Guidance on applying inherent safety in design: Reducing process safety hazards whilst optimising CAPEX and OPEX

2nd edition

energy institute

GUIDANCE ON APPLYING INHERENT SAFETY IN DESIGN: REDUCING PROCESS SAFETY HAZARDS WHILST OPTIMISING CAPEX AND OPEX

2nd edition

August 2014

Published by
ENERGY INSTITUTE, LONDON
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Registered charity number 1097899

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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.

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

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Tullow
Valero
Vattenfall
Vitol
World Fuel Services

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ISBN 978 0 85293 689 4

Published by the Energy Institute

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FOREWORD

The greatest opportunities to reduce risks from process facilities with potential for harm to people and/or the environment occur during the design. The principles of inherent safety in design (ISD) are well established but are often not systematically applied.

This publication is aimed at project leaders and provides encouragement and guidance on the practical application of ISD during the early stages of design in order to gain maximum benefits in terms of reducing both hazards and life cycle costs.

This publication addresses the lack of tools to identify potential ISD improvements, particularly during the early conceptual design stage where potential benefits are greatest. Setting ISD goals for the project during this stage and carrying out an ISD workshop should make a significant contribution towards safer facilities in the future. In time and as technology progresses, serious process safety incidents should be eliminated at the 'drawing board', rather than relying on 'add-on' safety systems that can and do fail, revealing weaknesses in the basic process design.

Traditional process safety approaches have often required 'add-on' risk safety systems that are costly to install and maintain. By comparison, ISD provides the opportunity to eliminate hazards or reduce their severity or likelihood by better design, with the potential of reducing overall capital expenditure (CAPEX) and operating expenditure (OPEX). ISD should promote a culture of challenging the need for designs that rely on 'add-on' safety systems, by confirming why they are needed, and how the need could be avoided by improving the basic process design.

The first edition of this publication (*Guidance for safer design of offshore installations: An overview*) was also sponsored by the GB Health & Safety Executive (HSE) and UK Offshore Operators Association (UKOOA), and aimed to reduce the occurrences of adverse findings in design safety cases for the UK offshore oil and gas sector. The scope of this second edition is broadened to large and small organisations in the global energy industry, including offshore production platforms, and onshore facilities such as petroleum refineries, bulk fuel storage installations, and power generation stations.

The EI welcomes feedback on its publications. Feedback or suggested revisions should be submitted to:

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ACKNOWLEDGEMENTS

This is dedicated to the memory of Trevor Kletz (1922 – 2013). His contribution to improved awareness of process safety is legendary throughout the world, most famously for introducing IS principles to the process industry during the 1970s with his motto 'What you don't have, can't leak'.

Graeme Ellis (ABB Consulting) updated this publication under the technical direction of the EI Process Safety Committee which comprised during the project:

Martin Ball	Bossiney Consulting Group
David Bleakley	ConocoPhillips
John Brazendale	Health and Safety Executive
John Briggs	Kuwait Petroleum International
Ian Buckland	Health and Safety Executive
Gus Carroll	Centrica
Jonathan Carter	Marsh Ltd
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Peter Davidson	UK Petroleum Industry Association Ltd
Dr David Firth	Chilworth Technology Ltd./DEKRA
Peter Gedge (Chairperson)	BP Exploration Operating Company Limited
John Henderson	Chicago Bridge and Iron/Lummus (representing British Chemical Engineering Contractors' Association (BCECA))
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Toby St Leger	ConocoPhillips

The Institute wishes to record its appreciation of the work carried out by the author and also its gratitude for the valuable contributions made by Process Safety Committee members during the course of the project. In addition, the EI acknowledges the following who provided significant comments during the stakeholder technical review (in particular, those members of the Oil and Gas UK Major Hazards Forum and the BCECA Design Safety and Environment Committee):

Lee Allford	European Process Safety Centre
Andy Bolsover	DNV GL
Adrian Bunn	KBR
Paul Davison	Amec
David Edwards	Granherne Limited
Dave Fargie	BP Exploration Operating Company Limited
Richard Gowland	European Process Safety Centre
David Mansfield	ESR Technology
Dr John Morgan	DNV GL
Dr Andy Rushton	ESR Technology
Jayadevan Vellani	Safetec
Howard Williams	Essar Oil UK

Dr Mark Scanlon managed the project and technically edited the publication.