# Risk Management Essentials

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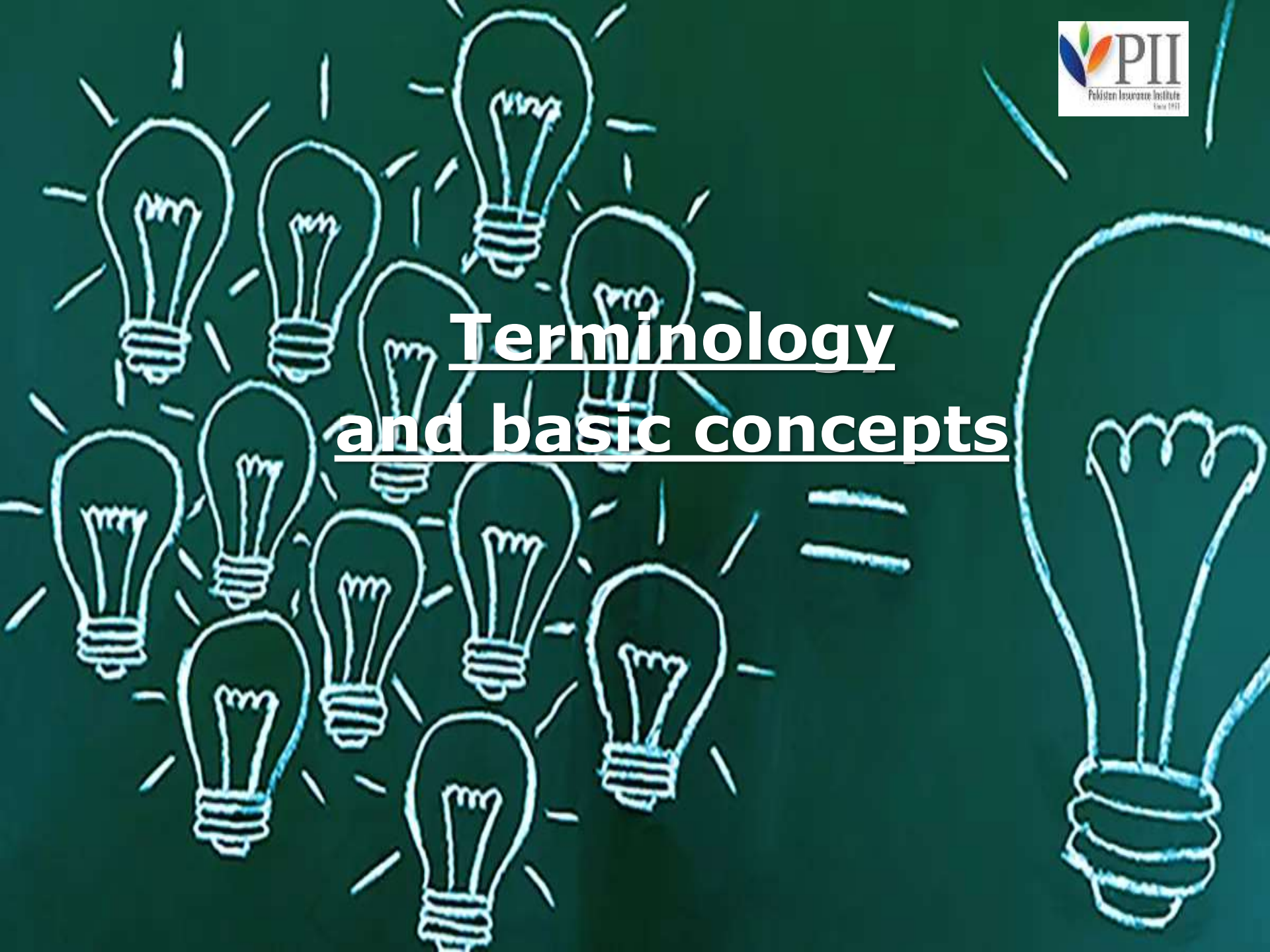


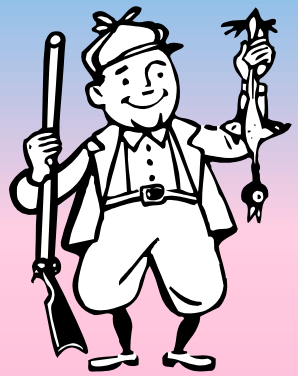
# Terminology and basic concepts

Caution!

*lay public uses*

**Hazard, Risk, Peril** *and* **Danger**

*as synonyms and relates them to safety*



# Risk

- *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

# Peril

*Is the prime cause that give rise to the loss, often beyond the control of anyone.*

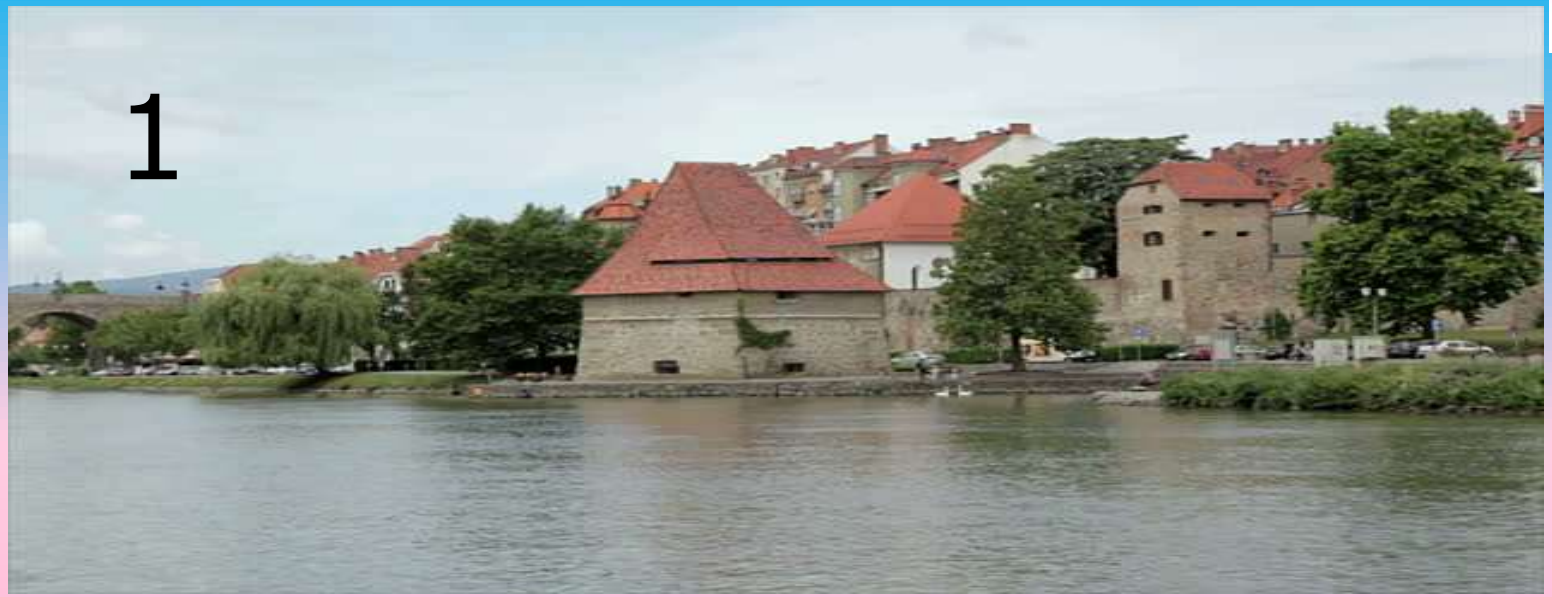
*example: storm, fire, theft, motor accident, explosion, flood*

# 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*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# Types of Hazards

## Physical Hazard

- *relates to the physical characteristics of the risk*

  *example*

  *- construction of a building*

  *- security protection*

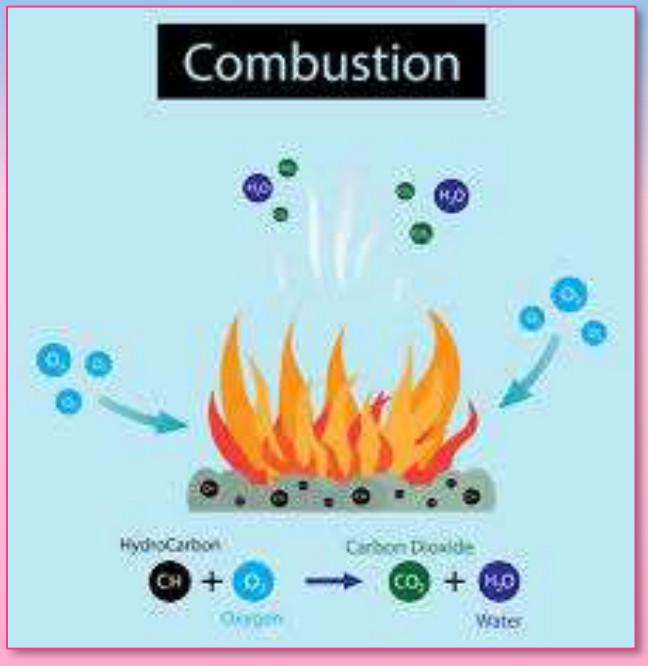
  *- proximity to river*

## Moral Hazard

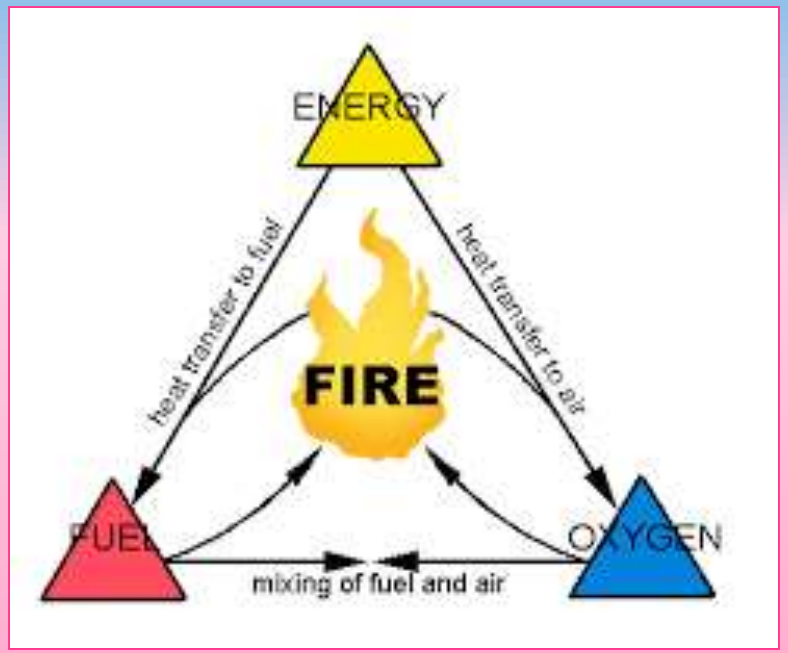
- *concerns human aspects which may influence outcome.*
- *usually refers to the attitude of the insured person*

# 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 |
| ***C*** | Gases | Methane, Propane, Butane, Nitrogen, Ammonia |
| ***D*** | Metals | Magnesium, titanium, Sodium |
| ***E*** | Live electrical equipment | Motors, switches, cables |

# Extinguishing Agents

| Gaseous | Liquid | Dry Chemicals |
| --- | --- | --- |
| • $CO_2$<br>• Nitrogen<br>• Water stream | • Water<br>• Water with additives<br>• Foam | • AB - Powder<br>• B – Powder<br>• D - Powder |

# Action of Extinguishing Agents

| Extinguishing Agent | Cooling | Block Oxygen | Reduce heat of combustibles | Chemical action with flame |
|---|---|---|---|---|
| Water | ++ | + | | |
| Foam | + | ++ | + | |
| AB-Powder | | + | | ++ |
| B-Powder | | | | |
| D-Powder | | ++ | | ++ |
| $CO_2$ | + | ++ | | |

**++ main effects** **+ secondary effects**

# Extinguishing Agents-Effects

| Class of Fires | A (solid) | B (liquid) | C (gas) | D (metals) | E (EE) |
|---|---|---|---|---|---|
| Water (full jet) | ++ | - | - | -- | - |
| Water (spray) | ++ | +/- | + | ++ | +/- |
| Foam | + | + | - | -- | - |
| AB-Powder | + | + | + | -- | +/- |
| B-Powder | ++ | ++ | -- | + | + |
| D-Powder | - | - | ++ | - | |
| $CO_2$ | - | + | +/- | -- | ++ |

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

Any guess what's wrong !

# RISK MANAGEMENT PROCESS

# Risk Management - definition

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

# 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 risk*
- *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 relevance of those risks to the individual operation and organization as whole*

- *Both the likely frequency of the risk incident happening and potential severity of the damage*

# Risk Mitigation

- *Once identified and analyzed, the organization has many options to mitigate the risk effects:*

  - reduce the risk

    *Physical/Non physical controls*

  - retain the risk

    *not to affect - acceptable*

  - transfer the risk

    *e.g insurance*

# Risk Management and Insurance

# 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

- Risk Policy
  - ✓ *defines the conditions of acceptable risks*
- Risk Strategy
  - ✓ *defines how to transfer the unacceptable risks*
- Risk Control
  - ✓ *defines the conditions for control and minimizing the risks*

# Risk Management and Insurance - advantages

## Risk Assessment

- selection
- adapt rates to risk quality

  - ***Improve Underwriting Results***

# Risk Management and Insurance - advantages

## Estimate of Maximum Loss Potentials

- Optimization of capacity allocation

  - ***Improve Underwriting Results***

# Risk Management and Insurance - advantages

## Risk Visits (Survey) and Recommendations

- Improve risk quality
- Service to the client
- Foster long term relationship with the client

- ***Improve Underwriting Results***

# Risk Management and Insurance - advantages

# Risk Identification

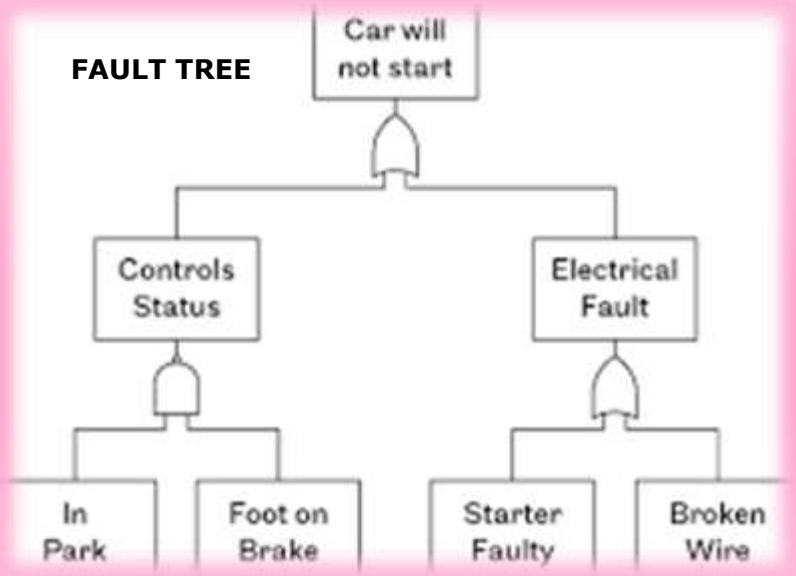
- *Information gathering to be structured with end objective always clear in mind*

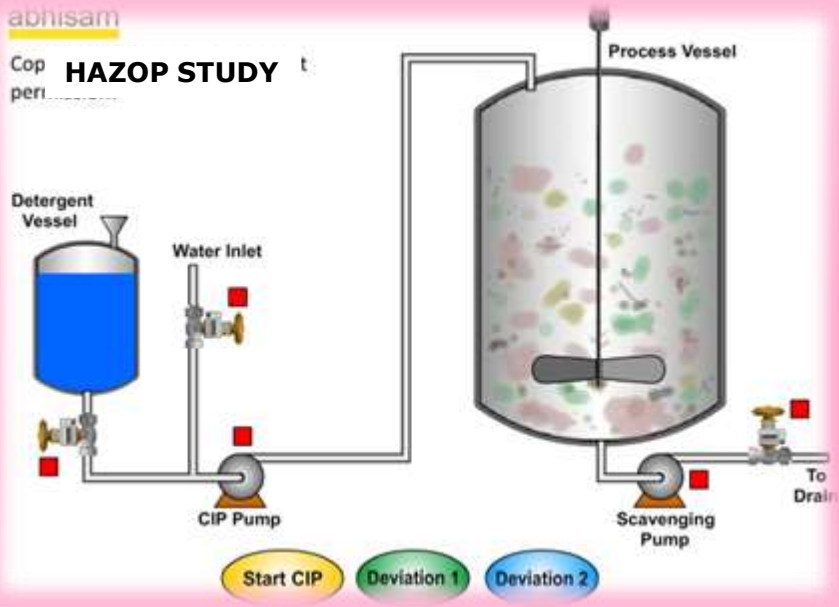
## Sources of information

- *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)*



# Risk Survey - an effective 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 – dual purpose i.e. identifying and managing*

# 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*
- *During Site Visit*
  - *Plant Tour*
  - *Interviews with Key Staff*
- *After Site Visit*
  - *Site Report*
  - *Risk Improvement*
- *Recommendations*
  - *Estimated Maximum Loss (EML)*
  - *Assessment of Risk*

# Risk Assessment

## Areas of Potential Hazards

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

# Risk Assessment

## Areas of Potential Hazards

- Management Systems (Internal Exposures)
  - *Operations/Process*
  - *Construction*
  - *Maintenance*
  - *Inspection Procedures*
  - *Engineering*
  - *Safety*
  - *Security*
  - *Housekeeping*
  - *Storage Arrangements*
  - *Pressure Vessels*
  - *Flammable Liquids*

# 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)*

# Risk Quality – the concept

- *Adequacy of protection measuers compared to exposure*
- *Comparison with industry standards in terms of protection*
- *Compliance with 'best in class'*
- *Criterion for risk selection and pricing*

# Risk Quality: Issues

- *Industry specific*
- *Industry standard, best proactice*
- *Local perspective vs global perspective*
- *Reference: specific portfolio vs global portfolio*
- *Consider protection concept*
- *Compliance with regulations is not relevant*

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

# Risk Improvement Recommendations Examples

# Risk Improvement Recommendations
# Fire wall between oil filled transformers

# Risk Improvement Recommendations
# Regular Emergency Exercise Practice

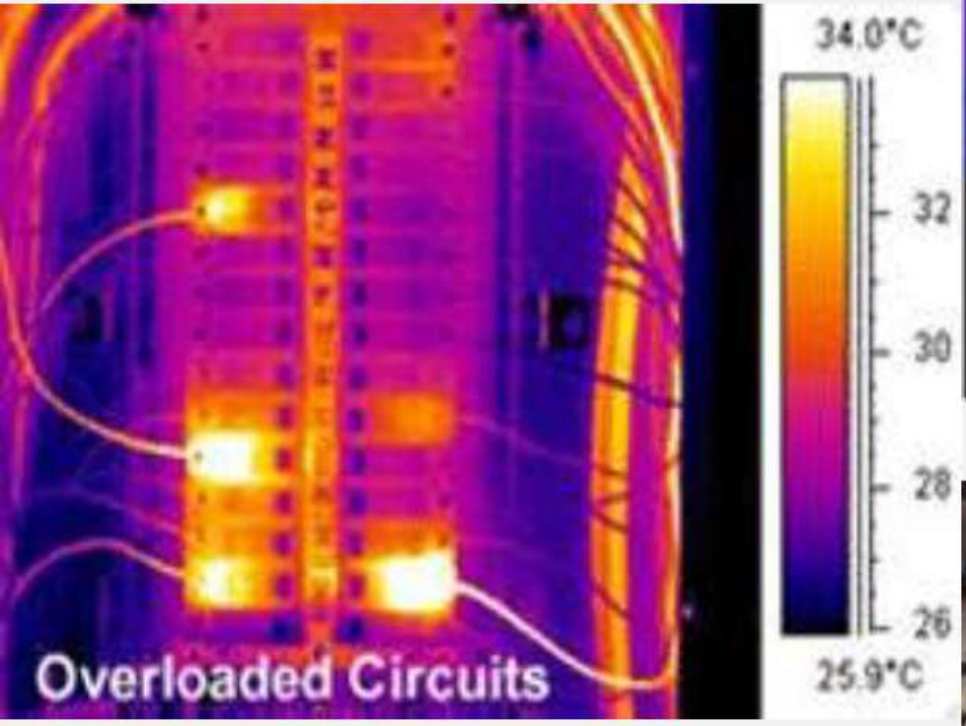
# Risk Improvement Recommendations
# Install Remotely Operated Isolation Valves, double mechanical seals in pumps

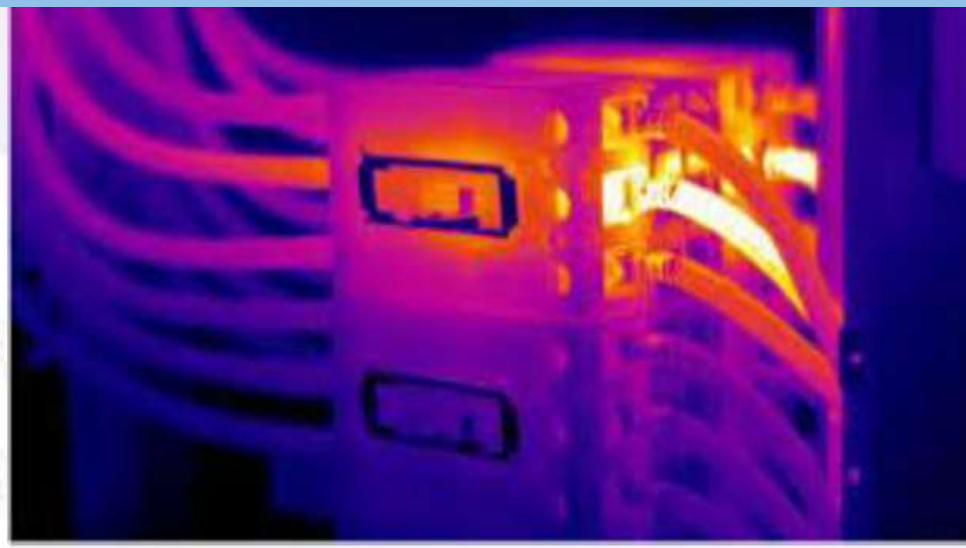
# Risk Improvement Recommendations

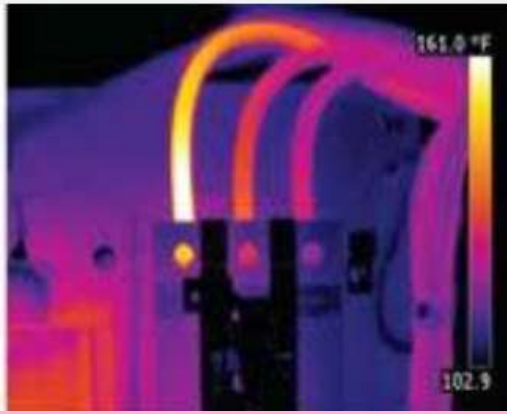
Log out Tag Out procedure, Implement Management of Change Procedure, Trip By-pass procedure, …etc.

# Risk Improvement Recommendations
## Piping corrosion Inspection

# Risk Improvement Recommendations
## Electrical Thermography





# Estimation of Loss Potential

- **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>**

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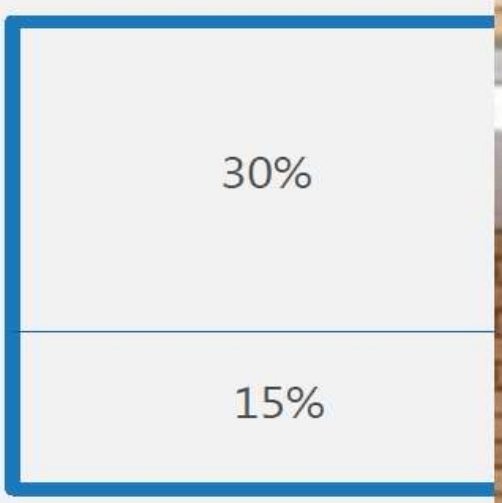
# Maximum Loss

## Plant Value Distribution



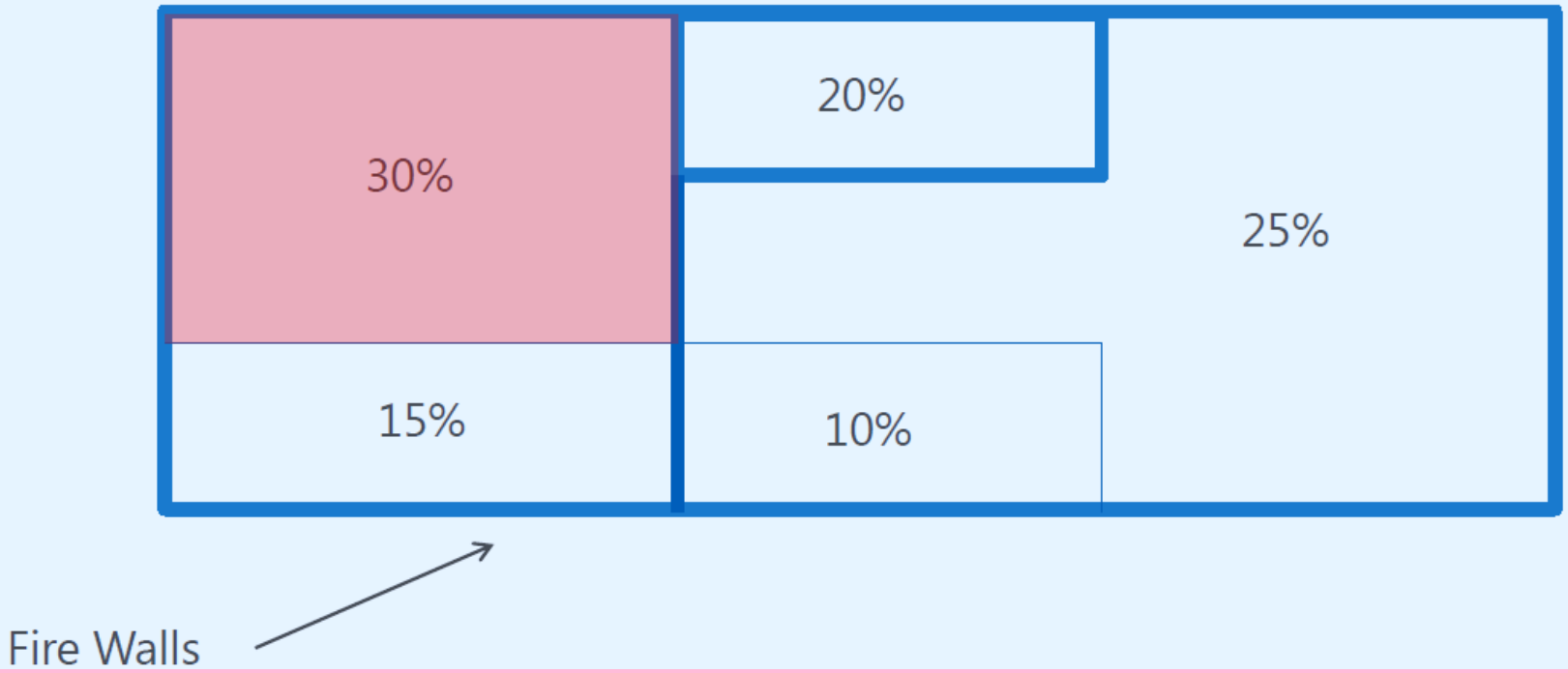


- *Passive Fire Wall Protection Around Some Areas*
- *Smoke Detection Installed in Ceiling of All Areas*
- *Water Sprinkler System Installed in All Buildings*

## Maximum Probable Loss (MPL)

## Fire Protection Systems

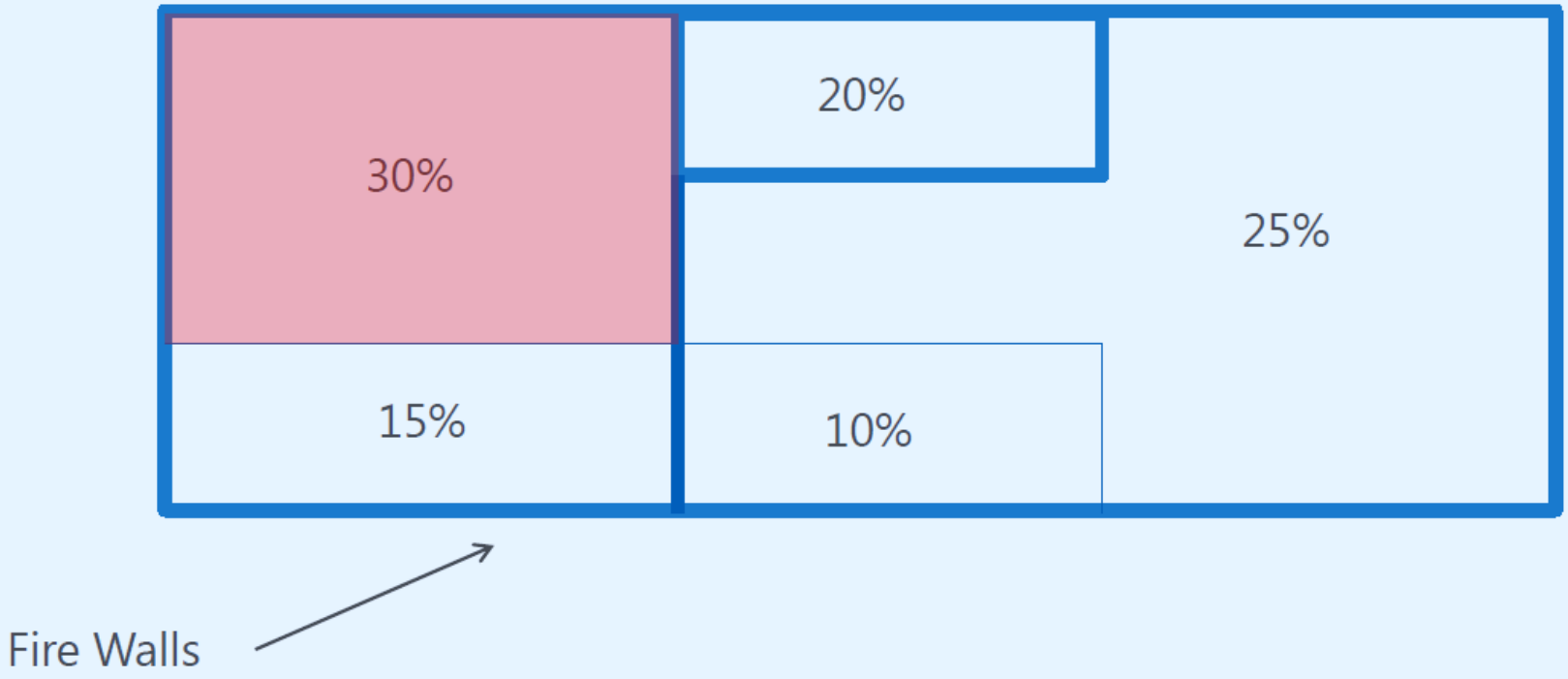
- *Smoke Detection and Water Sprinkler Systems fail to operate*
- *Only fire protection is Passive Fire Wall*
- *Fire spreads throughout largest unprotected area*
- *Results in loss of 45% of Total Value*



## 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*

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