Fire Risk Assessments for Complex Buildings – KF913
Agenda

1. Background to FRA’s
2. Why KF913?
3. What is in it?
4. The future ....
The Discipline of *Chemical Engineering* relies upon......
The Discipline of Civil Engineering relies upon......
The Discipline of Fire Engineering relies upon......

OPINION!
The Regulatory Reform (Fire Safety) Order......

“A Consultant’s Charter! ....”
The Regulatory Reform (Fire Safety) Order......
Plumber vs Fire Risk Assessor

Who is more valuable for you or your business?
Simple Risk Assessment?

“Can I assess this building?”
Simple Risk Assessment?

“Can I assess this building?”
A problem requires imagination!
Purpose

• “The purpose of this document is to give additional guidance for those undertaking fire risk assessments when faced with a set of fire precautions, management systems and fire protection systems that cannot be easily and readily verified for compliance, operability and effectiveness.”
As well as Legislation (1) ……

• To consider the requirements and needs of other stakeholders such as the Insurer, Local Authorities, organisations such as English Heritage and of those who have an interest in the business such as shareholders.

• To prompt a full and thorough consideration of the fire safety requirements of the premises in question and of its occupants as part of a wider risk management strategy.
As well as Legislation (2)……

- To widen the consideration of the impact of fire precautions to broader objectives encompassing life safety, property protection, business continuity/protection and environmental considerations.
- To review fire system design criteria prior to the specification of new fire protection systems.
- To incorporate the requirements of the Local Fire and Rescue Authority such as with their requirement to obtain specific information relating to the building with regard to the protection of both life and property (Clause 7(2) (d) of the Fire and Rescue Services Act 2004).
Complex Building?
What is a complex building?

• Large in size and / or incorporates many floors.
• Complex processes or hazards that may require special protection systems.
• Occupancy profiles - large, varied, etc.
• The fire strategy - fire safety engineered solution.
Objectives …

• RR(FS) O
• Other Life Safety Requirements
• Property and Asset Protection
• Business Continuity
• The Environment
Input information ...
Input information ...
Input information …
Input Information: Prescriptive or Performance based?
Input information …

- The fire strategy with updates
- Prior fire certificates.
- Other interested parties such as the Insurer.
- Fire protection system designs and configuration information (such as cause and effect programming).
- Drawings and layouts showing fire compartment lines and fire protection system locations.
- Minutes and Reports of corporate fire safety reviews and meetings.
- Supporting information for performance based designs such as fire and evacuation models, etc.
## Process

<table>
<thead>
<tr>
<th>Task</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-Assessment meeting to discuss objectives for the fire risk assessment(s).</td>
<td>Agreed outline scope for the assessment.</td>
</tr>
<tr>
<td>2. Documentation gathering and inspection.</td>
<td>An understanding of the key features of the existing fire precautions.</td>
</tr>
<tr>
<td>3. Gap Analysis</td>
<td>Determination of risk features that may warrant special assessment.</td>
</tr>
<tr>
<td>4. Scope and Timetable agreement.</td>
<td>An agreed schedule of site assessment with timescales.</td>
</tr>
<tr>
<td>5. On-site Assessment.</td>
<td>A record of findings with images taken as appropriate.</td>
</tr>
<tr>
<td>7. Recordings of findings including details of significant findings and observations.</td>
<td>Post-assessment meeting and a Report for issue to the Responsible Person.</td>
</tr>
<tr>
<td>9. Ensure all points on Corrective Action Plan have been actioned.</td>
<td><strong>COMPLIANCE ACHIEVED.</strong></td>
</tr>
</tbody>
</table>
Check Criteria (1)

- Fire Safety Management
- Building Characteristics
- Building Plant and engineering services
- Building Processes Occupant Characteristics
- Evacuation and means of escape
Check Criteria (2)...

- Fire Detections Systems
- Fire Warning Systems
- Fire Suppression Systems
- Fire and Smoke Control
- Fire Fighting Systems and Fire Fighter provisions
Post Assessment Tasks

• Recording of findings
• Significant Findings and Corrective Actions
• Post assessment meeting
• Post assessment actions
Summary of new ideas (1)

• Recognition of the additional expertise required for assessing complex buildings.
• Assessment considerations included for Performance based / Fire Safety Engineered buildings.
• Assessments may incorporate the opportunity to consider wider issues than that required by legislation alone.
• Assessments may consider issues such as the 7(2)(d) requirement of the Fire and Rescue Services Act to reduce duplication of effort and thus help Fire Authorities to meet their compliance requirement at less cost.
Summary of new ideas (2)

• Guidance on MIP provisions given in tabular form.
• Process flowchart and assessment questionnaire for complex buildings included.
• Full assessments to be undertaken every three years with an annual follow up.
The future …

• More third party certification?
• Improve the profile of fire risk assessors – from “trade” to “professional” status!
• Understand where the knowledge level of individuals stops!
• Better understanding of the fire strategy
KF913 - END
INTRODUCING PAS 911
Some Key Concepts

• Design Basis
• Seven Key Inputs
• Strategy Evaluation Tools
• Six Key Outputs
• The Fire Strategy
The PAS 911 flowchart....

The design basis

The fire strategy

- Fire strategy statement
- Management of fire strategy
- Evacuation strategy
- Fire and smoke control strategy
- Fire fighting strategy
- Fire protection strategy

Specification, arrangement and design

- Building layout and construction
- Internal sub-divisions and compartments
- Internal linings, fixtures and fittings
- Fire exit routes and designation of places of safety and relative safety
- Vertical escape arrangements
- Smoke reservoir and containment systems
- Fire/smoke doors and shutters
- Fire/smoke dampers
- Smoke control, pressurization and ventilation systems
- Fire detection systems
- Fire warning and alerting systems
- Fire suppression systems
- Fire inerting systems
- First aid fire fighting systems
- Fire service intervention facilities
- Emergency lighting systems
- Fire signage

Policies and procedures for:

- Managing fire safety
- Responsibilities and authorities
- Liaising with external parties
- Maintaining compliance
- Fire risk assessments
- Maintenance of fire systems
- Audits of active and passive fire systems
- Controlling works (e.g. hot works)
- Smoking
- Procuring materials
- Linings, fixtures and fittings
- Training
- Fire drills
- Monitoring of fire system performance

NOTE The above lists are not exhaustive and each item may not be relevant to every specific case.
Management and System Audit

- In-house standards, policies, existing strategies, etc.
- Fire safety management output.
- System audit ... how is the fire protection working ... effective?
- The system health check..... A third party fire system validation ... to see if you have got what you think you have?
Input 2
Mandatory Framework

• Relevant Legislation … the RR(FS)O
• Building Control Requirements
• Insurers
• Special Interest Groups
Input 3
Objectives Setting

FIRE STRATEGY OBJECTIVES MATRIX

LIFE
- OCCUPANTS
- VISITORS
- CONTRACTORS
- FIRE FIGHTERS

ENVIRONMENT
- INTERNAL
- EXTERNAL
- LOCALITY
- LONG TERM

BUSINESS
- CONFIDENCE
- MISSON
- LONG TERM OPERATIONS

PROPERTY
- BUILDING
- FABRIC
- FIXED ASSETS
- MOVABLE ASSETS

short term operations
Input 4
Risk and Hazard Assessment

- Basis of the RR(FS)O
- PAS 79 - Fire Risk Assessments
- Risk profiling
- Hazard assessment
- Use of Fire Modelling
- FRA’s for complex buildings .... KF913
Input 4
Risk and Hazard Assessment

Increase in risk profile

Level of risk

Cost

Risk profile 1
Risk profile 2
Risk profile 3
Input 4
Risk and Hazard Assessment

![Hazard Assessment Diagram]

- **Blue Zone**: Controlled environment with the hazard predominantly in the internal processes.
- **Green Zone**: Minimal hazard in both environment or process.
- **Red Zone**: Both environment and process incorporate hazards. Recommend review of alternative location for process or other techniques prior to the implementation of precautions.
- **Magenta Zone**: Process is controlled but inherent hazards within the room or area environment.

Fire strategies -
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Input 4
Risk and Hazard Assessment

Example Building and Hazard Assessment:
1 = Canteen
2 = Manufacturing area
3 = Office 212
4 = Boardroom
5 = Office 311
6 = Archive Room
7 = Store Room
Input 5

Building Characteristics

- Location
- Construction
- Fire Compartmentation
- Means of Escape
- Linings
- Processes
- Services
- Fire-fighting provisions
Input 5
Building Characteristics

10m Visibility (All Doors Open)
Input 6
Occupancy Characteristics

- Occupant profiles
- Visitors
- Contractors
- Mobility Impaired Persons (MIPs)
- Evacuation Analysis (incl. pre-movement time)
- Evacuation Modelling
Input 6
Occupancy Characteristics
Input 7
Practical Issues

• Understanding the constraints…
  – Technical
  – Logistical
  – Commercial / Economic

• Overprotection
A = Initial fire precautions providing high benefit for relatively small outlay
B = Additional fire precautions and measures adding to the effectiveness of the overall fire strategy
C = The optimum level of precautions, procedures and systems providing an appropriately costed and effective strategy.
D = Additional measures introduced that provide little, if any, additional benefit to the fire strategy.
The Process ...
Strategy Tools

Fire Protection System Flow Chart
<table>
<thead>
<tr>
<th>Factor</th>
<th>Time from ignition (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>ASET</td>
<td></td>
</tr>
<tr>
<td>Detection</td>
<td></td>
</tr>
<tr>
<td>Alert warning</td>
<td></td>
</tr>
<tr>
<td>Search time</td>
<td></td>
</tr>
<tr>
<td>Evacuation alarm</td>
<td></td>
</tr>
<tr>
<td>Pre-movement time</td>
<td></td>
</tr>
<tr>
<td>Evacuation – first phase</td>
<td></td>
</tr>
<tr>
<td>Alarm (all areas)</td>
<td></td>
</tr>
<tr>
<td>Evacuation – all</td>
<td></td>
</tr>
<tr>
<td>Fire service alerted</td>
<td></td>
</tr>
<tr>
<td>Fire Service attendance</td>
<td></td>
</tr>
<tr>
<td>Fire fighting</td>
<td></td>
</tr>
<tr>
<td>Fire dampers operate</td>
<td></td>
</tr>
<tr>
<td>Fire doors closed</td>
<td></td>
</tr>
<tr>
<td>Fire suppression</td>
<td></td>
</tr>
<tr>
<td>Smoke control</td>
<td></td>
</tr>
<tr>
<td>Salvage commences</td>
<td></td>
</tr>
</tbody>
</table>

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Strategy Tools – Quantified Assessment of Options

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Option A</th>
<th>Option B</th>
<th>Option C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td>N1 out of x</td>
<td>N2 out of x</td>
<td>N3 out of x</td>
</tr>
<tr>
<td>(<strong>Score from x</strong>)</td>
<td>Multiply by</td>
<td>Multiply by</td>
<td>Multiply by</td>
</tr>
<tr>
<td><strong>Logistics</strong></td>
<td>N4 out of y</td>
<td>N5 out of y</td>
<td>N6 out of y</td>
</tr>
<tr>
<td>(<strong>Score from y</strong>)</td>
<td>Multiply by</td>
<td>Multiply by</td>
<td>Multiply by</td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td>N7 out of z</td>
<td>N8 out of z</td>
<td>N9 out of z</td>
</tr>
<tr>
<td>(<strong>Score from z</strong>)</td>
<td>Multiply by</td>
<td>Multiply by</td>
<td>Multiply by</td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Wired point type</th>
<th>Wireless point type</th>
<th>CCTV based point type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>(<strong>Score from 10</strong>)</td>
<td>Multiply by</td>
<td>Multiply by</td>
<td>Multiply by</td>
</tr>
<tr>
<td><strong>Logistics</strong></td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>(<strong>Score from 7</strong>)</td>
<td>Multiply by</td>
<td>Multiply by</td>
<td>Multiply by</td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>(<strong>Score from 6</strong>)</td>
<td>Multiply by</td>
<td>Multiply by</td>
<td>Multiply by</td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td>64</td>
<td>210</td>
<td>56</td>
</tr>
</tbody>
</table>
Strategy Tools – Strategy Value Grid

- Control of ignition sources
- Control of combustibles
- First aid fire fighting
- Fire service intervention
- Fire compartmentation
- Smoke control systems
- Automatic fire suppression
- Automatic fire detection
Strategy Tools – Strategy Value Grid
The Six Strategy Outputs
## The Six Strategy Outputs

### 8.4 Evacuation strategy

#### Table 5 – Evacuation strategy checklist

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Output</th>
<th>Included</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Means of escape</strong></td>
<td>Identification of primary and secondary means of escape</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identification of places of relative safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Horizontal travel requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical travel requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Illumination of escape routes and provision of signage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special requirements for disabled persons</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Evacuation methodology</strong></td>
<td>Type of evacuation process</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warning arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evacuation assistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Performance criteria</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Final Fire Strategy

• An agreed format style
• About the right level of detail
• A controlled “live” document
• Reviewed annually – updated at least once every 5 years
Q&A