

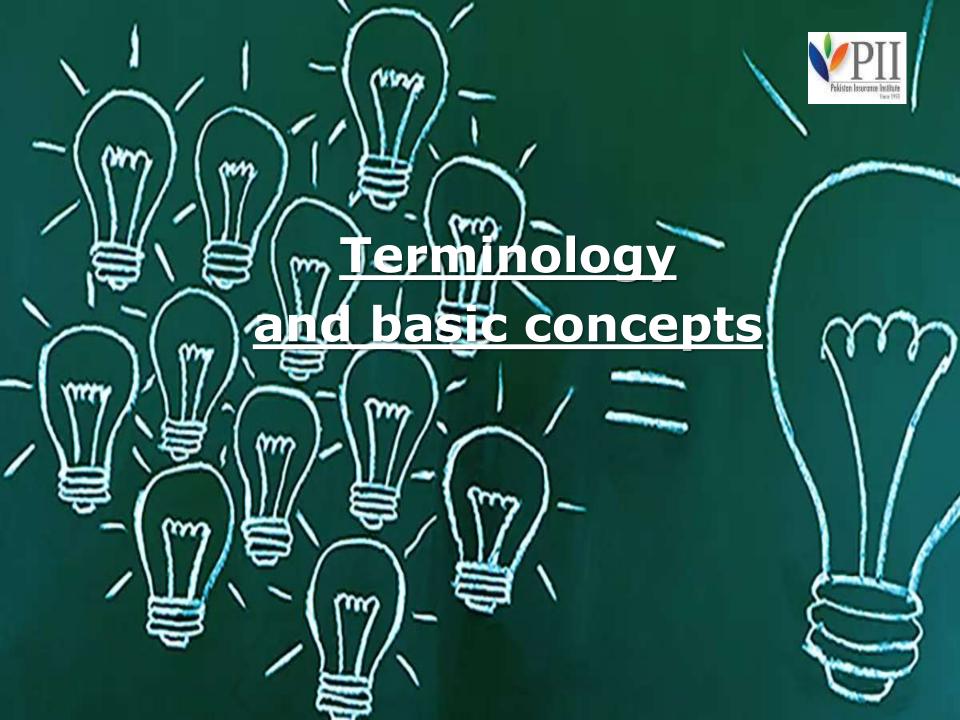
Risk Revolution: Navigate, Mitigate and Dominate

by

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Caution!

lay public uses



Hazard, Risk, Peril and Danger

as synonyms and relates them to safety





- risk refers to the possibility that something unpleasant or dangerous might happen.
- risk is a condition where there is a possibility of an adverse deviation from a desired outcome.
- defined in two dimension: impact and probability





Risk = probability * severity

PROBAILITY	SEVERITY
Frequent	Catastrophic
Occasional	Important
Unlikely	Marginal
Very unlikely	Insignificant

Risk Acceptance??

- 1,000 car accidents in a year
- 1,000 train accidents in a year



<u>Peril</u>

Is the prime cause that give rise to the loss, often beyond the control of anyone. example: storm, fire, theft, motor accident, explosion, flood





Hazard

- factors (physical or chemical) which may influence the outcome.
- the conditions that increase the severity of the loss or the conditions affecting perils.
- not themselves cause of loss, but can increase or decrease the effect, in case a peril operates
- example proximity of house to river
 - use of solvents









Types of Hazards

Physical Hazard

- relates to the physical characteristics of the risk example
 - construction of a building
 - security protection
 - proximity to river

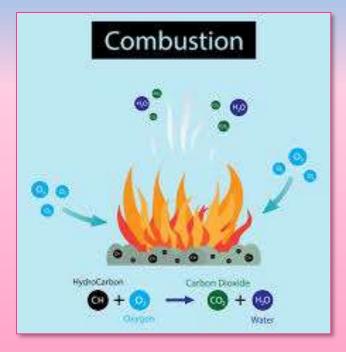
Moral Hazard

- concerns human aspects which may influence outcome.
- usually refers to the attitude of the insured person



Principles (behavior) of Fire

Fire/combustion is a Chemical Reaction (uncontrolled fast oxidation) that involves evolution of light and energy (heat) in significant amount







Fire Triangle



Energy (heat) causes vaporization of fuel in and results in thermal decomposition in presence of Oxygen (Chemical Reaction)



4 basic ways to extinguish fire

- Physically separating the combustible substance from the flame
- *Removing or diluting the oxygen supply*
- Reducing the temperature of the combustible or of the flame
- Introducing chemicals that modify the combustible chemistry



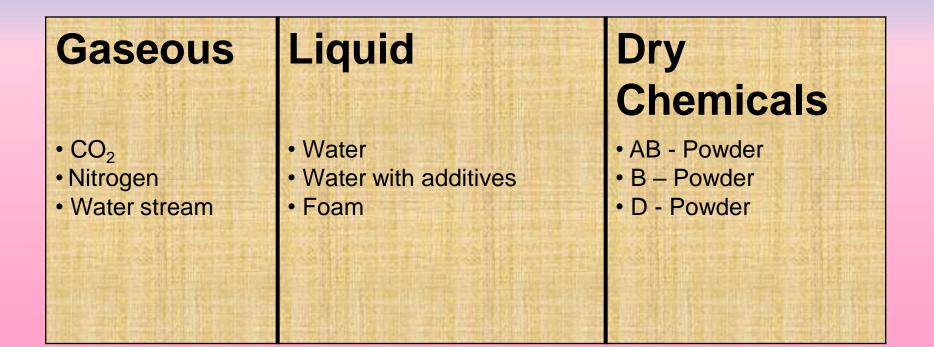


Classes of fire

Class	Combustibles	Examples
A	Charring solids	Wood, paper, fibers, plastics
B	Liquids, melting plastics	Ethanol, gasoline, oils, gasses, patrol
С	Gases	Methane, Propane, Butane, Nitrogen, Ammonia
D	Metals	Magnesium, titanium, Sodium
E	Live electrical equipment	Motors, switches, cables



Extinguishing Agents





Action of Extinguishing Agents

Extinguishing Agent	Cooling	Block Oxygen	Reduce heat of combustibles	Chemical action with flame
Water	++	+		
Foam	+	++	+	
AB-Powder	a A Sugar	+	the state of Samely	++
B-Powder	1.200			
D-Powder	Carlo de	++		++
CO ₂	+	++ *		

++ main effects

+ secondary effects

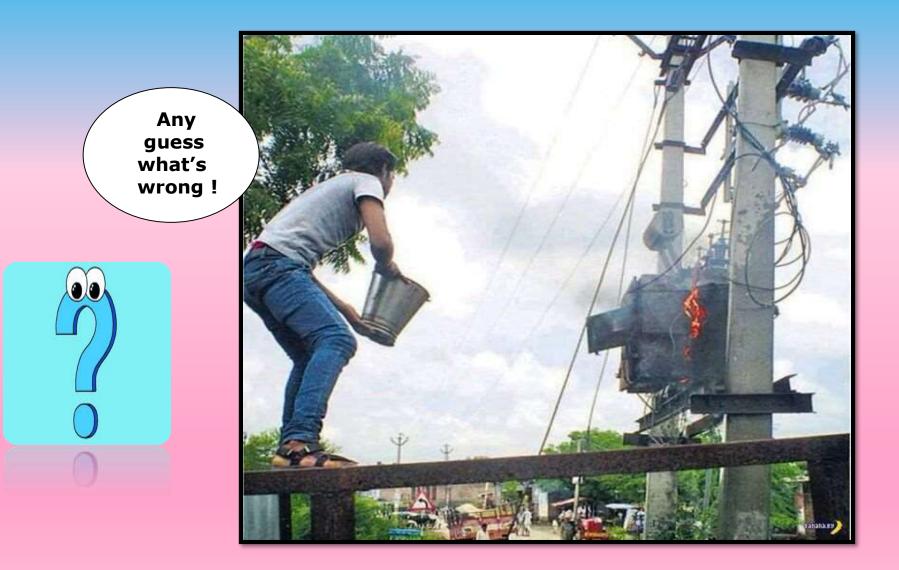


Extinguishing Agents-Effects

Class of Fires	A (solid)	B (liquid)	C (gas)	D (metals)	E (EE)
Water (full jet)	++			A A	
Water (spray)	++	+/-	+	++	+/-
Foam	÷.	~ + \			20.00
AB-Powder	(+	60 + 0 /	- 1 - 1	2 - 22	+/-
B-Powder	-++ C	++		*	
D-Powder			· ++ · ·		
CO ₂		1	+/-		++

++ very suitable + suitable +/- limited efficiency - not suitable -- dangerous







RISK MANAGEMENT PROCESS





Risk Management - definition

"The <u>identification</u>, <u>analysis</u> and <u>economic control</u> of those <u>risks</u> which can <u>threaten</u> the <u>assets or</u> <u>earning capacity of an enterprise</u>"



Risk Management - process

- Identify risk
- Analyze/ Evaluate risk
- Risk Control (Treatment)
- Risk Transfer (unacceptable risk)
- Regular review





Risk Identification

- Identify any activity that may give rise to <u>risk</u>
- Determining what the risks are that pose a threat to the company or business that if realized could prevent company from achieving its goals (economic)





Risk Evaluation

- To understand <u>relevance of those risks to the</u> <u>individual operation and organization as whole</u>
- Both the <u>likely frequency</u> of the risk incident happening and <u>potential severity</u> of the damage



Risk Mitigation

- Once identified and analyzed, the organization has many options to mitigate the risk effects:
 - <u>reduce the risk</u>
 Physical/Non physical controls
 - retain the risk

not to affect - acceptable

- transfer the risk

e.g insurance



Risk Management and Insurance

SUR



Risk Management and Insurance

- Risk transferred to insurance company becomes
 insurer's risks
- Company intend to carry out internal risk management to decide upon risk identification, reduction, retention and transfer...



Risk Management Policy

<u>Risk Policy</u>

 ✓ defines the conditions of acceptable risks

<u>Risk Strategy</u>

 ✓ defines how to transfer the unacceptable risks

<u>Risk Control</u>

 ✓ defines the conditions for control and minimizing the risks





Risk Identification

• Information gathering to be structured with end objective always clear in mind

Sources of information

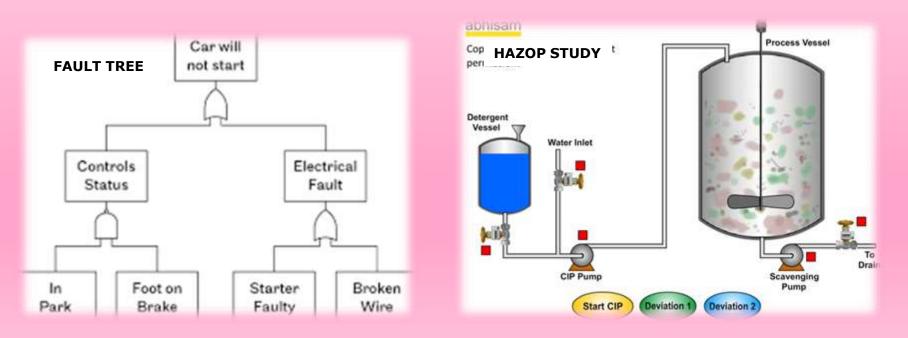
- Internal (officials, documents, layout, plans etc.)
- External (consultants, insurers, govt. depts.,)
- Others

(newspapers, associations, internet)



Techniques to identify risk

- Organizational chart | Flow Chart
- Checklist and questionnaires
- Physical Surveys | Brainstorming
- Fault tree
- Hazard & Operability Studies (HAZOP)





<u>Risk Survey - an effective</u> tool...

- Risk identification
- Risk reduction (RIR)
- Underwriting support (fire/property)
- Risk retention (EML/MPL/PML)
- Risk transfer (reinsurance)







Risk Survey - advantages

- Clear and personal picture of risk
- Face to face conversations
- Other tools like questionnaire and checklist can be used during survey
- Survey report conclude with recommendations for improvement risk or reduce impact – <u>dual</u> <u>purpose i.e. identifying and managing</u>



Risk Survey - disadvantages

- Survey exposure present and visible on the day of visit
- Expensive time and money
- Raise confidence unrealistically
- Related third party premises can not be surveyed
- Factory Manger may abdicate his responsibility



Site Engineering Survey

- Before Site Visit
 Site Information Request
- <u>During Site Visit</u>
 - Plant Tour
 - Interviews with Key Staff
- <u>After Site Visit</u>
 - Site Report
 - Risk Improvement
- <u>Conclution</u>
 - Estimated Maximum Loss (EML)
 - Assessment of Risk





video

Risk Assessment

Areas of Potential Hazards

- External Exposures
 - o Location
 - o Earthquake/Tsunami
 - o Weather (Extreme) Pattern
 - o Lightning
 - Neighbors (Arson/Fire)
 - o Falling Aircraft
 - Sabotage/Terrorism
 - Vehicle/Vessel Impact
 - o Flooding
 - Natural Hazards (Rain/Wind Storm etc.)







<u>Risk Assessment</u> <u>Areas of Potential Hazards</u>



Management Systems (Internal Exposures)

- Operations/Process
- o Construction
- o Maintenance
- Inspection Procedures
- o Engineering
- o Safety
- o Security
- o Housekeeping
- Storage Arrangements
- o Pressure Vessels
- o Flammable Liquids







ERMIT

Risk Assessment Controls

Plant Protection System

- Active Process Protection (Emergency shut down)
- Passive Process Protection (Permit system)
- Active Fire Protection (Automatic Deluge)
- Passive Fire Protection (Fire proof walls/doors)
- Site Protection (Fencing/access control)

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Consequence								
		Insignificant	Minor	Moderate	Major	Severe		
	Almost certain	Medium	High	High	Extreme	Extreme		
Likelihood	Likely	Medium	Medium	High	Extreme	Extreme		
	Possible	Low	Medium	Medium	High	Extreme		
	Unlikely	Low	Low	Medium	High	High		
	Rare	Low	Low	Low	Medium	High		

Two variable risk matrix





Risk level / score	Recommended action		
Very High	Act Now: Steps must be taken to lower the risk level to as low as reasonably practicable using		
(72 -150)	the hierarchy of risk controls;		
High (48 -71)	Act Today: Highest management decision is required urgently		
Medium	Follow management instructions: The supervisor must review and document the effectiveness		
(24 - 47)	of the implemented risk controls.		
Low	OK for now: Record and review if any equipment/ people/ materials/ work processes or		
(6 – 23)	procedures change. Managed by local documented routine procedures which must include		

Risk Improvement Recommendations

- Objective is to reduce risk of a major incident
- Based on insurance company experience of world class
- *Review progress on previous survey recommendations*
- Underwriters give credit for progress on recommendations



























CU 11

Estimation

Loss Potentia

1700



MPL=Maximum Possible Loss*

The Maximum Possible Loss is that which may occur when the most unfavorable circumstances are more or less exceptionally combines and when, as a consequence, the fire is not or unsatisfactorily fought against and therefore is only stopped by impassable obstacles or by lack of combustible material.

EML=Estimated Maximum Loss*

The extent of the fire likely to occur in the normal conditions of activity, occupancy and fire-fighting of the range of buildings concerned. Unusual circumstances (accidental or extraordinary) likely to modify the circumstances of the risk are left out.

MPL/EML are insurance technical terms. Loss Potential is measured in <u>monetary terms</u>

* Swiss Re

Maximum Loss



Plant Value Distribution

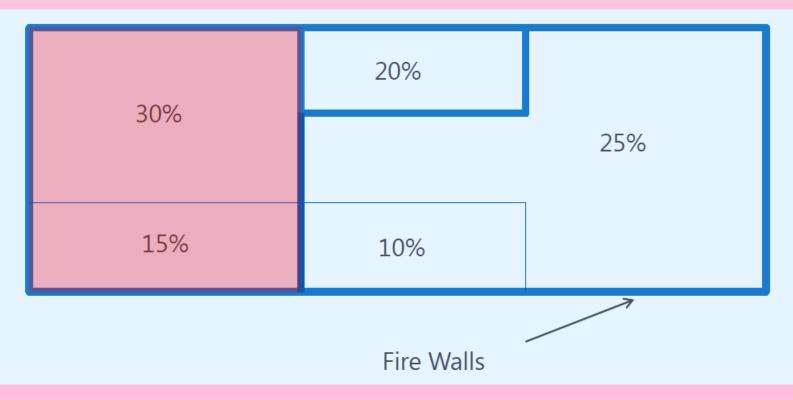
30%	
15%	
Fire Walls	1100°C

- Passive Fire Wall Protection Around Some Areas
- Smoke Detection Installed in Ceiling of All Areas
- Water Sprinkler System Installed in All Buildings

Maximum Probable Loss (MPL) Fire Protection Systems



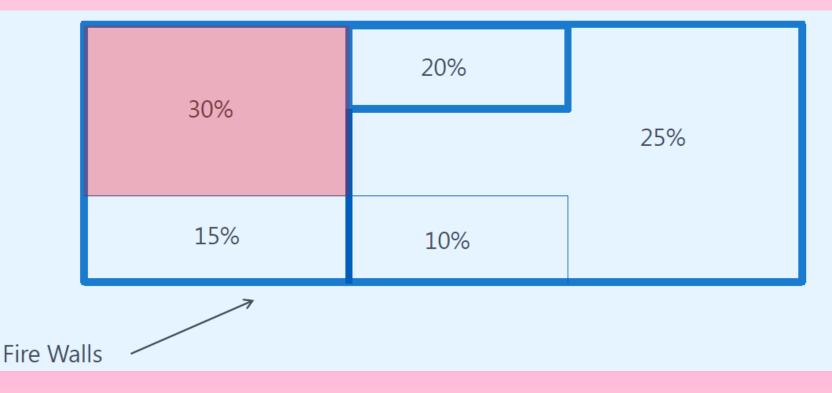
- Smoke Detection and Water Sprinkler Systems fail to operate
- Only fire protection is Passive Fire Wall
- Fire spreads throughout largest unprotected area
- Results in loss of 45% of Total Value



Estimated Maximum Loss (EML) Fire Protection Systems



- Smoke Detection and Water Sprinkler Systems operate effectively minimizing fire damage
- Fire limited to area with single largest value
- Result in loss of 30% of Total Value



Difference between underwriting based on the Sum Insured (SI), MPL and EML basis

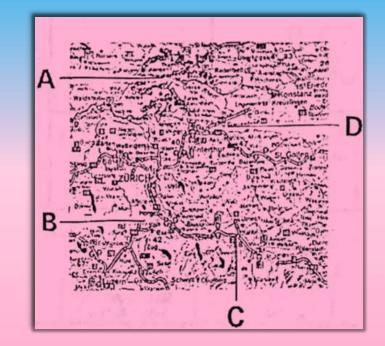


- SI basis capacity is not fully utilized.
- Not attractive for fire risks
- MPL basis of underwriting provide more capacity
- The insurer should have expertise in determining MPL



1. <u>Example (various locations)</u>:

 The K-Group owns operating units, which are all included in one policy, but spread across various locations:



Locations	Sum Insured	MPL	EML
	(millions US\$)	(millions US\$)	(millions US\$)
Α	30	20	10
В	20	8	4
С	10	3	2
D	40	25	5
TSI	100		



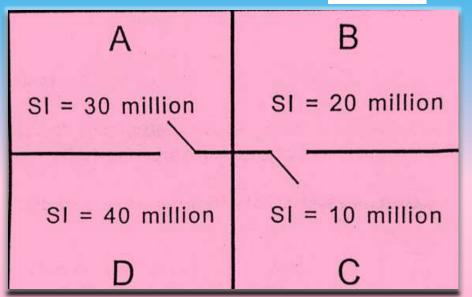
Assuming insurer has capacity of US\$ 5m. <u>SI Basis</u> TSI = US\$ 100m Underwriting Capacity = US\$5m Written Lines = 5% of TSI

<u>MPL Basis</u> TSI = US\$ 100m MPL = 25% (highest) Underwriting Capacity = US\$ 5m (MPL basis) Written Lines = 5/25% = 20% of TSI

<u>EML Basis</u> TSI = US\$ 100m EML = 10% (highest) Underwriting Capacity = US\$ 5m (EML basis) Written Lines = 5/10% = 50% of TSI

2. <u>Example (segregation)</u>:

 The K-Group moves into a single building complex. Facilities A & D are perfectly separated from B & C (MPL separation). Units A & D and units B & C are fitted with fire proof doors (EML separation):



Risks	Sum Insured	MPL	EML
	(millions US\$)	(millions US\$)	(millions US\$)
A	30	45	10
D	40		5
В	20	11	4
С	10		2
TSI	100		





Assuming insurer has capacity of US\$ 5m. <u>SI Basis</u> TSI = US\$ 100m Underwriting Capacity = US\$5m Written Lines = 5% of TSI

<u>MPL Basis</u> TSI = US\$ 100m MPL = 45% (highest) Underwriting Capacity = US\$ 5m (MPL basis) Written Lines = 5/45% = 11.11% of TSI

<u>EML Basis</u> TSI = US\$ 100m EML = 10% (highest) Underwriting Capacity = US\$ 5m (EML basis) Written Lines = 5/10% = 50% of TSI







