A risk-based approach to hazardous area classification

energy institute

A RISK-BASED APPROACH TO HAZARDOUS AREA CLASSIFICATION

Second edition

October 2016

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

The Energy Institute (EI) is the chartered professional membership body for the energy industry, supporting over 23 000 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;
– the Science Council to award Chartered Scientist 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
CLH
ConocoPhillips Ltd
DCC Energy
DONG Energy
EDF Energy
ENGIE
ENI
E. ON UK
ExxonMobil International Ltd
Kuwait Petroleum International Ltd
Maersk Oil North Sea UK Limited
Nexen
Phillips 66
Qatar Petroleum
RWE npower
Saudi Aramco
Scottish Power
SGS
Shell UK Oil Products Limited
Shell U.K. Exploration and Production Ltd
SSE
Statkraft
Statoil
Talisman Sinopec Energy (UK) Ltd
Tesoro
Total E&P UK Limited
Total UK Limited
Tullow Oil
Valero
Vattenfall
Vitol
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 0 85293 906 2

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

Contents continued **Page**

LIST OF FIGURES

FIGURES

LIST OF TABLES

TABLES

FOREWORD

The objective of this report was to develop a means for establishing the outer boundaries of Zone 2 hazardous areas taking account of the risks associated with contributory factors.

This second edition of *A Risk Based Approach to Hazardous Area Classification* report was updated by the Energy Institute's Area Classification Working Group who are also responsible for updating the area classification guidance – *Model Code of Safe Practice part 15: Area classification for installations handling flammable fluids* (EI 15). The content of this report is used in the fourth edition of EI 15 and as a source of reference for the application of the risk-based approach.

Following publication of the first edition of the *Risk Based Approach to Hazardous Area Classification*, the Energy Institute commissioned Quantra Limited to analyse the HSE Hydrocarbon Release Database[8] data to determine more accurately a release hole size frequency data set, thus Table 6 has been modified. The report *Analysis of the HSE Hydrocarbon Release Database for use with EI 15* is appended to this publication in Annex D. The frequency calculations shown in (Annex A of) the first edition are therefore superseded and have been deleted.

Calculations outlined within the Energy Institute's Research Report – *Dispersion modelling and calculations in support of EI Model code of safe practice part 15: Area classification for installations handling flammable fluids, second edition,* supersede the previous Annex D Calculations for Hazardous Areas of the first edition, and therefore this content has been deleted and replaced by the Quantra report[8], as stated in paragraph four.

Although it is believed that adoption of the procedure in this report for determining the boundaries of hazardous areas will provide an adequate level of safe operation, the Energy Institute cannot accept responsibility of whatsoever kind, for damage or alleged damage arising or otherwise occurring in or about premises, installations, areas or vehicles to which the contents of this report have been applied.

KEY TECHNICAL CHANGES

The following technical changes have been made to this edition:

– Includes the Quantra Ltd. report – *Analysis of the HSE Hydrocarbon Release Database for use with EI 15.*

– Release hole sizes for the risk-based approach have been revised based on the values provided by the Quantra Ltd. analysis and technical judgement of the Area Classification Working Group (see Annexes D and E and Table 6).

– Reference to the EI Research Report *Ignition probability review, model development and look up correlations* [7] as an alternative approach for determining P_{ign}.

– Dispersion modelling calculations are now carried out by reference to EI Research Report – *Dispersion modelling and calculations in support of EI Model code of safe practice Part 15: Area classification code for installations handling flammable fluid* [9], that replaces first edition Annex D.

ACKNOWLEDGEMENTS

This report has been updated by Mr Kieran Glynn of BP International on behalf of the Energy Institute (EI) Area Classification Working Group, convened to review and update the area classification guidance – *Model Code of Safe Practice Part 15: Area Classification for installations handling flammable fluids*.

The EI would like to thank Kieran Glynn and Stephen Hall (Quantra Ltd.) for their contributions to this second edition of the *A Risk based approach to hazardous area classification*.