Safety Case & PE (Chemical)

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PE(Chemical) Briefing 28 Nov 2016

The Intent

- Singapore: a global petrochemical and chemicals hub
 - A need to ensure public safety as Major Hazard Installations (MHIs) may have inventories of dangerous substances with complex processes
 - Potential of catastrophic consequences if not properly managed
- MOM is planning to enact a new WSH (Major Hazard Installations) Regulations in 4Q 2016
 - MHIs in Singapore required to prepare Safety Case, demonstrating to authorities (MOM, NEA & SCDF) that they are safe to operate
 - Some elements of the Safety Case could be endorsed by a Professional Engineer

Adopt a demonstration approach – Onus for MHIs to showcase to the **Regulator**

The Safety Case consists of **structured arguments**, supported by a **body of evidence**, that provides a compelling, comprehensive and valid case that the MHI is safe for given application in a given operating environment

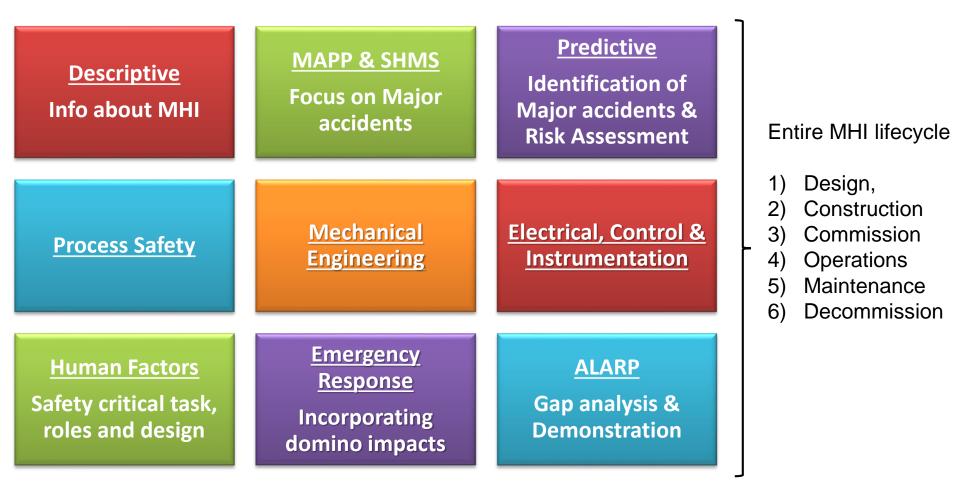
Clear Links between prevention, control and mitigation and the major accident hazards

Degree of analysis proportionate to intrinsic risk Risk reduction measures (Gaps analysed and time plans to implement the improvements)

• Argument without Evidence is <u>Unfounded</u>

Evidence without Argument is <u>Unexplained</u>

Safety Case Regime



Roles of a PE(Chemical) from Plant Lifecycle Approach

Typical Duration		Possible Areas	Could be Certified by:	Current Legislative Requirements
0.5 ~2 yrs	Process Design	Technology Parameters	PE(Chem)	No
	Front End Engineering	 Design Calculations / Basis Quantitative Risk Analysis (QRA) 	PE(Chem)	No No (Approved Coys)
0.5 ~1.5 yrs _	Detailed Engineering	 Vessel Design PHA e.g. HAZOP Process Safety Control (Interlocks Design) Process Safety Critical Systems Fire Safety Provision 	PE(Mech) PE(Chem) PE(Chem)/ PE(Elect) PE(Chem) /PE(Elect) PE(C&S/M/E)	Yes(if fabricated in SG) No No Yes
l	Procurement	1) Oversight of procurement according to specifications.	PE(Chem) / PE(Mech)	
0.5 ~ 3 yrs	Construction	 1) Structural Designs 2) Vessel Testing 3) Electrical Works / Design 4) Instrumentation 	PE(Civil) SPE(PV) PE(Elect) PE(Elect)	Yes Yes (PV only) Yes No

N.B. Although there is currently no legislation requiring certification of these possible areas, a company that employs a PE(Chem) would enhance assurance and credibility of the technical areas where endorsement was sought.

Roles of a PE(Chemical) from Plant Lifecycle Approach

Typical Duration		Possible Areas	Could be Certified by:	Current Legislative Requirements
2 ~6mths	Commissioning & Handover	Process Parameters and Commissioning Data	PE(Chem)	No
	Operations & Maintenance	 Selected Elements of Safety Case e.g. Safety Management System Fire Sefety System Design 	PE(Chem) PE(Chem)	No
20 ~ 30 yrs & beyond		 2) Fire Safety System Design (Process Related Portion) 3) Fire Protection System Inspection 	PE(Mech)	Yes
		4) Asset Integrity Programs	SPE(PV) / PE(Elect)	Yes (For PV only) For SCDF, also include storage tanks and
		5) Power Supply and Instrumentation	PE(Elect)	pipings
~2 yrs	Decommission & Demolition	1) Certify safe for removal 2) Demolition works	PE(Chem) PE(Civil)	No No

N.B. Although there is currently no legislation requiring certification of these possible areas, a company that employs a PE(Chem) would enhance assurance and credibility of the technical areas where endorsement was sought.

Core Competencies

- Areas of Chemical Engineering identified as core competencies
 - Process Safety
 - Process Design and Control
 - Fire and Explosion Protection, Prevention and Mitigation
 - Quantitative Risk Assessment (QRA)
 - Research and Development in Chemical Engineering field
 - Industrial Production and Plant Operation
 - Environment Protection and Pollution Control

The way forward

- Possible areas that PE (Chemical) could contribute in:
 - Quantitative Risk Assessment (QRA)
 - Technical aspects of Safety Case
 - > Predictive
 - Process Safety
 - Human Factors
 - > ALARP demonstration

The End

Thank

