GUIDELINES FOR THE CONDUCT OF OIL, GAS & PETROCHEMICAL RISK ENGINEERING SURVEYS

OG&P GRES 2018/001

INSIGHT CONSENSUS INFLUENCE

ACKNOWLEDGEMENTS:

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DISCLAIMER:

Nothing in this document, which is entirely voluntary, shall relieve any party of any legal obligations existing in the absence of this document and nothing contained in this document shall take precedence over any provisions of any policy issued by a party who has chosen to adopt these Guidelines.

In the event that the risk engineering service provider is unable to follow one or more of the particulars set out in this document, they should negotiate an acceptable alternative with the (Re)Insurer(s).

DOCUMENT REVISION HISTORY:

Version	Version Notes	Date of Revision
2015/001	Initial Publication	15/06/2015
2018/001	General Update including reference to findings in "An Analysis of Common Causes of Major Losses in the Onshore Oil, Gas & Petrochemical Industries – Implications for Insurance Risk Engineering Reviews"	19/12/2018

FOREWORD

The primary purpose of insurance risk engineering is to allow (Re)Insurers to understand exposures and loss control features such that the (Re)Insurer can make an informed decision about the transfer of risk. (Re)Insurers would therefore consider themselves the primary (but not the only) customer. In addition, risk improvement is an important aspect of insurance risk engineering which is for the mutual benefit of (Re)Insurers and (Re)Insureds.

The risk engineering survey process and the subsequent market reports have remained essentially the same over a number of years and a review was undertaken in 2015 to refocus and modernise the approach in line with industry process safety developments and insurance loss experience.

It is (Re)Insurers' belief that surveys should be planned and conducted in line with the following principles:

- A focus on process safety and loss prevention.
- An awareness of the common causes of losses in the industry.
- The importance of evidence-based risk engineering opinion.
- The effectiveness of implementation and compliance with site and best practice standards and procedures.
- Reporting of critical measures of process safety and loss prevention performance such as Process Safety Performance Indicators (PSPIs)

To that end, three inter-related documents were developed to provide guidance on the development of survey programmes, conduct of surveys and key information to be included within market reports:

- Code of Practice for Delivery of an Oil, Gas & Petrochemical Risk Engineering Survey Programme (OG&P COPRES)
- Guidelines for the Conduct of Oil, Gas & Petrochemical Risk Engineering Surveys (OG&P GRES)
- Key Information Guidelines for Oil, Gas & Petrochemical Risk Engineering Survey Reports (OG&P IGRES)

During 2016, an analysis was conducted of common causes of major losses in the onshore oil, gas and petrochemical industries with a view that this would underpin the survey process and subsequent market reports. "An Analysis of Common Causes of Major Losses in the Onshore Oil, Gas & Petrochemical Industries - Implications for Insurance Risk Engineering Surveys" was published in September 2016 with the intention to provide short updates as considered necessary. The 2018 review and update of the three risk engineering documents is intended to incorporate findings from the loss analysis study.

It is recommended that these guidance documents be adopted as far as practicable for the benefit of all involved parties.

Not only will the above approach provide the information requested by (Re)Insurers, it should also result in a more effective process for the (Re)Insured and will provide important process safety improvement opportunities.

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SECTION A: INTRODUCTION TO THIS DOCUMENT

1. Purpose

1.1. The purpose of this document is provide guidance to risk engineers in the planning, preparation and execution of oil, gas and petrochemical risk engineering surveys. The aim is to ensure that surveys are conducted in such a way that the **key** information required by (Re)Insurers is obtained during the survey.

2. Scope

2.1. This document is intended to apply to a standard single site survey. It is recognised that other survey formats may be carried out such as property only coverage, recommendation update visits, focussed surveys or Group level process safety management assessments. For non-standard surveys this document can be adapted as necessary.

2.2. This document has been developed for onshore oil, gas & petrochemical assets.

2.3. This document has been developed by the Lloyd's Market Association (LMA) and hence is principally for reports produced for the London market, although this guidance could be adopted in other global markets.

2.4. LMA OG&P IGRES 2018/001 'KEY INFORMATION GUIDELINES FOR OIL, GAS & PETROCHEMICAL RISK ENGINEERING SURVEY REPORTS' provides full details of the key information required by (Re)Insurers. It is important that this is used in conjunction with this document when preparing and carrying out the survey.

3. General Principles

3.1. The following points are intended as general principles applicable to conducting risk engineering surveys. Planning and conduct of the survey should aim to obtain the information as detailed in LMA OG&P IGRES 2018/001.

Focus on process safety, loss prevention and the causes of major losses

3.2. The focus of risk engineering surveys should be on process safety aspects with a view to assessing the adequacy of loss control elements. Whilst loss *mitigation* elements remain important (particularly when considering potential loss quantum), it is failures of loss *prevention* elements which lead to incidents and ultimately insurance claims and therefore there should be an increased focus on the latter.

3.3. "An Analysis of Common Causes of Major Losses in the Onshore Oil, Gas & Petrochemical Industries - Implications for Insurance Risk Engineering Surveys" analysed 100 major losses over a 20 year period considering causal factors. It identified common Management System Failures (MSFs) as well as trends associated with the plant operating mode and remote isolation capability. Reference should be made to this paper for further detail but the key focus areas are reproduced here for easy reference:

- Mechanical Integrity
- Operations Practices & Procedures
- Process Hazard Analysis

- Control of Work
- Availability of Safety Critical Devices
- Management of Change
- Remotely Operated Emergency Isolation Valves

Evidence-based opinion

3.4. The risk engineer's opinion of the quality of individual risk control elements is a critical measurement for (Re)Insurers. Opinion should be based on a review of relevant documentation, records and data and observations in the field. Opinion should be benchmarked against recognised good industry practice based on experience of other risks worldwide, with supporting evidence to justify the opinion to the (Re)Insured and (Re)Insurers.

Implementation and compliance

3.5. A description of the features of each risk control element, for example the risk control procedure, is normally provided during surveys. However, commentary and evidence to support the *actual* implementation of an apparently sound system is often missing. Failures in implementation and non-compliance with established systems of work and procedures are a significant contributor to major losses and therefore this is an important aspect to address during the survey.

Performance data

3.6. Wherever possible, relevant performance data in the form of Process Safety Performance Indicators (PSPIs) and other Key Performance Indicators (KPIs) should be obtained as evidence to support opinion and effective implementation (as above). Where possible, it is also important to consider any trends and any exceptions to ensure the data is meaningful to the risk engineer. A list of PSPIs is provided in LMA OG&P IGRES 2018/001.

Audit and third party technical review

3.7. The limitations of the survey process are recognised in terms of the time available to carry out any depth of review. A key question, therefore, is what level of process safety auditing is being undertaken internally and externally to the site, both from within the company (e.g. group process safety audit) and externally by third parties. Details of any process safety auditing or third party technical review and in particular the key findings are of interest to (Re)Insurers.

3.8. Should there be significant findings during a survey, then recommendations should be made to improve process safety auditing and/or conduct a third party technical review.

SECTION B: PREPARING FOR AND CONDUCTING THE SURVEY

4. The (Re)Insured

Survey preparation

4.1. The purpose and format of the survey should be explained to the (Re)Insured in advance of the survey such that the site can prepare in an appropriate manner. Surveys are not audits and should not require excessive preparatory work on the part of the (Re)Insured. In order to aid the (Re)Insured, it is recommended that copies of this document and LMA OG&P IGRES 2018/001 are provided to the (Re)Insured in advance.

4.2. Rather than a series of formal presentations, surveys should be conducted through open question and answer sessions with knowledgeable personnel who can provide access to supporting documentation where necessary. Time limitations prevent any kind of rigorous process safety audit approach but rather the survey team will sample specific loss control activities based upon personal and industry loss experience.

Site Survey Coordinator

4.3. The (Re)Insured should nominate a Site Survey Coordinator whose role is to ensure that the pre-survey preparation is completed, that the agenda runs smoothly and that any information requested prior to and during the survey is provided. The Site Survey Coordinator should be from a process safety, operations or technical background rather than a finance or insurance function.

Corporate Process Safety Representation

4.4. It is important to encourage the involvement of the (Re)Insured corporate process safety department where this exists. It is often the case that they are able to communicate important findings to senior management in the organisation, or are aware of corporate procedures, practices, initiatives and programmes that the individual sites may not be aware of.

5. Pre-Survey Preparation

Number in Survey Team

5.1. The number of engineers on the survey team is important. If the survey team is too large it is impossible to focus in any great detail in any specific areas. It also encourages Boardroom style surveys with formal presentations rather than a small team of engineers, getting out on the plant to observe practices and conditions and verifying performance and compliance through review of documentation. A survey team of maximum 4 risk engineers is usually the most effective and it is recommended that numbers be actively managed to achieve this.

Factual Update of Previous Report

5.2. Whilst it is intended that the focus of the survey is on performance assessment, it is recognised that the survey team leader is still required to update the market report to ensure it remains factually accurate. It is recommended that a copy of the latest market report (if this exists) be issued to the (Re)Insured in advance of the survey

with a request that it is reviewed and marked up with any changes since the last survey. The reviewed and marked up copy should be made available by the (Re)Insured to the survey team ideally in advance of the survey but, if not, at the kick-off meeting.

Agenda

5.3. A proposed agenda should be sent to the (Re)Insured and (Re)Insurer engineers participating on the survey for review well in advance of the survey. The finalised survey agenda should typically be developed and agreed by the survey participants not less than 30 days prior to the agreed survey date.

5.4. A suggested template for a typical Standard Site three day survey is provided within Appendix 1 but this may be tailored to the specific situation.

5.5. The relative time spent in each area is intended to be representative of the perceived importance to (Re)Insurers including consideration of the causes of major losses highlighted in section 3.3 of this document. Consideration should be given to the inherent process hazards when developing the agenda. For example, process piping inspection is critical for refineries but may be less so when considering some petrochemical processes with more limited internal damage mechanisms where perhaps an increased focus on operating practices and procedures may be warranted.

5.6. To aid the preparation of the (Re)Insured, it is suggested that relevant documentation required for review should be indicated for each of the sessions within the agenda.

5.7. Guidance notes for a Focussed Site Survey and a Group Level (or Corporate) Process Safety Management Assessment are also provided in Appendix 2 and Appendix 3 respectively.

Information Request List

5.8. Along with the agenda, an information request list should be sent to the (Re)Insured well in advance of the survey. A suggested information request list is provided within Appendix 4 to this document which has been based upon LMA OG&P IGRES 2018/001. This list may need to be tailored to the specific survey.

5.9. Ideally this information should be provided to the survey team in advance of the survey but as a minimum should be made available at the kick-off meeting. Receipt of such information after the survey is of limited value as the opportunity to discuss is lost.

6. Conducting the Survey

Use of Presentations

6.1. Excessive use of PowerPoint (or similar) presentations should be avoided as these inhibit the free flow of what should be question and answer sessions and review of supporting documentation. Whilst they can be a good information tool, presentations are often a statement of how things should be done but not necessarily representative of how things are *actually* done. PowerPoint (or similar) presentations are often prepared by the (Re)Insured out of a misunderstanding of

the purpose of the survey and the needs of the survey team. Reducing PowerPoint (or similar) presentations would also reduce the burden upon the (Re)Insured.

6.2. Generally, formal presentations should be limited to the survey kick-off meeting and perhaps a brief opening introduction to each departmental meeting.

Access to Documentation

6.3. It is important that the (Re)Insured make available knowledgeable personnel able to conduct an open question and answer session on the relevant agenda topic. Ready access to supporting documentation during the sessions is an important aspect and to facilitate this it is normally preferable to hold the sessions within the departmental offices rather than a central meeting room. On occasions, documentation may be available electronically through the site intranet in which case a central meeting room may be appropriate.

6.4. In addition to the documentation requested in advance of the survey (Appendix 4), access to further documentation items are likely to be requested during the survey. It is recommended that this information be made available to the survey team, preferably electronically, in a dedicated 'data room'. Whilst generation of large amounts of hard copy documentation is not advocated, provision of a hard copy 'data room' could also prove useful for review by the survey team during the course of the survey.

Kick-Off, Daily Review & Wrap-Up Meetings

6.5. The kick-off meeting should comprise managers from each of the departments on the agenda as well as from senior management. This is to ensure that the site fully understands the purpose of the survey and that all managers are able to meet the expectations of the survey team.

6.6. It is recommended that a brief daily review meeting be conducted at the end of each day between the survey team and the site survey coordinator (as a minimum). This is to review any emerging issues, requests for information and/or comments on the agenda, particularly in relation to any potential recommendations.

6.7. The wrap-up meeting should consist of the same management personnel as the kick-off meeting. This is to ensure that each manager fully understands the observations of the survey team and the background to any risk improvement recommendations. The wrap-up meeting is an important opportunity for discussion and to resolve any misunderstandings.

Focus Areas

6.8. Although the survey should aim to obtain the information as detailed in LMA OG&P IGRES 2018/001, as mentioned earlier, specific focus should be given to the following:

- Mechanical Integrity
- Operations Practices & Procedures
- Process Hazard Analysis
- Control of Work

- Availability of Safety Critical Devices
- Management of Change
- Remotely Operated Emergency Isolation Valves

6.9. For each of the above, a general approach may be as follows:

6.9.1. Review the site and corporate programme, procedures and practices to ensure understanding of the system as intended.

6.9.2. Review relevant Process Safety Performance Indicators (PSPIs) to determine level of performance or implementation.

6.9.3. Select a number of examples either specifically from the field or more generally and review data and records to verify implementation.

6.9.4. Verify implementation of the programme, procedures and practices in the field.

6.9.5. Review findings from the latest process safety management audit.

Control Room Visits

6.10. The control room visit is a critical part of the survey as it contains much of the information required by (Re)Insurers. However, control room visits are often unsatisfactory with a number of engineers congregating in a typically restricted space wishing to ask questions whilst the panel operators are trying to safely run the plant. It is suggested that the initial discussion be moved away from the control room to an adjacent meeting room where access to certain documentation could also be provided. The subsequent visit to the control room itself could then be targeted at specific items.

Site (Field) Tours

6.11. A walking tour of the facilities (including the ability to take photographs) is a critical part of the survey but, as time is limited, certain areas should be targeted. The site tour should occur as early as possible within the survey and focus upon the high process risk areas where historically major loss incidents and insurance claims have occurred. For large risks comprising process and offsites areas, whether visits to offsite and utility areas (such as tank farms, jetties and power plants) are necessary should be agreed by the survey team.

6.12. The areas of the plant visited should be detailed in the Executive Summary of the survey report, as per the requirements in LMA OG&P IGRES 2018/001.

Recommendations

6.13. Recommendations should be developed and discussed by the survey team and presented as consensus survey team recommendations during the wrap-up meeting. Preference is to provide the recommendation title and brief outline only during the wrap-up meeting with the final wording to be developed and agreed by the survey team after the survey (and within agreed timeframes per LMA OG&P COPRES 2018/01).

APPENDIX 1 - Typical Standard Site Survey Agenda

1. The following Agenda has been produced as an example of the areas to be covered and the time to be allocated to those areas on a first survey of a site. Subsequent surveys of the same site might be more focussed on particular areas of interest. The Agenda is for a typical three day survey but this is not intended to be prescriptive of the length of a survey. The final agenda for any survey should be agreed by the survey team in discussion with the (Re)Insured.
2. For detailed content relating to each Agenda item, please see the relevant section of LMA OG&P IGRES 2018/001 indicated within the table. These are suggestions only as it is recognised that information is often gleaned throughout the survey and not necessarily dedicated to a specific session.

DAY 1			
Session	**Format**	**Duration**	**LMA OG&P IGRES 2018/001 Cross-Reference**
Kick-off Meeting/Site Overview • Review of agenda • Collection and review of pre-survey information request list • Site overview presentation	Brief presentation by site management team followed by Q&A Location: Meeting Room	1hr	Sections 5, 6, 7 & 11
Process Safety • Process safety framework • PSPIs • Process safety incidents • Process safety auditing	Q&A and review of sample documentation/data Location: Process Safety Department	1hr	Section 12
Operations & Control Room • Organisation • Shift handover • SOPs/EOPs • Training & competence assurance • Permit To Work (PTW) • Equipment isolation • Safety critical instrumentation override management • Alarm management & Safe Operating Limits (SOLs)	Q&A and review of sample documentation/data Location: Control Room Building	2hrs	Sections 10.4 & 13
Site Tour I	Walking tour of selected process units and offsites	3hrs	Sections 10.1, 10.2, 14.3.6, 17, 18.1 & 18.3
Daily Review Meeting	Review of Day 1	15mins	-

DAY 2			
Session	**Format**	**Duration**	**LMA OG&P IGRES 2018/001 Cross-Reference**
Site Tour II	Walking tour of selected process units and offsites	3hrs	Sections 10.1, 10.2, 14.3.6, 17, 18.1 & 18.3
Production Planning BI Scenarios	Q&A Location: Production Planning Department	1hr	Section 8.2, 9.2, 9.3, 9.4
Maintenance Planning & Rotating • Organisation • Basis of programmes • Planning, prioritization & performance • Reliability • Rotating programmes	Q&A and review of sample documentation/data Location: Maintenance Department	1hr	Sections 14.1, 14.2, 14.3, 14.4 & 14.5
Maintenance Electrical & Instrumentation • Testing of safety critical instrumentation • Electrical programmes	Q&A and review of sample documentation/data Location: Maintenance Department	1hr	Sections 14.6 & 14.7
Fire Fighting & Emergency Response • Active protection • Emergency response	Q&A and review of sample documentation/data Location: Emergency Response Building	1hr	Sections 18 & 19
Daily Review Meeting	Review of Day 2	15mins	-

DAY 3			
Session	**Format**	**Duration**	**LMA OG&P IGRES 2018/001 Cross-Reference**
Inspection (Mechanical Integrity) • Organisation • Basis of programmes • Equipment specific programmes • Planning & deferment management • Equipment deficiency management • Operational changes & deviations • Material verification • Records & analysis • Performance monitoring & audits	Q&A and review of sample documentation/data Location: Inspection Department	3hrs	Section 15
Technical/Engineering • Basic process control, emergency shutdown & isolation • Equipment safeguarding • Process Hazard Analysis (PHA) • Management of Change (MoC) • Safety Integrity Level (SIL) Assessment	Q&A and review of sample documentation/data Location: Engineering Department	2hrs	Sections 10.1, 10.2, 10.3 & 16
Wrap-Up Meeting preparation	Survey team preparation time Location: Data Room	1hr	-
Wrap-Up Meeting	PowerPoint (or similar) presentation by the survey team to the site management team Location: Meeting Room	1hr	Section 20

APPENDIX 2 - Focussed Site Survey Guidelines

1. As indicated in LMA OG&P COPRES 2018/001, a Focussed Site Survey could be conducted in place of (or part of) a Standard Site Survey or as part of a Recommendation Update with the intention to spend more time focussing on specific areas of concern. Focus areas to be addressed could be based on any of the following:

1.1 Weaknesses, or potential weaknesses, highlighted from previous (Standard) Site Surveys.

1.2 Where significant risk recommendations have been made to address process safety management deficiencies e.g. Inspection, Maintenance, PHAs, etc.

1.3 (Re)Insurers' and industry loss experience specific to the occupancy e.g. refinery, steam cracker, etc.

1.4 Following a loss at the facility, to verify that the barrier failures which caused the loss have been identified and appropriate risk control measures implemented.

2. A focussed approach agreed by Lead (Re)Insurers addressing the above would enable additional time to be spent on the review of documentation and verification that practices and procedures are being implemented rather than simply gaining an understanding of how the procedure is supposed to work.

APPENDIX 3 - Group/Corporate Process Safety Management Assessment Guidelines

1. As indicated in COPRES 2018/001, a Group Level Process Safety Management Assessment could be conducted in conjunction with a Standard Site Survey or Recommendation Update by providing an additional half or full day. The following topics should be considered for inclusion within the agenda:

1.1 Process safety organisation and resources

1.2 Process safety training and awareness programmes

1.3 Process safety management system and associated standards

1.4 Implementation status across the (Re)Insured locations

1.5 Process Safety Performance Indicators (PSPIs)

1.6 Learning from incidents programme

1.7 Process safety audit programme

APPENDIX 4 - Pre-Survey Information Request List

1. The following information should be provided **before** the site survey commences preferably in electronic format. All information should be legible and reproducible:

1.1. **Asset Details**

1.1.1. List of process units (including year of original commissioning and any subsequent revamps, technology licensor, current design capacity and current status, e.g. idled).

1.1.2. Overall simplified process Block Flow Diagram including onsite interdependency between process units.

1.1.3. Basic details of the steam and electrical power supply systems including current site demand versus supply balance, redundancy, reliability and a single line electrical diagram.

1.1.4. Site plot plan (separate file for legibility).

1.1.5. Management level organisation chart.

1.1.6. Breakdown of declared values by process unit and off-sites (Property Damage (PD) and Business Interruption (BI))

1.1.7. List of potential liquefied flammable products vapour cloud source terms (usually light hydrocarbon inventories in process units). List equipment with liquid hold-ups > 5 m3.

1.1.8. List of critical rotating machinery (include basic design details, approximate replacement cost, impact on production in the event of failure, spares holding and estimated time to repair/replace).

1.1.9. List of critical transformers (include basic design details, impact on production in the event of failure, spares holding and estimated time to repair/replace).

1.1.10. Site safety case or equivalent document.

1.2. **Performance Data**

1.2.1. Operations report including monthly production data for the last 12 months and indicating the number of unplanned shutdowns.

1.2.2. Process Safety report including the site's suite of PSPIs and monthly process safety incident data for the last 12 months.

1.2.3. Maintenance report including maintenance KPIs for the last 12 months.

1.2.4. Inspection report including Inspection KPIs for the last 12 months.

1.3. **Systems & Procedures**

1.3.1. Permit to Work (PTW) procedure and forms including Hot Work permit.

1.3.2. Equipment isolation procedure (both mechanical and electrical).

1.3.3. Safety critical instrumentation override procedure including override form.

1.3.4. Samples of root cause analysis studies and lessons learned from process safety incidents including recommendations made and their current status.

1.3.5. Process Hazard Analysis (PHA) procedure including recommendation status report for existing facilities and example worksheets.

1.3.6. Management of Change (MoC) procedure.

1.3.7. Pre-Startup Safety Review (PSSR) procedure.

1.3.8. Firewater pump test procedure and most recent test results.

1.3.9. Fire protection systems impairment procedure including impairment form.