

Contents

Preface.....	VIII
Acknowledgements.....	VIII
Abbreviations / Acronyms used in this Guide.....	IX
1. Introduction.....	1
1.1 Purpose	2
1.2 Scope.....	2
2. Incident at UK refinery	3
2.1 Process and process equipment.....	3
2.2 Description of dead-leg failure.....	3
2.3 Inspection regime	4
3. Dead-leg management guidance.....	5
3.1 Comparison of Dead-leg definitions.....	5
3.2 Dead-leg categories.....	8
3.3 Dead-leg degradation	8
3.4 Typical dead-leg degradation mechanisms	10
3.5 Main pipe and attached dead-leg degradation mechanisms.....	10
4. Some early views from forum discussions.....	11
5. Dead-leg questionnaire	12
6. Dead-leg management issues based on questionnaire answers and further discussions	14
6.1 Issues associated with the management process	14
6.1.1 Important aspects to consider	14
6.2 Issues associated with guidance and recommended practice	15
6.2.1 Important aspects to consider	15
6.3 Agreed definition for dead-leg	15
6.3.1 Instrument and small-bore lines	15
6.3.2 Definitions.....	16
6.3.3 Geometric qualifications.....	16
6.3.4 Orientation considerations.....	18
6.3.5 Permanent dead-legs.....	18
6.3.6 Operational dead-legs – flow and time qualifications	19
6.3.7 Determining dead-leg count.....	19
6.3.8 Important aspects to consider	20

6.4	Identify and record potential dead-legs.....	21
6.4.1	Important aspects to consider.....	21
6.5	Initial and refined risk ranking.....	22
6.5.1	Important aspects to consider.....	22
6.6	Barrier and mitigation plan.....	23
6.6.1	Important aspects to consider.....	23
6.7	Implement barrier and mitigation plan.....	24
6.7.1	Corrosion mechanisms.....	24
6.7.2	Inspection techniques	25
6.7.3	Inspection coverage/amount of inspection.....	25
6.7.4	Time between inspections.....	26
6.7.5	NDT qualifications	26
6.7.6	Important aspects to consider	27
6.8	Monitor, review effectiveness of plan and risk ranking	27
6.8.1	Important aspects to consider	28
7.	Meaningful inspection	29
7.1	Typical arrangements.....	29
7.2	Notes and further considerations.....	31
7.3	Inspection techniques	31
7.4	Examples of modified inspection plans	31
8.	Risk ranking and Risk Based Inspection	34
Appendix A HSE Safety Alert CEMHD2-2019		36
Appendix B Published Guidance for Dead-legs.....		40
Appendix C Published documents and articles concerning Dead-legs		41
Appendix D Dead-leg questionnaire		43
Appendix E Examples of dead-leg definitions in use in member companies		47
References (see also Appendix C)		48
EEMUA can offer you a lot more than publications.....		50
EEMUA Publication: Feedback form.....		51
EEMUA Publication Catalogue		52

List of Figures

Figure 2-1 Photo showing the displaced section of line	3
Figure 3-1 Typical piping configurations for dead-leg consideration.....	7
Figure 5-1 Dead-leg management process used to devise members' questionnaire	13
Figure 6-1 Horizontal extension dead-leg flow depiction	17
Figure 7-1 Downward vertical dead-leg.....	29
Figure 7-2 Upward vertical dead-leg.....	30
Figure 7-3 Horizontal dead-leg.....	30
Figure 7-4 Changes to inspection plan for downward dead-leg.....	32
Figure 7-5 Changes to inspection plan for upward dead-leg.....	33
Figure 8-1 Risk based inspection and implementation.....	35

List of Tables

Table 3-1 Comparison of Dead-leg descriptions.....	5
Table 3-2 Features of Dead-legs that can promote degradation	9