

RESEARCH REPORT

HUMAN FACTORS PERFORMANCE INDICATORS FOR
THE ENERGY AND RELATED PROCESS INDUSTRIES

1st edition

December 2010

Published by
ENERGY INSTITUTE, LONDON
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Registered charity number 1097899

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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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ISBN 978 0 85293 587 3

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CONTENTS

	Page
Foreword	v
Acknowledgements	vi
1 Introduction	1
1.1 Background to the research	1
1.2 The research programme	1
1.3 This report	2
1.3.1 Structure and readership	2
1.3.2 Scope	2
2 Human factors and major accident hazards	4
2.1 HSE human factors framework	4
2.2 The HSE human factors key topics	5
Part I - Technical background	
3 Current practices in process safety performance measurement	7
3.1 What are indicators?	7
3.1.1 Key performance indicators (KPIs)	7
3.1.2 Process safety performance indicators (PSPIs)	8
3.2 Technical review: findings from literature assessment	9
3.2.1 Indicators for safety	9
3.2.2 Attributes of safety PIs	9
3.2.3 Process safety performance indicators (PSPIs)	10
3.2.4 Indicators for human factors	10
3.2.5 Reporting system - structure and communication	11
3.2.6 Leading and lagging indicators	12
3.3 Findings from industry consultation	12
Part II - Establishing indicators for human factors performance	
4 An approach to developing performance indicators for human factors	14
4.1 Introduction	14
4.2 Which HSE human factors key topic should be monitored and what indicators are appropriate?	17
4.2.1 Key topics	17
4.2.2 Critical elements and PIs	17
4.3 How should indicators be collected and managed?	19
4.3.1 Reporting level, structure and frequency	19
4.3.2 Organisational maturity	19
4.3.3 Unintended consequences	20
5 Performance indicators (PIs) for HSE human factors key topics	21
5.1 Introduction	21
5.2 How to use the information in this section	21
5.2.1 Managing human failures	24

5.2.2	Procedures	26
5.2.3	Training and competence	27
5.2.4	Staffing (staffing levels and workload, supervision, contractors)	29
5.2.5	Organisational change	31
5.2.6	Safety critical communications (including permits and shift handover)	33
5.2.7	Human factors in design (control rooms; human/computer interfaces (HCI); alarm management; lighting, thermal comfort, noise and vibration)	35
5.2.8	Fatigue and shiftwork	39
5.2.9	Organisational culture (leadership, behavioural safety, learning organisations)	40
5.2.10	Maintenance, inspection and testing (maintenance error, intelligent customers)	43
Annexes		
Annex A	References.	46
Annex B	Abbreviations	50
Annex C	Human factors performance indicator (PI) template and completed example	52
C.1	Human factors performance indicator (PI) template	52
C.2	Human performance indicators (PIs) template: completed example.	53
Annex D	Technical review	56
D.1	Literature assessment	56
D.1.1	Indicators for process safety in the process industries	56
D.1.2	Indicators for process safety in the nuclear and related sectors	57
D.2	Key texts: process safety indicators.	60
D.2.1	Developing process safety indicators (HSE, 2006a).	60
D.2.2	Guidance on developing safety performance indicators related to chemical accident prevention, preparedness and response (OECD, 2008).	63
D.2.3	Process safety leading and lagging metrics: you don't improve what you don't measure (CCPS,2008)	64
D.2.4	Process safety performance indicators for the refining and petrochemical industries (API, 2010).	65
D.3	Critical success factors for implementation	67
Annex E	The human factors key topics	69
E.1	Managing human failures.	69
E.2	Procedures	69
E.3	Training and competence	69
E.4	Staffing	69
E.5	Organisational change	70
E.6	Safety critical communications	70
E.7	Human factors in design (human factors engineering)	70
E.8	Fatigue and shiftwork.	70
E.9	Organisational culture	70
E.10	Maintenance, inspection and testing	71
Annex F	Cultural maturity.	72

FOREWORD

The measurement of safety performance using retrospective (lagging) indicators such as incident and accident rates is a long-standing requirement in most developed economies. Similarly, the use of leading indicators to monitor the precursors to individual accidents (so-called 'slips, trips and falls') is usual in many industries, particularly where behavioural safety systems have been implemented. The adoption and use of leading and lagging indicators (performance indicators (PIs)) to monitor and manage major accident hazards safety performance is, however, still a developing area. In general, the literature that does exist in this area covers technical aspects of process safety, but not human factors.

This research report is intended for senior management and specialists charged with designing and implementing indicators for major accident hazards safety, or responsible for operating such systems. The report provides an introduction to the HSE human factors key topics, and proposes ways in which these might be measured. It also sets out a process for identifying relevant PIs. The research report incorporates findings related to current thinking on safety PIs, in particular for human factors, how organisations currently monitor human factors in practice, and what processes are used to ensure appropriate indicators are selected.

The research on which this report is based involved:

- An assessment of the literature regarding PIs.
- Discussions held with representatives of organisations active in the development of process safety performance measurement systems.
- A workshop with energy industry and related process industries' representatives to determine what use is made of human factors indicators currently within onshore and offshore energy and related process industry sectors, and to develop proposals for indicators for the HSE human factors key topics.
- Finally preparation of guidance in consultation with users.

This is an emerging area, and so it should be noted that rather than representing mature guidance, this is a research report that contains proposals for potential indicators, and a process for their selection. Further information is available from the EI website **www.energyinst.org/hofpi**.

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ACKNOWLEDGEMENTS

This work was developed by Lloyd's Register and Lloyd's Register/Human Engineering, under the technical direction of the EI, Lloyd's Register EMEA, and the UK Health and Safety Executive (HSE) joint-project team. During the project, the joint project-team consisted of:

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The joint-project team wishes to acknowledge the following individuals who supported the delivery of the research presented in this report:

Martin Anderson	HSE
Wayne Barratt	Rhodia
Mike Beanland	ABB Engineering Services
Fiona Brindley	HSE
Kenny Crighton	Nexen Petroleum UK Limited
Dr Paul Davies	Lloyd's Register EMEA
Mike Finucane	Maersk Oil North Sea UK Limited
Peter Jefferies	ConocoPhillips
Stuart King	EI
Terry Laker	HSE
King Lee	Lloyd's Register EMEA
Marc McBride	Centrica
Graham Reeves	BP
Helen Rycraft	Magnox North Sites
Dr Graham Stewart	Lloyd's Register EMEA
Dr John Symonds	ExxonMobil International
Chris Venn	Chevron
Mike Wood	SABIC

The project team is also pleased to acknowledge the support of Lloyd's Register EMEA and the UK HSE Offshore Division in sponsoring this work.

Technical editing was carried out by Stuart King (EI).

1 INTRODUCTION

1.1 BACKGROUND TO THE RESEARCH

Lord Kelvin observed that "when you can measure what you are speaking about, and express it in numbers, you know something about it".

The measurement of safety performance using retrospective (lagging) indicators such as incident and accident rates is a long-standing requirement in most developed economies. Similarly, the use of leading indicators to monitor the precursors to individual accidents (so-called 'slips, trips and falls') is usual in many industries, particularly where behavioural safety systems have been implemented. The adoption and use of leading and lagging indicators to monitor and manage major accident hazards safety performance is, however, still a developing area.

Recent major accidents at Texas City in the USA, and at Buncefield in the UK, have brought into focus the need for industry to monitor the safety of major hazards operations in a different, more consistent and more proactive way, to allow improvements to be identified and implemented before major accidents occur. This area is one in which active development is underway and one to which this research report is intended to contribute.

As part of the growing attention paid to measurement of process safety, recognition of the significance of the human contribution to process safety has also been growing. The UK Health and Safety Executive (HSE) has condensed its experience of shortcomings in the human aspects of management of major accident hazards (MAHs) into a set of human factors key topics¹. These key topics cover the breadth of human involvement, from culture to staffing levels and from incident investigation to organisational change. Whilst the key topics are generally easy to understand, there are few established indicators available to help an organisation judge whether it is managing them well, and there is consequently a need for industry guidance in this area. The main objective of this research report is to propose specific leading and lagging indicators for the key topics, along with a structured process for their appropriate selection.

1.2 THE RESEARCH PROGRAMME

This research report was prepared by Lloyd's Register EMEA (LR) over the period of March to September 2010, under the guidance of a steering team comprising representatives from the Energy Institute (EI), HSE and LR.

The EI took the lead role in coordinating industry input, with its Human and Organisational Factors Committee providing the vehicle for industry consultation. HSE's Offshore Division and LR provided specialist technical input to the project, which was delivered by LR consulting personnel. The EI was responsible for final publication of the report.

The research programme involved:

1. Information gathering: the available literature was assessed, and discussions held with representatives of organisations active in the development of process safety performance measurement systems.
2. A workshop: a performance indicators workshop was held with representatives of onshore and offshore high hazard industry, from the energy and related process industries to:

¹ See section 2.2

- determine what use is made of human factors indicators currently within these sectors, and
 - develop proposals for indicators for the HSE human factors key topics introduced in 1.1.
3. Preparation of guidance and consultation with users: the outputs of the literature assessment and workshop were developed and a draft report prepared. Industry users were consulted over the period mid-August to mid-September 2010, and additional input consolidated in this final research report.

As indicated in 1.1, the main objective of the research reported here was to propose specific leading and lagging indicators for the key topics, along with a structured process for their appropriate selection. In support of this, an important secondary aim was to access current practices in industry, which are not necessarily reported in the literature, and the delivery of the performance indicators workshop was central to meeting this objective.

The volume of material related to performance indicators (PIs) is significant, and it was not feasible to complete an in-depth literature review. Therefore only the most relevant literature was identified, and this is introduced in Section 3 and in Annex D.

1.3 THIS REPORT

1.3.1 Structure and readership

The intended readership of this research report is senior management and specialists charged with designing and implementing indicators for major accident hazards (MAH) safety, or responsible for operating such systems.

The research report is divided into Part I, which (in conjunction with Annex D) provides the technical background to the area, and Part II which contains the proposed approach to developing PIs, and associated supporting information.

In parallel with the work reported here, the EI has also prepared a human factors briefing note on PIs (EI, 2011a) and the reader is referred to this for an overview of the topic area.

1.3.2 Scope

This research report is concerned with human and organisational factors, as they are defined by the HSE human factors key topics. In general, the literature that exists provides detailed coverage of technical matters, but does not include human factors in any depth. Further, whilst the indicators proposed in the literature might provide broad coverage of the various technical challenges to process safety, the process for selecting an appropriate set of indicators is not always well defined.

This research report is intended to propose possible indicators specifically for the HSE human factors key topics and - as importantly - a process for selecting relevant indicators.

Part I of the research report incorporates findings related to:

- current thinking on safety PIs, and in particular indicators for human factors;
- how organisations monitor human factors in practice, and
- what processes are used to ensure that appropriate indicators are selected.

Part II of the research report:

- provides an introduction to the HSE human factors key topics;
- proposes ways in which these might be measured, and
- sets out a process for identifying relevant indicators.

Part II also contains more general guidance for successful indicator implementation, including consideration of the reporting structure and cultural aspects.

This is an emerging area, and so it should be noted that rather than representing mature guidance, this is a research report only.