Performance standards in the management of risk of major accident events

Michael Coppen
OHS Inspector
3 September 2014
Definition

• *Performance Standard* means a standard, established by the operator, of the performance required of a system, item of equipment, person or procedure which is used as a basis for managing the risk of a major accident event.

Regulations

• 2.5 (3) (i) – The Safety Case for the facility must also contain a detailed description of the safety management system that specifies the performance standards that apply.

• 2.20 (2) (b) – The (emergency response) plan must specify the performance standards that it applies.
Technical Controls

Other Controls
(procedural and administrative)

Layers of Protection
Developing Performance Standards for Control Measures

Basis for design engineering standards and specifications → Detailed design → Control Measures

Achieve ALARP

Formal safety assessment

Hazard identification
Major accident analysis
Fire and explosion analysis
Escape, evacuation and rescue analysis
Emergency systems survivability analysis

Performance Standards
Basis for Design, Engineering Standards and Specifications

Statutory, Class & Flag Requirements

Safety Case Requirements – FSA, SMS

Assurance Requirements – RCM, RBI, CM

Performance Standard
• Measurable and Auditable
• Facility Specific
• E.G. SMART

Format
• Functionality
• Availability / Reliability
• Survivability
• Dependency / Interaction

FSA - Formal Safety Assessment
SMS – Safety Management Systems
RCM – Reliability Centred Maintenance
RBI – Risk Based Inspection
CM – Condition Monitoring
Developing Performance Standards for Control Measures

- **Functionality** - What the Control Measure must do and the criteria it must achieve,
- **Availability / Reliability** - Assuring its functional capability
- **Survivability** - Will it continue to function, if needed, after a hazardous event occurs,
- **Dependency / Interaction** - What other Control Measures are needed to allow its functional capability,

**AND**

- How the above items will be/are ‘Assured’ e.g. Design/Technical Review, QA/QC, Maintenance, Inspection and Testing, Audits etc.
Performance Standards → Safety Goal

Functionality
Function → Criteria / Guidance → Assurance

Availability and Reliability
Function → Criteria / Guidance → Assurance

Survivability
Event → Component → Criteria → Assurance

Dependency / Interaction
System → Reason → Performance Standards

Design, Procurement, Manufacture, Fabrication, Construction, Commissioning

Manage Deviations
a) Technical
b) Operating

Change Management and Accidental Damage
Operational Envelope
Protect Against Recognised Failure Modes
Maintenance, Inspection, Test
Integrity Envelope
Fire, Explosion, Collision, Environmental Damage, Accidental Damage

What the control measure must do and the criteria it must achieve

Assuring its functional capability

Will it continue to function, if needed, after a hazardous event occurs

What other control measures are needed to allow its functional capability
• Full functionality of control measure not defined e.g. start systems of emergency generators missing,
• Performance criteria not fully specified, thus difficult to measure e.g. closing requirement / time for temporary refuge fire dampers not specified,
• Referencing marine standards (Class / IMO) as the performance standard e.g. IMO MODU Code for active fire protection states “capacity of required pumps should be appropriate to the fire fighting service” i.e. no flow and pressure performance criteria specified.
Performance Standard
Development Issues – cont.

• Assurance tasks not fully specified e.g. maintenance tasks for emergency switchboard not referenced,
• Not enough input from engineering discipline technical authorities – risk / safety engineers drive development.
Apply and Maintain Control Measures

- Asset Register
- RCM, RBI, CM
- Critical Maintenance
- CMMS
  - Develop Plans / Routines
  - Task / Scope / Frequency
  - Schedule
  - History
- Performance Standards
- Control Measures
- Formal Safety Assessment
- Execute Assurance Activities

RCM  Reliability Centred Maintenance
RBI  Risk Based Inspection
CM  Condition Monitoring
CMMS  Computerised Maintenance Management System
• Performance standards not being aligned and optimised with assurance activities e.g. no GAP analysis and optimisation of maintenance management system,
• Assurance activities not testing and recording performance criteria e.g. deluge and sprinkler systems coverage not being adequately tested and recorded,
Performance Standard
Implementation Issues – cont.

- Assurance activities not fully defined / referenced in performance standards e.g. key components of control measure assurance not in performance standards – UPS systems,
- Availability / reliability of control measure not being measured and assessed e.g. equipment uptime, equipment performance, equipment defect management, maintenance completed on time, maintenance backlog, maintenance deferral.
Lack of Availability / Reliability of Control Measure

- **Technical**
  Degradation, Failure, Accidental Damage, Loss of Redundancy.

- **Operating**
  Operating Conditions, Environmental Conditions, Out of Service for Maintenance.

- **Manage Deviations/Technical Change**
  Design Review (Outside Original Design Envelope), Operational Review (Outside Originally Specified Operating Conditions).

- **Contingency Planning (Short Term Control Measures)**
On-going Assessment of Control Measures Performance

- Monthly assessment of control measures performance,
- Annual review and assessment of control measure performance,
- Safety management system audit of management of control measures,
- Independent verification of control measures performance.
Summary
Robust development and effective use of performance standards significantly contributes to the demonstration that control measures for the prevention and mitigation of major accident events are being appropriately and adequately managed.

Further Information
GN0271 - Guidance note on control measures and performance standards:

NOPSEMA website ➔ safety section ➔ safety case section ➔ safety case guidance notes
Any questions?