KEY INFORMATION GUIDELINES FOR POWER GENERATION

RISK ENGINEERING SURVEY REPORTS

1. Purpose

The purpose of this document is to outline the **key** information requirements for power generation risk engineering survey reports ('market reports') and to provide guidance to risk engineers responsible for producing such market reports.

2. Scope

This document identifies the key items of interest to (Re)Insurers rather than providing an exhaustive and definitive list of all possible information. It is recognised that, depending on the type of survey being undertaken, it may not always be possible to obtain all the information requested.

This document does not stipulate a specific format for market reports (section titles, order etc.) Ensuring that the information (Re)Insurers find most useful is present somewhere within a market report is far more important than the report format itself.

This document is intended to outline information which would typically be available from a standard single site survey. With particular reference to business interruption, it is intended to outline information which should be available at the site level.

This document has been developed for power generation assets.

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

3. General Principles

The following points are intended as general principles applicable to market reports.

Primary customer

The primary purpose of market reports is to allow (Re)Insurers to understand the exposures and loss control features of a particular site, such that the underwriter can make an informed decision about the transfer of risk. (Re)Insurers would therefore consider themselves as the primary (but not the only) customer for market reports.

Report length

There is a growing tendency for market reports to expand. It is considered that a more succinct market report, containing the information needed by (Re)Insurers, is achievable through better report writing and greater use of bullet points, tables, charts and diagrams. Certain pitfalls should be avoided:

- Avoiding lengthy narrative and ensuring that text is relevant to risk quality assessment and the insurance cover being provided. Lengthy descriptions of the physical asset including the process should generally be avoided.
- Avoiding repetition.
- Avoiding report 'creep' by not simply adding more information to an existing market report following each survey, unless that information is considered to materially improve the report content. It is also to ensure that historical information left in a report does not become obsolete. Where reports for a particular site become lengthy

following re-surveys, it is important to highlight any changes in the Executive Summary.

- Removing generic text from the main body of the report. Examples of generic text include standardised sections which appear in every report from the same engineering provider (e.g. the description of the loss estimating methodology). Such generic text could be provided within an appendix or even as a standalone document.

Evidence based opinion

The risk engineer's opinion of the quality of individual risk control elements should only be provided along with supporting evidence. Reference should be made to the review of relevant documentation where applicable. Comments benchmarking against recognized good industry practice should also be provided where possible.

Implementation and compliance

A description of the features of a risk control element is normally provided in market reports, 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 making this is an important aspect to address within the report.

Performance data

Wherever possible, relevant performance data such as RAM (Reliability, Availability and Maintainability) data and other Key Performance Indicators (KPIs) should be provided and can be used as evidence to support opinion and effective implementation (as above) (e.g. availability %, forced outage % and scheduled outage %). Where possible, it is also important to comment upon trends and any exceptions to ensure the data is meaningful to the reader.

Information not provided

Within the constraints of the survey process, it is recognized that not all of the information outlined in this document can be provided or revalidated at every survey. If information was not available or was not assessed then this should be stated within the market report.

Electronic format

All text, attachments and embedded files (appendices, drawings, photos etc.) should be inserted such that they can be extracted and clearly read.

KEY INFORMATION REQUIREMENTS

EXECUTIVE SUMMARY

4. Executive Summary

4.1 Introduction

4.1.1 Purpose of the site visit

4.1.2 Date and duration of site survey, and scope of survey activity.

4.1.3 History of any previous survey activities.

4.1.4 Details of the key survey participants.

4.2 Overview

Ideally no more than one or two pages, this should be a précis and *not a cut and paste from the main body of the report,* covering:

4.2.1 Site location, and significant natural hazards.

4.2.2 Brief description of the plant (MW and $/MW), type of plant and machinery (including gas turbines, steam turbines, boilers, transformers and generators as well as model numbers and country of manufacture where available), total generating capacity, number of units.

4.2.3 Ownership and management.

4.2.4 Brief history, year built, main contractor(s), and commercial operation dates.

4.2.5 Brief details of any future development projects, or upgrades.

4.3 Comments and conclusions

This section should give the Engineers opinion of the risk, including:

4.3.1 Strengths and areas for improvement of the plant.

4.3.2 Highlight any engineering issues, equipment hardware anomalies which could affect the risk.

PLANT STATUS

5. Site Description
6. Plant Decription
7. Loss And Incident History

EXPOSURE ASSESSMENT

8. Exposures

8.1. Identify and comment on any unusual fire and explosion exposures.

8.2. Identify and comment upon technology risks such as novel or unproven processes and pioneering design (e.g. design capacity).

8.3. Identify the key natural peril exposures along with the associated controls, both physical (e.g. design standards, flood defences etc.) and procedural (e.g. hurricane preparedness procedures). Provide details of any natural catastrophe exposure assessments and emergency response plans in the event of a natural catastrophe (including any relevant third party and/or government and/or local authority studies, e.g. in respect of flood defences).

9. Values

9.1. Property Damage (PD)

9.1.1. The date of the last valuation and who provided it.

9.1.2. Whether the values are based on historical book values or current replacement

values.

9.1.3. Comment on whether the values appear reasonable compared with industry benchmarks.

9.1.4. The basis for the values used in the Estimated Maximum Loss (EML)/Maximum Possible Loss (MPL) calculations (e.g. if declared values or engineers' estimates have been used).

9.1.5. civil works

9.1.6. hydraulic circuit

9.2. Business Interruption (BI)

9.2.1 Develop BI payment bases with the relevant employee and record Basis If Settelment accordingly in the engineering survey.

10. Loss Estimates

The EML/MPL is based upon a catastrophic loss caused by a credible worst case event. The event is based upon historical evidence for the type of plant in question. It is assumed that active systems (firefighting systems etc.) are non-operational.

If an earthquake EML/MPL is quoted then the rationale for this compared with a normal EML/MPL should be stated.

10.1. Property Damage (PD)

10.2. Business Interruption

11. Business Interruption

LOSS PREVENTION

12. Management & Organisation

12.1. A copy of the (Re)Insured's management organigram (high level positions) is required. The following comments are important:

12.1.1. Adequacy of staffing in critical positions (including management turnover).

12.1.2. Staff training and background.

13. Operations

13.1. Organisation

13.1.1. Average experience levels (provide data and/or KPIs).

13.2. Shift Handover Procedures

13.3. Standard & Emergency Operating Procedures (SOPs & EOPs)

13.3.1. Comment on availability of SOPs and drawings for the Operations Personnel.

13.3.2. Comment upon the quality of the SOPs based on review of sample documentation.

13.3.3. Comment upon the use of signed and itemised checklists for critical operations; such as return to service following an outage.

13.3.4. Comment upon the adequacy of the routine review process for SOPs and provide data and/or KPIs on compliance with the process.

13.4. Training & Competence Assurance

13.4.1. Describe the main elements of the training and certification process for new operators.

13.4.2. Describe the main elements of the operator competence definition and assessment process.

13.4.3. Describe the main elements of the critical SOP refresher training programmes.

13.5. Permit To Work (PTW)

13.5.1. Describe the main elements of the PTW system and highlight any deficiencies versus industry best practice.

13.5.2. Provide evidence of compliance with the PTW system based on review of sample documentation (both at the permit issuing location and in the plant) and verification on the plant.

13.5.3. Comment upon housekeeping, including caps and blanks on open ends, bolting standards of pipework and junction boxes, condition of surface coatings, condition of lagging etc.

13.5.4. Describe the main elements of the PTW audit process and provide data and/or KPIs for PTW compliance.

14. Maintenance

14.1. Organisation

14.1.1. Provide a basic and brief outline of the maintenance organisation including employee numbers and sub-department numbers.

14.1.2. Comment on experience levels.

14.1.3. Describe the extent of the use of contractor workforce and the level of in- house supervision. Third-party QA.

14.1.4. Details of any Long Term Maintenance Agreements or Parts Supply Agreements, such as performance guarantees, penalties, spares pricing, guaranteed response times, and the equipment which is covered.

14.1.5. Maintenance Training.

14.2. Planning, Prioritisation & Performance

14.2.1. Maintenance Planning and use of Computerised Maintenance Management System

14.2.2. Provide details of the overall major overhaul plan (schedule, frequency etc.),

any interim planned shutdowns.

14.3. Generators

14.3.1. Specify the actual dates of the last major overhaul and the number of operating hours since the last major overhaul.

14.3.2. Scope of electrical testing; what electrical tests are carried out and how frequently, review the last set of test results and comment on them.

14.4. Transformers (including bushings and tap changers)

14.4.1. Provide details of the insulation oil analysis routines; frequency of DGA analysis, screen tests (physical and chemical properties) and which laboratory carries out the analysis.

14.4.2. It is essential that the last set of insulation oil analysis results are reviewed to ensure that the results are satisfactory, and to confirm the testing frequency.

14.4.3. Electrical testing, scope of testing (IR/PI/Tan Delta/Turns Ratio/SFRA) and frequency. The last electrical testing report should be reviewed.

14.5. Balance of Plant

14.5.1. Describe the inspection regime for storage tanks.

14.5.2. Testing of static grounding/bonding systems.

14.6. Preventive Maintenance Routines

14.6.1. Vibration monitoring; frequency, internal/external contractor, scope, review the last report.

14.6.2. Thermographic surveys; frequency, internal/external contractor, scope, review the last report.

14.7. Inspection Quality Assurance

14.7.1. What controls are in place to ensure that work of contract inspection or repair organisations meet the required standard?

14.8. Incoming material control

14.8.1. What controls are in place to ensure that incoming materials meet the required standard?

15. LOSS MITIGATION

Fire Protection & Emergency Response

15.1. Organisation

15.1.1. Provide basic details of the emergency response organisation (onsite, offsite and any mutual aid schemes).

15.1.2. Provide basic details of the training programme with data and/or KPIs on compliance with the stated training programme.

15.1.3. Provide opinion of the adequacy of the on-site and/or local fire fighting force (manning, training, equipment, etc.)

15.1.4. Quality of the emergency plans and procedures and pre-fire plans.

16. Active Protection

16.1. Fire water system

16.1.1. Is there redundancy in the fire main/hydrant system?

16.1.2. Comment on the adequacy of fire water supply (volume of storage tank, volume dedicated to fire water, pump capacity, backup diesels for electric pumps, security/reliability of power supply).

16.1.3. Comment on the design of the fire water system (automatic/manual starting, jockey pumps, etc.)

16.1.4. Comment on the adequacy of the testing of fire water system performance including piping systems and pumps – weekly and annually.

16.1.5. Comment on the general condition of the system.

16.1.6. Testing and maintenance procedures, frequency, responsibility.

16.2. Detection Systems

16.2.1. Comment on the adequacy of fire, smoke and gas detection and alarm systems.

16.2.2. The operability of these systems (check they are functional).

16.2.3. Testing and maintenance procedures, frequency, responsibility.

17. Emergency Response

17.1. Emergency Response Planning

17.1.1. Provide basic details and comment on the adequacy and quality of the emergency response plan.

17.1.2. Provide basic details and comment upon the adequacy and quality of the fire pre-plans.

RISK IMPROVEMENT RECOMMENDATIONS

1. Risk Improvement Recommendations

1.1. Recommendations should be presented in two parts. The background to the issue should be explained in some detail and include references to standards or established best practice followed by the recommendation.

1.2. Where recommendations are in multiple parts each sub-recommendation should be individually identified with a separate letter (a, b, c etc.) or number (I, ii, iii, etc.). Bulleted lists should be avoided.

1.3. A report of outstanding recommendations should be provided in the market Report.

1.4. The response of the Insured to survey recommendations is a very important risk quality indicator. A status report of outstanding previous recommendations must be provided in the market Report. This status report should be based on a written response from the Insured and there should be a comment in the market Report regarding the intent of the client to address the recommendations. This could be made during the survey or before the market Report is published.

1.5. The recommendations section should also include:

1.5.1. Implementation status verified by the surveyor. Note the status can only be established following an on-site visit or exceptionally if the client can provide compelling evidence.

1.5.2. The status flags can either be: No Plan; In Progress; No Progress; Under Review; Completed; Superseded; or Withdrawn.

1.5.3. These status flags are not sufficient without additional explanation and justification.

1.5.4. Where recommendations are being implemented in a phased manner, e.g. as a project, the recommendation should only be closed if the site has demonstrated a clear commitment to complete the work and, if necessary, there is a matching line item in future expenditure budgets.