional membership body supporting individuals and organisations across the energy industry. With a combined membership of over 13 500 individuals and 300 companies in 100 countries, it provides an independent focal point for the energy community and a powerful voice to engage business and industry, government, academia and the public internationally.

As a Royal Charter organisation, the EI offers professional recognition and sustains personal career development through the accreditation and delivery of training courses, conferences and publications and networking opportunities. It also runs a highly valued technical work programme, comprising original independent research and investigations, and the provision of IP technical publications to provide the international industry with information and guidance on key current and future issues.

The EI promotes the safe, environmentally responsible and efficient supply and use of energy in all its forms and applications. In fulfilling this purpose the EI addresses the depth and breadth of energy and the energy system, from upstream and downstream hydrocarbons and other primary fuels and renewables, to power generation, transmission and distribution to sustainable development, demand side management and energy efficiency. Offering learning and networking opportunities to support career development, the EI provides a home to all those working in energy, and a scientific and technical reservoir of knowledge for industry.

This publication has been produced as a result of work carried out within the Technical Team of the Energy Institute (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

BG Group
BP Exploration Operating Co Ltd
BP Oil UK Ltd
Centrica
Chevron
ConocoPhillips Ltd
EDF Energy
ENI
E. ON UK
ExxonMobil International Ltd
Kuwait Petroleum International Ltd
Maersk Oil North Sea UK Limited
Murco Petroleum Ltd
Nexen
Saudi Aramco
Shell UK Oil Products Limited
Shell U.K. Exploration and Production Ltd
Statoil Hydro
Talisman Energy (UK) Ltd
Total E&P UK plc
Total UK Limited

ISBN 978 0 85293 549 1

Published by the Energy Institute

Further copies can be obtained from Portland Customer Services, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK. Tel: +44 (0) 1206 796 351 e: **sales@portland-services.com**

Electronic access to EI and IP publications is available via our website, **www.energyinstpubs.org.uk**.
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

Contents Cont... **Page**

FOREWORD

This document updates the Protocol first produced in 2000. It contains some new and updated emission factors; a change log is presented in the Annexes.

The Protocol provides methods for the estimation of annual emissions of non-methane volatile organic compounds (NMVOCs) from potential sources in refineries and gasoline marketing facilities. The aims are to aid industry compliance with existing legislative reporting requirements and to allow consistency in emission estimation methodologies.

The emission factors in this Protocol are consistent with those provided in the 2009 revision of the EMEP/EEA *Air Pollutant Emission Inventory Guidebook* [1] (formerly called CORINAIR) for refinery sources.

Several of the potential sources produce very low VOC emission levels. The average value of NMVOC emissions for eight UK oil refineries in the 2004 EPER database is 3,7 kte/year. For reporting purposes, therefore, sources emitting <10 te/year can be deemed to be deminimus and do not need to be included in the total site NMVOC estimate.

The Protocol is intended for the estimation of annual emissions and the methodologies provided are not generally appropriate for the estimation of emissions over shorter time periods.

Refineries

The Protocol is intended to be used to satisfy both the requirements of the Refinery Integrated Pollution Control authorisations and mandatory reporting requirements e.g. for the European Pollutant Release and Transfer Register (E-PRTR).

The first edition of the Protocol was a development of the methodology used by UKPIA members to report refinery VOC emissions for inclusion in the UK national emissions inventory. As previously, the methodologies presented in this edition are intended to provide reasonable estimates of annual emissions without resorting to overly lengthy and/or complicated calculation methods.

The vast majority of VOC emissions arise from diffuse sources such as leaks from pressurised equipment components, storage of volatile products, etc. As these sources are not channelled (i.e. not connected to a stack) it is not practical to undertake continuous measurement of VOC emissions of them.

The potential sources listed are those which were originally agreed during discussions between the DETR, UKPIA, UKOOA (now Oil & Gas UK), IP (now Energy Institute) and OCIMF in developing the demarcation of emissions between the up and downstream oil industries.

The emission sources listed are those commonly found in UK refineries. In those cases where specific refinery operations (such as delayed coking) are not covered by this Protocol, the operator should develop suitable factors based upon measurement campaigns.

Sites should review their processes to establish if there are any other potential sources of NMVOC emissions which are not listed in this Protocol.

This Protocol can be used in conjunction with the EI *Protocol for the determination of the speciation of hydrocarbon emissions from oil refineries* [2] to provide speciated annual NMVOC mass emission estimates.

Gasoline marketing operations

Neither gasoline distribution terminals nor service stations are regulated under the IPPC Directive and hence do not need to provide E-PRTR emission reports. Emission estimates, however, may be made by oil companies for their own environmental reporting purposes. This Protocol is intended to provide consistency in the estimating methodologies used to generate those reports.

Although it is believed this Protocol will assist the user in estimating non-methane VOC emissions, the Energy Institute cannot accept responsibility, of whatsoever kind, for any damage arising or otherwise occurring as a result of the application of this Protocol.