Guidance on United Kingdom continental shelf (UKCS) subsea pipeline decommissioning including comparative assessment (CA) and interim pipeline regime (IPR)





GUIDANCE ON UNITED KINGDOM CONTINENTAL SHELF (UKCS) SUBSEA PIPELINE DECOMMISSIONING INCLUDING COMPARATIVE ASSESSMENT (CA) AND INTERIM PIPELINE REGIME (IPR)

First edition

October 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 El'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 El 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 El 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
Repsol Sinopec
Centrica
Chevron North Sea Ltd
Chevron Products Company

Agatar Petroleum
Repsol Sinopec
RWE npower
Saudi Aramco
Scottish Power

Chrysaor SGS

CLH Shell UK Oil Products Limited

ConocoPhillips Ltd Shell U.K. Exploration and Production Ltd

DCC Energy SSE

TAQA Bratani **EDF Energy** Total E&P UK Limited ENI E. ON UK Total UK Limited Equinor Tullow Oil ExxonMobil International Ltd Uniper Valero Innogy Kuwait Petroleum International Ltd Vattenfall Vitol Energy Nexen CNOOC Ørsted Woodside

Perenco World Fuel Services

Phillips 66

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.

Copyright © 2019 by the Energy Institute, London.

The Energy Institute is a professional membership body incorporated by Royal Charter 2003.

Registered charity number 1097899, England

All rights reserved

No part of this book may be reproduced by any means, or transmitted or translated into a machine language without the written permission of the publisher.

ISBN 978 1 78725 120 5

Published by the Energy Institute

The information contained in this publication is provided for general information purposes only. Whilst the Energy Institute and the contributors have applied reasonable care in developing this publication, no representations or warranties, express or implied, are made by the Energy Institute or any of the contributors concerning the applicability, suitability, accuracy or completeness of the information contained herein and the Energy Institute and the contributors accept no responsibility whatsoever for the use of this information. Neither the Energy Institute nor any of the contributors shall be liable in any way for any liability, loss, cost or damage incurred as a result of the receipt or use of the information contained herein.

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 1 1.2 1.3 2 2 1 2.2 2.3 2.3.1 General legislative and regulatory framework for subsea pipeline 2.3.2 2.3.3 2.3.4 Legislative and regulatory framework for subsea pipeline decommissioning 20 3 3.2 3.2.2 3.3 3.4 3.5 3.6 3.6.1 3.6.2 3.7 Maximising economic recovery from the United Kingdom Continental 3.8.1 3.8.2 4 4.2 4.3 4.3.1 4.3.2 4.3.3 Interim pipeline regime (IPR)......41 5 Considerations regarding decommissioning45 5.1 5.2

Contents continued Page 5.2.1 5.2.2 5.2.3 5.3 5 3 1 5.3.2 5.3.3 5.3.4 Rockdump on seabed......48 5.3.5 5.4 Removal 5.4.1 5.4.2 5.4.3 5.4.4 5.4.5 5.4.6 Removal by towing using inherent buoyancy 50 5.4.7 5.4.8 5.5 5.6 5.7 5.7.1 5.7.2 Operating company's exposed pipeline crosses buried 3rd party 5.7.3 Operating company's exposed pipeline crosses exposed 3rd party 5.7.4 3rd party pipeline crosses operating company's buried pipeline 54 3rd party pipeline crosses operating company's pipeline on seabed 5.7.5 5.8 5.9 Annexes Annex A Δ 1 A.2 A.3 A.4 Annex B Annex C C.1 C.2 Decommissioning programme (DP)......67 C.3 Annex D D.1 D.2

Contents continued

Page D.2.1 D.2.2 D.2.3 D.3 Pipeline still connected but flushed......80 D.3.1 D.3.2 D.3.3 D.4 D.5 D.6 D.7 D.8 Annex E E.2 Installation methods......94 E.2.1 E.2.2 Reel-lay.....94 F.2.3 E.2.4 Flexible pipe and umbilicals......95 E.3 E.3.1 F.3.2 E.3.3 F.3.4 F.3.5 E.3.6 E.3.7 E.3.8 F.3.9 E.3.10 E.3.11 E.3.12 F.3.13 E.4 F.4.1 F.4.2 F.4.3 E.4.4 E.4.5 F.4.6 E.4.7 E.5 Service. E.5.1 F.5.2 E.5.3 E.5.4 F.5.5 E.5.6 E.5.7

Contents continued

	Pag
E.5.8	Water (wash)
E.5.9	Hydrate control using mono-ethylene glycol (MEG),
	tri-ethylene glycol (TEG) and methanol (MeOH) 104
E.5.10	Chemicals
E.5.11	Umbilical

LIST OF FIGURES AND TABLES

Page Figures Figure 1 Figure 2 Figure 3 Figure 4 Figure 5 Schematics of PLUG Screening tool questions 2–7......40 Figure 6 Figure 7 Figure 8 Figure 9 Figure 10 **Tables** Table 1 Outcome of risk assessment for a flushed and positively isolated pipeline Table 2 Generic risk assessment for pipeline under IPR......83 Table 3 Table 4

FOREWORD

Guidance on United Kingdom continental shelf (UKCS) subsea pipeline decommissioning including comparative assessment (CA) and interim pipeline regime (IPR) was commissioned by the Pipeline Users Group's (PLUG's) Good Operational Practice Forum (GOPF). It should enable operating companies to develop and justify a decommissioning programme (DP) for their subsea pipelines on a case-by-case basis.

This technical publication is focused on UKCS requirements, and as such it refers to UK legislation and regulatory expectations. In developing the technical publication, PLUG engaged key UKCS stakeholders Department for Business, Energy and Industrial Strategy (BEIS), Oil and Gas Authority (OGA) and the Health and Safety Executive (HSE) to ensure the guidance provided aligns to their expectations. This publication does not represent, replicate or replace regulatory guidance (from BEIS, HSE, OGA, etc), which takes precedence. Rather, the aim is to provide enhanced guidance in support of the regulatory guidance as deemed appropriate by PLUG. Each operating company should interpret national or local legislative and regulatory frameworks in the context of their intended applications. It is acknowledged that this technical publication is UKCS-centric and future revisions may include additions to make it more relevant internationally.

It covers a broad range of subsea pipeline decommissioning issues, including:

- description of subsea pipeline systems and processes to inform stakeholders (background);
- the legislative and regulatory environment for subsea pipeline system decommissioning;
- decommissioning programme (DP), building on BEIS, HSE and OGA guidance;
- decommissioning options, including description of the PLUG Screening tool;
- CA approaches;
- risk assessment for IPR, and
- features of subsea infrastructure, including installation methods.

The intended users of this technical publication are:

- operating company personnel, such as pipeline engineers and technical authorities, and
- stakeholders in decommissioning outcomes.

The information contained in this publication is provided as guidance only. Whilst every reasonable care has been taken to ensure the accuracy of its contents, neither the Energy Institute (EI), nor PLUG, nor the representatives listed in the Acknowledgements, can accept any responsibility for any actions taken, or not taken, on the basis of this information. The EI shall not be liable to any person for any loss or damage that may arise from the use of the information contained in any of its publications. The intent is to review and where necessary update this technical publication periodically. Comments or suggestions for improvement (e.g. relevant project experience) should be sent to:

Technical Department, Energy Institute, 61 New Cavendish Street, London, W1G 7AR, UK.

e: technical@energyinst.org

El will engage PLUG regarding comments received.

ACKNOWLEDGEMENTS

Guidance on United Kingdom continental shelf (UKCS) subsea pipeline decommissioning including comparative assessment (CA) and interim pipeline regime (IPR) was commissioned by the Pipeline Users Group (PLUG) and authored under the direction of a Working Group by Dr Jerry Baker of Baker Marine Technology Ltd, facilitator of PLUG's Good Operational Practice Forum (GOPF).

Members of either one or both Working Groups during the project comprised:

Imandeep BualApacheHans BoersmaBBL Company

Phil Goby BP
Frances Chalmers Centrica
Alan Zakielarz Chevron
Colman Bairead Chevron ETC

Dr John Lawson (RIP) Chevron ETC (chair DWG)

John MacDonald Chevron ETC
Liam Williams ConocoPhillips

Bill Elrick HSE
Aaron Hasnip HSE
Hywel Williams HSE

Alastair Cassels Maersk Oil (chair IWG)

Daniel Mercado Maersk Oil Glyn Pritchard Premier Oil

Steven Alexander Scottish Fishermen's Federation

Richard Holt Shell

Prof. Ana Ivanovic University of Aberdeen Prof. Richard Nielson University of Aberdeen

PLUG acknowledges their direction and technical contributions to the project. The listing refers to representatives' last affiliation whilst participating. PLUG also acknowledges the following who, in addition to Working Group members, provided significant comments during the stakeholder technical review that facilitated consensus building:

Mark Bayman BEIS

Peter Hayes Marine Scotland Science

Kate Black Shell UK
Jostein Kvale Shell UK
Gary McGee Shell UK
Fraser Whyte Shell UK

Further, PLUG acknowledges Chris Blake (formerly Chevron ETC) who programmed the PLUG *Subsea pipeline decommissioning screening tool* (a.k.a. PLUG *Screening tool*).

In developing this technical publication, PLUG engaged Department for Business, Energy and Industrial Strategy (BEIS), the Oil and Gas Authority (OGA) and the Health and Safety Executive (HSE) to ensure the guidance provided aligns to their expectations.

Development of this technical publication was funded by the PLUG GOPF. In addition to those operating companies identified above, the following companies are GOPF members: Centrica, Dana Petroleum, Marathon, Ørsted, PX Group, Repsol Sinopec, Wood (CATS) and Woodside Energy.

The National Archives (NA) is acknowledged for use of public sector information licensed under Open Government Licence v3.0.

1 INTRODUCTION, SCOPE AND APPLICATION

1.1 INTRODUCTION

Working groups of the Pipeline Users Group (PLUG) have been pursuing two related initiatives on the broad topic of decommissioning of subsea systems. The Decommissioning Working Group (DWG) has developed the PLUG Subsea pipeline decommissioning screening tool (a.k.a. PLUG Screening tool) to enable users to carry out an initial comparative assessment (CA). The Interim Pipeline Regime (IPR) Inspection Working Group (IWG) has investigated the inspection requirements for pipelines that have been placed in IPR; their findings are reflected in 4.3.3 and Annex E. Both initiatives draw on the extensive knowledge and experience of PLUG members to provide guidance to operating companies and stakeholders that satisfies:

- The requirements of the Department for Business, Energy and Industrial Strategy (BEIS) set out in BEIS Oil and gas: Decommissioning of offshore installations and pipelines.
- Oil and Gas Authority (OGA) processes for maximising the economic recovery from the UKCS (MER UK) (see OGA *Decommissioning*), and for Pipeline Works Authorisation (PWA) and legal consent (see OGA *Licensing and consents*).

This technical publication was commissioned by the GOPF and covers a broader range of subsea pipeline decommissioning issues, (see 1.2).

1.2 SCOPE

The scope of this technical publication includes:

- description of subsea pipeline systems and processes to inform stakeholders (background);
- the legislative and regulatory environment for subsea pipeline system decommissioning;
- decommissioning programme (DP), building on BEIS, HSE and OGA guidance;
- decommissioning options, including description of the PLUG Screening tool;
- CA approaches;
- risk assessment for IPR, and
- features of subsea infrastructure, including installation methods.

The scope excludes:

- decommissioning of onshore pipelines (including landfalls of subsea pipelines);
- decommissioning costs (beyond discussion of their contribution to CA);
- specific proprietary decommissioning tools or technologies;
- the various activities likely to be required to prepare a pipeline for new service, where an alternative use for a pipeline has been identified, and
- a user guide to the PLUG Screening tool (as this is provided alongside the PLUG Screening tool).