PROPERTY INSURANCE
RISK QUALITY ASSESSMENT

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Introduction

Bachelor of Engineering - NED

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Process Safety Management - OGSC

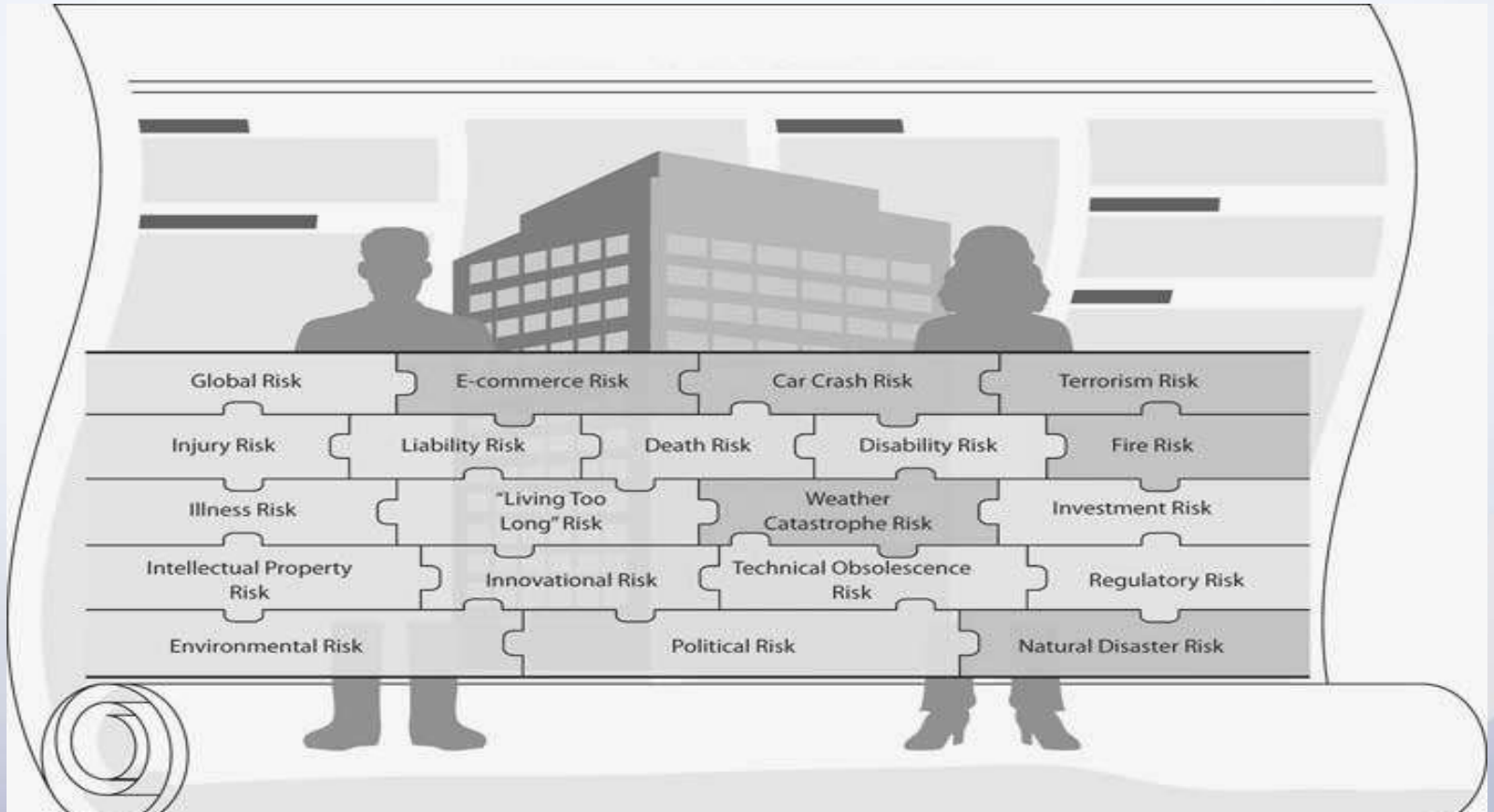
Course Contents

- Phases of Risk Management
- Property Risk Assessment
- Risk Control Measures
- Major Industrial Hazards
- Causes and Fire Classification
- Active and Passive Fire Protection
- Calculation of Loss (Estimation)
- Features of Risk Assessment Report

Overview-Insurance Contract

Insurance is the transfer of risk to an insurance company, which pools the risks and provide indemnification who suffer covered losses.

“losses of the few are met by the contributions of many”



Video: Risk & Insurance

Insurable Risks

- Almost all risks insured by insurance companies are pure risks
- Only risks involving financial loss are insurable

Insurance companies also do not insure against predictable losses, such as wear and tear, and inherent vice, which is the self-destruction of property caused by the nature of the thing itself, such as the rotting of fruit.

Underwriting Process

Underwriter must obtain enough Information and knowledge as permitted by time and cost to prevent adverse selection and to ensure the accurate classification of the insurance applicant. Generally the sources are:

- Proposal form
- Agent or broker;
- Physical examinations or inspections

After obtaining adequate information, the underwriter has following choices in regards to the application:

- Accept the application;
- Accept the application but with restrictions or modifications;
- Reject the application

Risk Engineer & Underwriter Expectation

The underwriter needs to be satisfied that the person who is to undertake a survey and produce a report must have to:

- Understands what is to be surveyed
- Has sufficient insurance knowledge
- Is suitably qualified
- Has experience to produce opinions which are credible and assess the risk against national / international best practice standards
- Has a good reputation
- Familiarity with policy clauses and codes

What does an Underwriter Look for

- Size of the risk
- Nature & Quality of the Risk
- EML/PML for retention & Risk sharing

What does a Risk Engineer Do !

The Risk Engineer delivers outstanding consultancy services, technical reports and recommendations on all aspects of hazard risk, additionally assists clients to minimize the frequency and consequence of a loss.

Aspects covered in the risk survey; usually includes:

- Major process / material hazards
- Process Safety management systems
- Fire protection/emergency response equipment and programs
- Security Vulnerability
- Identify critical item along with replacement timeframe that can influence Business Interruption cover
- Qualitative risk ranking of scenarios involving hazardous materials
- Risk reduction recommendations

Phases of Risk Management

- Risk Identification
- Risk Assessment
- Risk Mitigation
- Risk Monitoring / Control

Video: Why do risk assessment

Risk Management Process (ISO 31000)

What is Risk?

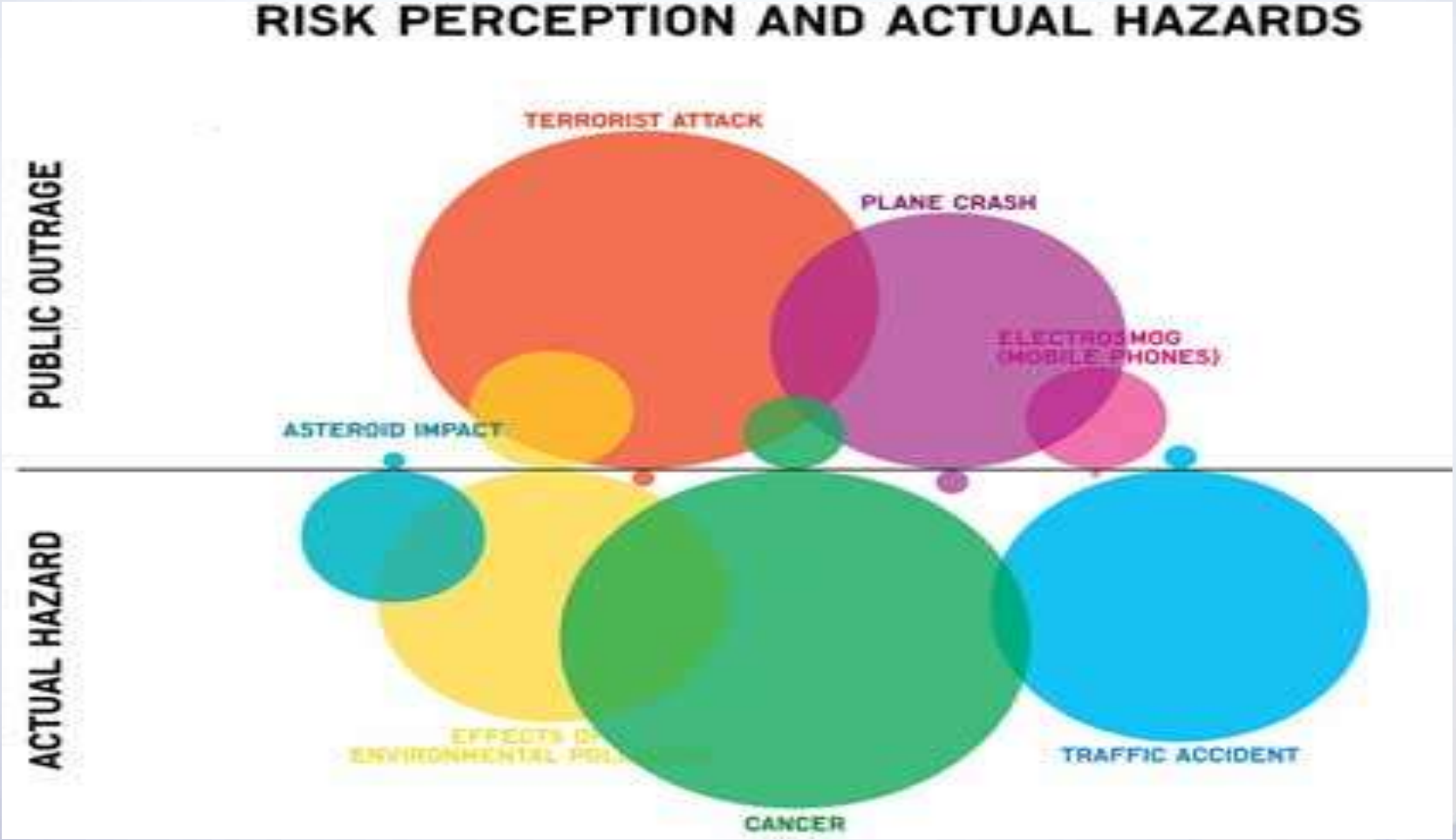
- Risk can be defined as the combination of the probability of an event and its consequences (ISO/IEC Guide 73)
- A dictionary definition of risk is “ the possibility of loss or injury”
- ISO 31000-Effect of Uncertainty on objectives

Risk Perception:

A natural extension of our hard-wired ability to quickly size up threats**.** Belief (whether rational or irrational) held by an individual, group, or society about the chance of occurrence of a risk, among many other factors

- Voluntariness
- Controllability
- Delay
- Man Made and Natural
- Familiarity
- Expected benefit
- Media

Video: Risk Perception


RISK PERCEPTION AND ACTUAL HAZARDS
PUBLIC OUTRAGE
ACTUAL HAZARD
TERRORIST ATTACK
PLANE CRASH
ELECTROSMOG
(MOBILE PHONES)
ASTEROID IMPACT
TRAFFIC ACCIDENT
CANCER

Risk and Consequences

Red on yellow, kill a fellow. Red on black, won't hurt Jack.

Classification of Risk

- Financial and non-financial risk
- Pure and speculative risk
- Fundamental and particular risk

Other definition of Risk

“A risk is the threat that an event or action will adversely affect an organization's ability to maximize stakeholder value and to achieve business objective”

Other Definitions of Risk (cont.)

“Risk arises as much from the possibility that opportunities will not be realized as it does from the possibility that threat will materialize or that mistake will be made”.

“Risk, however, is integral to all opportunity and is as much about opportunity as it is about threat”

Subjective Vs Objective Risk

Subjective risk refers to the mental state of an individual who experiences doubt or worry as to the outcome of a given event

- It is essentially the psychological uncertainty that arises from an individual's mental attitude or state of mind

Objective risk differs from subjective risk in the sense that it is more precisely observable and therefore measurable

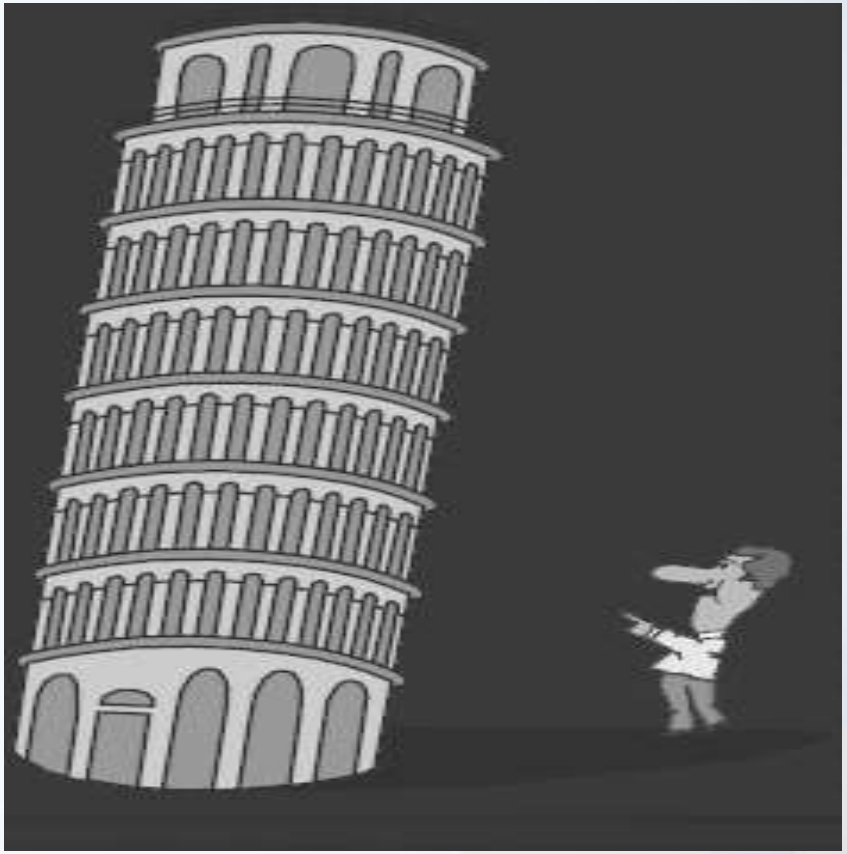
- It is the probable variation of actual from expected experience

Video: Hazard Blind Spot

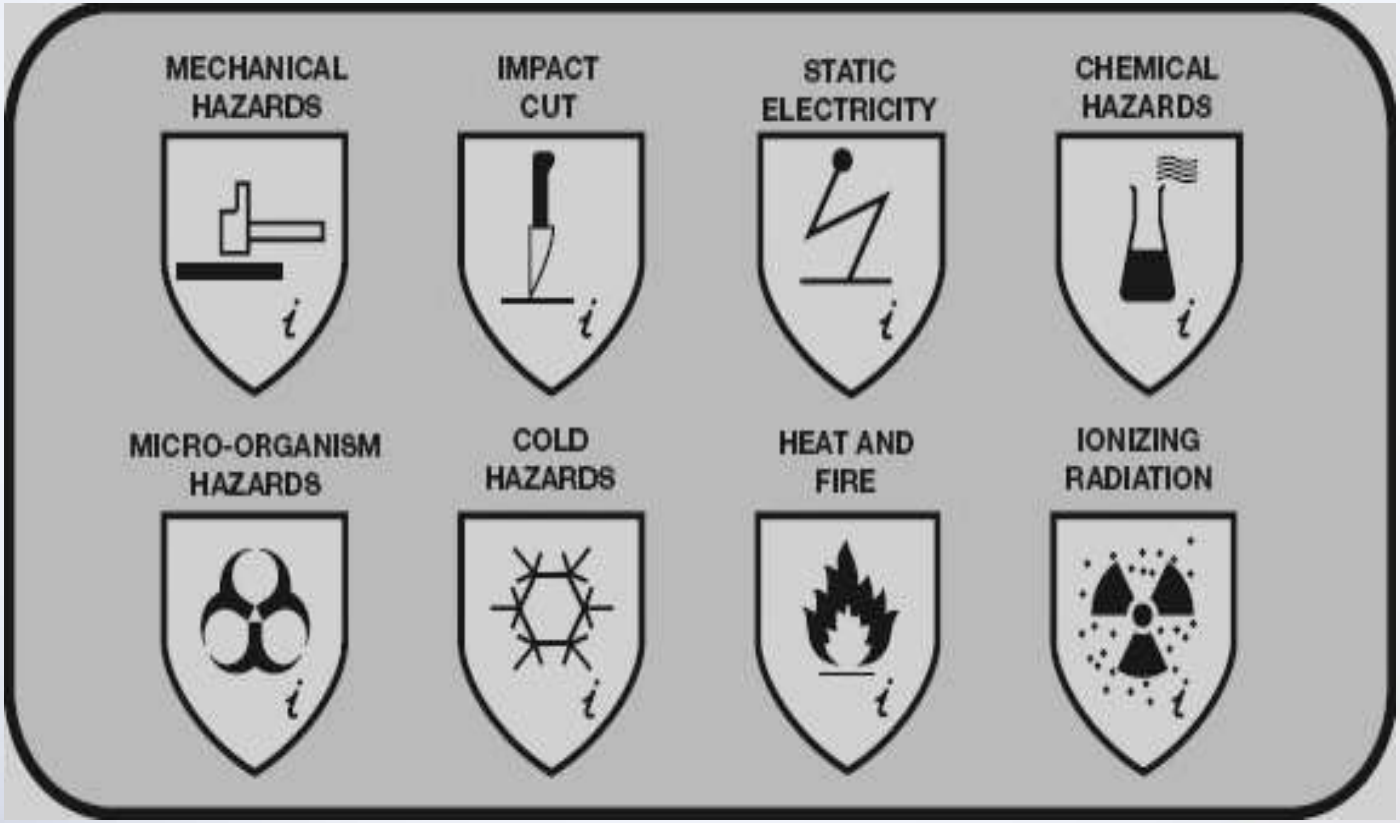
Hazard

The terms ‘hazard’ is used throughout this presentation and it is important that you have a clear understanding:

- Act or Situation for harm
- Something with the potential to cause harm
- A hazard is a feature that might alter the frequency and severity of a peril occurring
- A hazard is not itself the cause of loss, but it can increase the effect of a peril and may make the operation of a peril more likely.



Causes Of Hazards



Inception & Propagation Hazard - Fire

An inception hazard is a hazard which may originate a fire.

- Heating.
- Electricity.
- Charging of fork lift truck.
- Hydraulic oil.
- Process inception hazard.

A propagation hazard is a hazard which may cause a fire to spread.

- Construction.
- Combustible stock.
- Bulk storage of flammable liquids.
- High piled storage.
- Congestion within the premises.

Process Hazards

General Process Hazards	Special Process Hazards
1. Exothermic reactions. 2. Endothermic processes. 3. Material handling and transfer 4. Enclosed or indoor process units. 5. Access. 6. Drainage and spill control.	1. Toxic materials. 2. Sub-atmospheric pressure (<500 mmHg). 3. Operating in or near flammable range. 4. Tank farm storage flammable liquids. 5. Process upset or purge failure. 6. Always in flammable range. 7. Dust explosion. 8. Pressure.

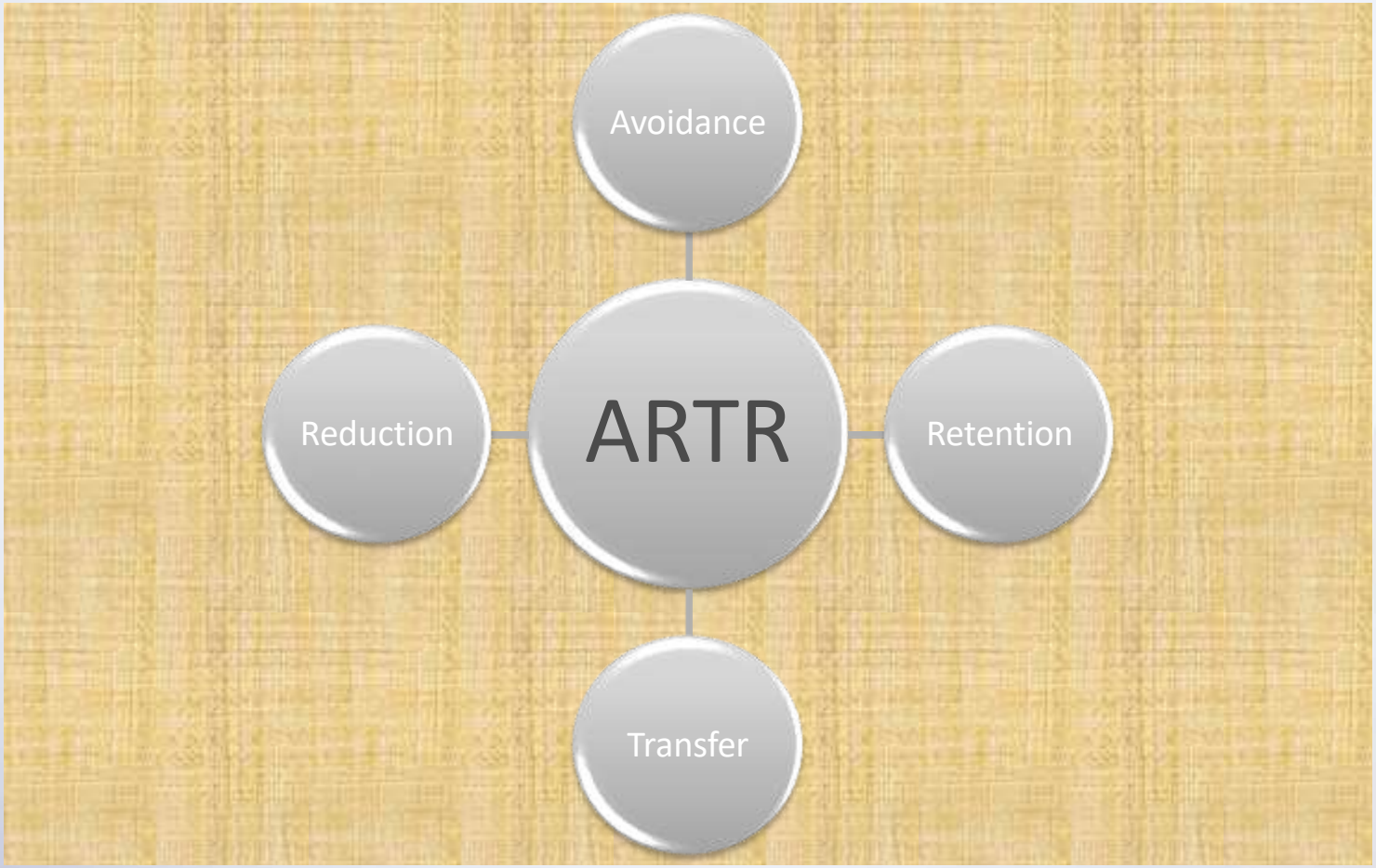
Overview- Property Risk Assessment

For a full risk evaluation of a facility (e.g. baseline visit), there are critical information should be gathered for the following four categories.

- Fire / Explosion Hazards
- Natural Disaster Hazards
- Human Elements
- Production Analysis

Identify Risk

Ways to Handle Risk



Methods of Risk Identification

Effective risk identification need to examine and processing various information's, with specific reference to:

- Organizational Chart
- Process Flow
- Checklist and Questionnaire
- Physical Inspection
- Fault Tree
- Hazard and Operability (HAZOP)

Qualitative Risk Assessment

General

- Simplest & least costly method
- Use for initial screening
- Risk Matrix approach
- Probability & Consequences

Insurer's Perspective

- Construction
- Protection
- Track Record of the client / Risk
- Loss History or the claim ratio

Quantitative Risk Assessment

General

- Resource-intensive approach
- QRA Approaches
  - Fault Tree Analysis
  - Failure modes & effects analysis

Insurer's Perspective

- Sum insured
- Maximum probable loss
- Occupation
- Exposure

Risk Control

Preventative controls are designed to reduce the possibility of undesirable outcomes. They are measures to stop a risk happening or an unwanted outcome arising:

Examples:

- Separation of duties;
- Limit specified actions only to authorized personnel such as signing off of designs by qualified and trained personnel;
- Authorization of price quotations;
- Allowing only trained press officers within an organization to talk to the media thus avoiding unwanted publicity.

Corrective controls are measures to limit the scope for loss and reduce any undesirable outcomes that have already occurred. These controls are a means of recovery against loss or damage.

Examples:

- Continuity planning.
- Contract terms that allow a supplier to recover goods that have not been paid for from a customer whose business is in receivership or administration.
- Insurance as it facilitates financial recovery when an insured risk materializes.

Directive controls are instructions or regulation designed to ensure that a particular outcome is achieved. They are important when people's behavior can prevent an undesirable event. Directive controls are commonly associated with health, safety and security.

Examples:

- Operational instructions for machinery;
- Staff training to certain skill levels before being allowed to work unsupervised ;
- Requirement to wear protective clothing while performing dangerous duties;
- Checklists, worksheets and test schedules to ensure that all critical aspects of a task; have been properly addressed and completed.

Detective controls are designed to identify unwanted occurrences that have already happened and are, therefore, only appropriate when it is possible to accept the loss or damage incurred.

E.g.

- Stock or other assets checks to detect theft or anomalies;
- Reconciliation authorized payments with bank statements to detect unauthorized transactions;
- Audits and inspections and similar quality controls look for causes of defects in products and procedures, with a view to introducing changes in the future.

Fire Risk Assessment

What is Fire Risk Assessment?

A fire risk assessment is an organized and methodical look at the premises, the activities carried on there and the likelihood that a fire could start and cause harm to those in and around the premises.

The aims of the fire risk assessment are:

- To identify the fire hazards.
- To reduce the risk of those hazards causing harm to as low as reasonably practicable.
- To decide what physical fire precautions and management arrangements are necessary to ensure the safety of people / property at premises if a fire does start.

Fire / Explosion Hazards

Investigated flammable gases/liquids storage and their handling process

- Dust explosion hazards
- Gas fired equipment explosion hazards

- Construction Material Investigation
- Plastic ducts
- Plastic insulations (roof, wall panels and ducts)

Storage Configuration

Video: Fire Risk Assessment

Identify Fire Hazards

Identify:

1. Sources of ignition
2. Sources of fuel
3. Sources of oxygen

Evaluation & Loss Prevention

Evaluate the risk of a fire occurring, provide cost-effective improvements; enabling the organization to remove or reduce fire hazards:

- Detection and warning
- Fire-fighting
- Escape routes
- Lighting
- Signs and notices
- Maintenance

What is a Fire?

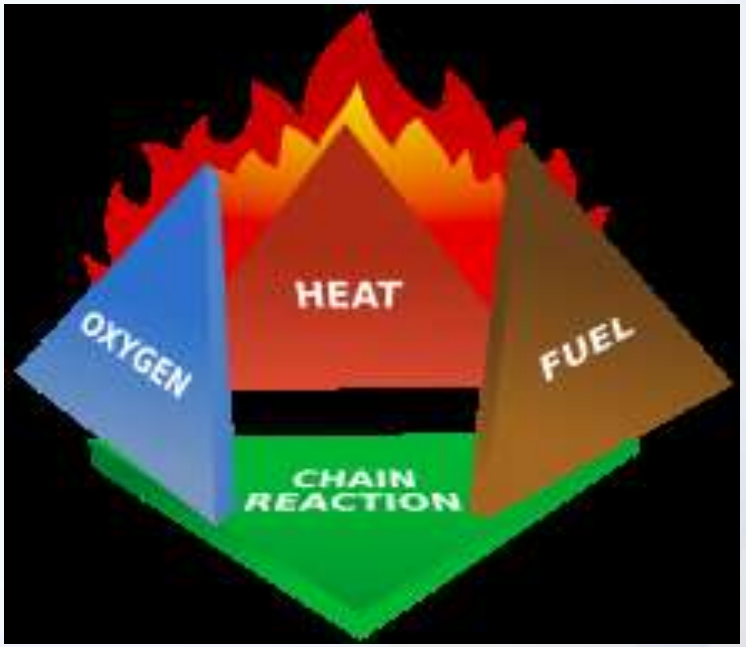
Fire is a rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light and various reaction products.

Fire Tetrahedron

Once ignited, a chain reaction must take place whereby fires can sustain their own heat by the further release of heat energy in the process of combustion and may propagate, provided there is a continuous supply of an oxidizer and fuel.

Fire Triangle

Fire Tetrahedron



Causes of Fire

General Causes of Fire loss	Major Causes of Fire loss
1. People	1. Heating and industrial process
2. Process	2. Spontaneous combustion
3. Heating System	3. Operating in or near flammable range.
4. Lighting and Power Systems	4. Smoking
5. Waste	5. Electrical apparatus
6. Material	6. Arson
7. Trade Process	7. Housekeeping
	8. Contractor and application of heat

Video: FMB

Fire Hazards of Material Used in Industry

Generally substance exist in one of three state:

- Solid
- Liquid
- Gas

Fire hazards attached to any specific material are two fold:

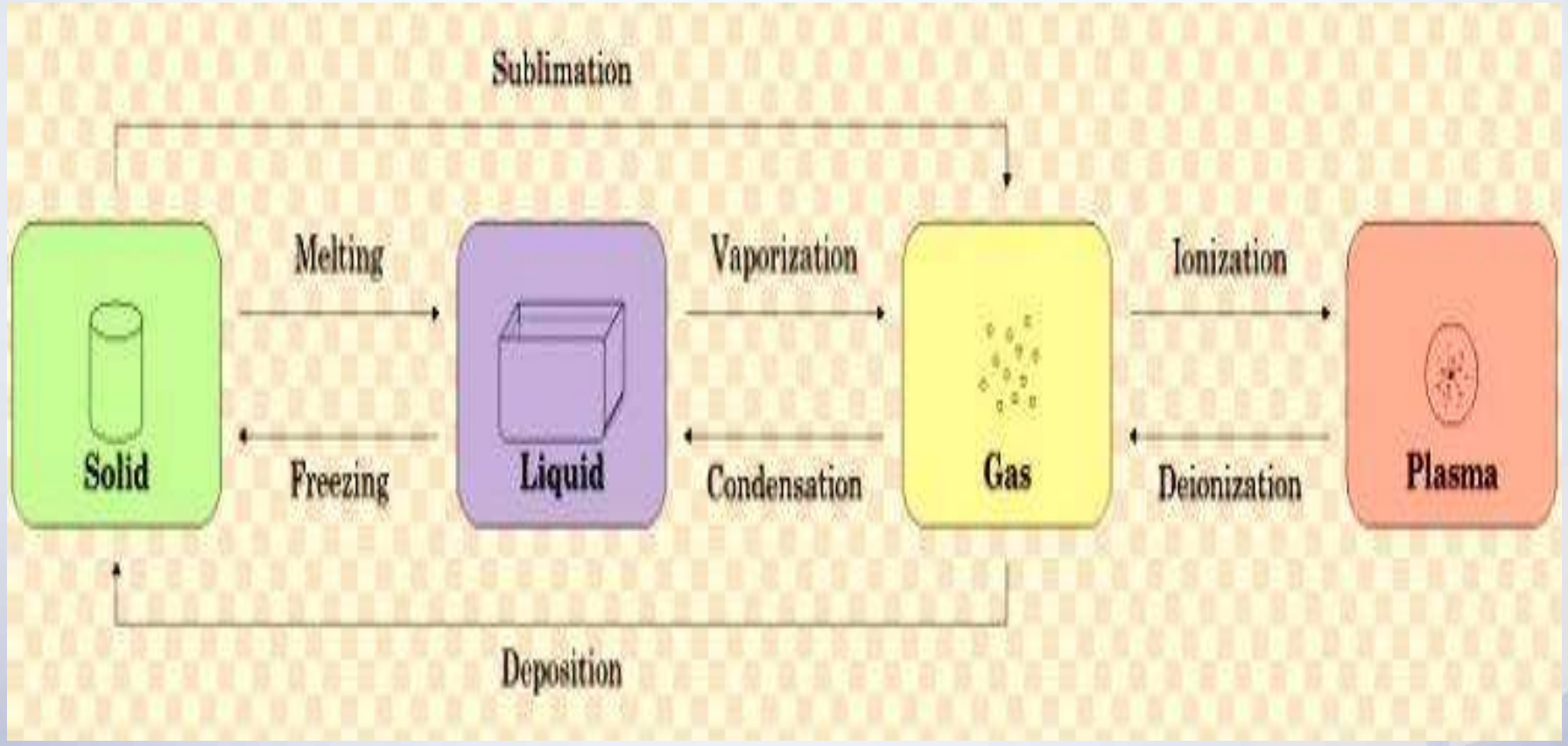
1. Its own characteristic will contain certain hazards
2. The way it is stored, handled and processed will certain hazards

Natural Hazards- Earthquake Exposures

- Fire after earthquakes
- Water damage after earthquakes
- Shake damages (Building, Storage, Equipment)

Phase Transition

The temperature of a substance governs its physical state.



Difference between:

- Flash point and Auto ignition temperature
- Flash point and Fire Point
- Backdraft and Flashover
- Flammable and Combustible Liquids

Relationship Between Propagation Hazard & Fire Load

Propagation Hazard: Risk of fire developing and spreading, involving an assessment of the quantity and nature of the combustible material exposed, i.e.

- Building
- Machinery, plant, fixture, fittings ad other contents,
- Stock in trade and raw material

Fire Load; Totality of the combustible elements in building, machinery etc., and stock is termed the fire load of the risk

How to calculate Fire Load of a Compartment:
Calorific Value x Mass (or volume) / Floor Area = Area Fire Loading Kj/m2

Structural Hazard

Consideration must be given to the extent to which design or layout may facilitate or restrict the spread of fire with in a building and the degree to which building is exposed to risk from fire in adjoining or adjacent buildings.

A fire in a building / premises may spread from its point of origin either:

- Vertically
- Horizontally

Video: Building Fire - Role of Oxygen

Classifying Fire

When deciding on what fire protection is appropriate for any given situation, it is important to assess the types of fire hazard that may be faced

Class of fire	Sym-bol	Type of combustible material	Type of fire	Examples
A		solid, non melting materials	glow and fla-mes	wood, paper, tex-tiles, coal, non melt-ing plastics
B		liquids and melting solid materials	flames	oils, solvents, wa-xes, melting plastics
C		Gases	flames	propane, butane, acetylene
D		Metals	glow	sodium, magnesium
E		A,B,C,D materials combined with installations charged with electric potential	glow and fla-mes	electric motors, switchyards, trans-formers

Comparison of fire classes

American	European	Australian/Asian	Fuel/Heat source
Class A	Class A	Class A	Ordinary combustibles
Class B	Class B	Class B	Flammable liquids
	Class C	Class C	Flammable gases
Class C	Class F/D	Class E	Electrical equipment
Class D	Class D	Class D	Combustible metals
Class K	Class F	Class F	Cooking oil or fat

For a fire to start, three things are needed:

1. Source of ignition;
2. Fuel; and
3. Oxygen.

If any one of these is missing, a fire cannot start. Taking measures to avoid the three coming together will therefore reduce the chances of a fire occurring.

How to identify potential ignition sources, the materials that might fuel a fire and the oxygen supplies which will help it burn?

Identify the Fire Hazard

- Have you identified all potential ignition sources?
- Have you identified all potential fuel sources?
- Have you identified all potential sources of oxygen?
- Have you made a note of your findings?

Evaluate the Fire risk

The management of the premises and the way people use it will have an effect on your evaluation of risk. In multi-occupied buildings you need to consider the risk generated by others in the building.

To evaluate the fire risk to property / people at the premises, you will need to understand the way fire can spread. Fire is spread by three methods:

1. Conduction
2. Convection
3. Radiation

Assessment of Fire Protection

Fire protection is the study and practice of mitigating the unwanted effects of potentially destructive fires.

FP is achieved via:

1. Active Fire Protection
2. Passive Fire Protection
3. Education

Active & Passive Fire Protection

Active and passive fire protection systems, although different, are important to a premises overall fire safety..

AFP uses systems that take action in putting out the fire, while PFP uses systems that help prevent the spread of fire and smoke

Having identified the fire hazards now need to remove or reduce those hazards if reasonably practicable to do so:

- Remove or reduce sources of ignition
- Remove or reduce sources of fuel
- Remove or reduce sources of oxygen
- Enhance Fire protection measures
- Limit the area to trained staff only.
- Increase staff training and awareness.

The level of fire protection should be proportional to the risk posed in order to reduce the remaining risk to a level as low as reasonably practicable.

The higher the risk of fire , the higher the standards of fire protection will need to be

Human Elements

- Emergency response plans
- Hot Work System
- Fire protection inspections
- Smoking Control Policy
- Equipment maintenance programs
- Business Contingency Plans

Video: Human Element (Process Hazard)

Loss Estimation

- Helps Underwriters to decide how much (what proportion) of a risk they can retain, and whether they need to purchase reinsurance for their share of that risk.
- Estimation only based on experience, there is no exact formula that risk engineer use to arrive at this figure.

Loss Estimation (Cont.)

It is important that the assessment is neither excessively high, nor excessively low:

- If it is set too high, the Underwriters will be buying reinsurance cover that they do not really need, or retaining smaller shares of risks than they could otherwise hold. In either case, premium income and the potential for profit will be curtailed.
- If it is set too low, then rates could be set too low and there is an increased risk that the chosen figure will be exceeded by a loss, which also affects their profit/loss ratios and affects their credibility and relationships with their reinsurers.

Loss Estimation (Cont.)

Calculation of loss estimation is normally based on three distinctly different scenarios.

1. Maximum Foreseeable Loss
2. Probable Maximum Loss
3. Normal Loss Expectancy

Basic Considerations

Three questions must be addressed:-

1. What is at risk?
2. What is it worth?
3. How much of it is likely to be damaged, and to what extent?

Consider these variables

1. Building construction
2. Combustibility of contents
3. Susceptibility of contents
4. Public and private protection

Maximum Foreseeable Loss (MFL) Scenario

Potential damage caused by a fire starting in the most vulnerable area within a building or facility with all its active fire systems impaired or unavailable at the time of the incident.

Scenario assumes a **“free-burn”** until all combustible material throughout the fire area is consumed.

Additionally considered:

1. Potential business interruption loss exposure
2. Environmental pollution arising from the fire etc.

Normal Loss Expectancy (NLE) Scenario

The NLE (Normal Loss Expectancy) by definition is the “most likely” loss scenario and like the MFL and PML scenarios is based on a fire starting within the most vulnerable area of the facility, however, the NLE scenario assumes all available fire systems are in service at the time of the fire.

Maximum Probable Loss (MPL) Scenario

Maximum Possible Loss (MPL) is that which may occur when, the most unfavorable circumstances being more or less exceptionally combined, the fire is only stopped by **impassable** obstacles or **lack** of substance. (*CEA = Comite European des Assurances)*

Impassable obstacle means:

- Any space between buildings and / or
- Any obstacle

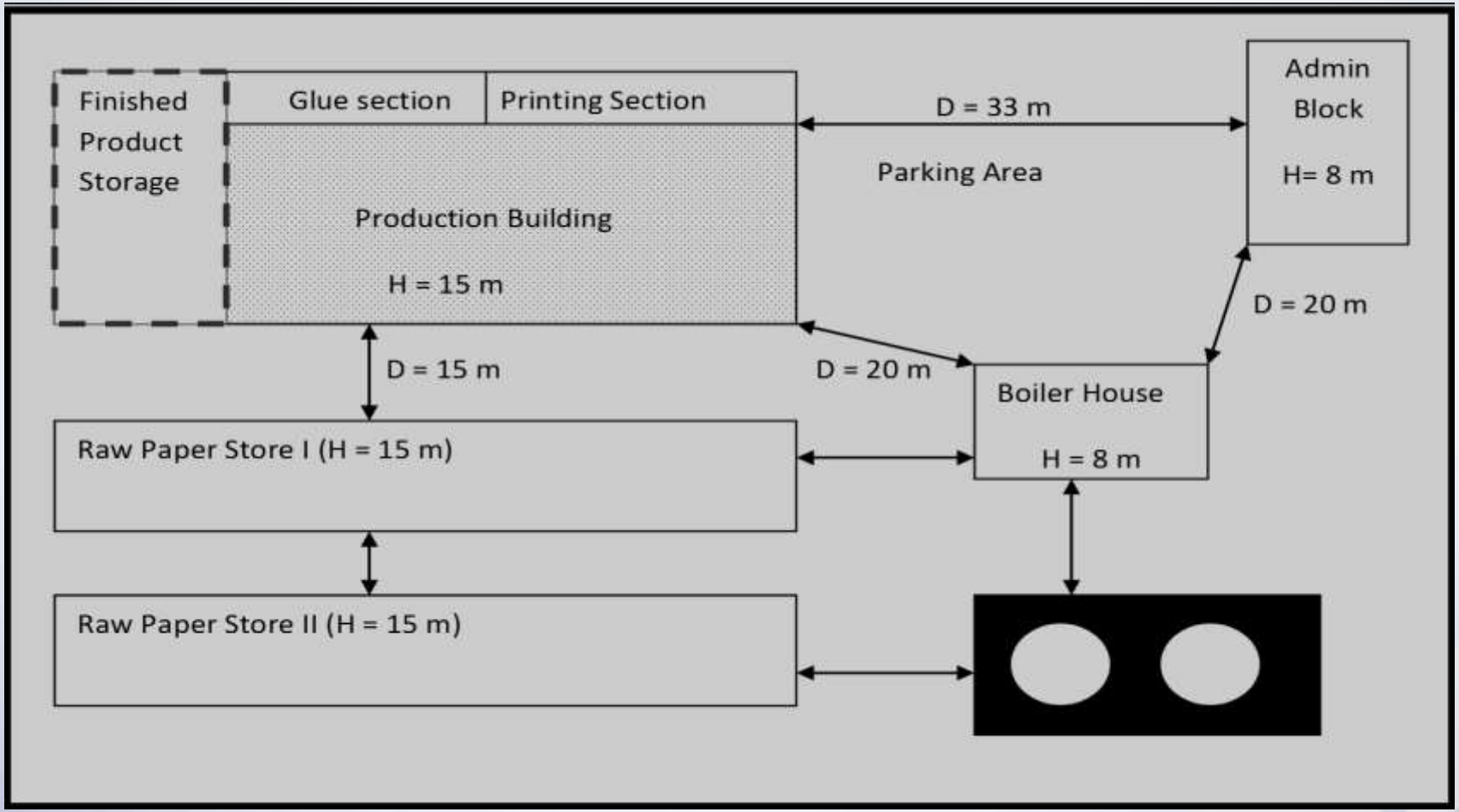
Which makes all propagation of fire (or the shock wave) impossible.

Factors to Reduces MPL Value

Following factors may contribute to a reduction in the MPL:

- Physical separation of buildings: compliance with minimum distance requirements.
- Structural separation of buildings: creation of fire zones using fire walls, compartments etc.
- Absence of fire load.

Scenario


Finished Product Storage
Glue section
Printing Section
Production Building
H = 15 m
D = 33 m
Parking Area
Admin Block
H= 8 m
D = 20 m
D = 15 m
D = 20 m
Boiler House
H = 8 m
Raw Paper Store I (H = 15 m)
Raw Paper Store II (H = 15 m)

Purpose of Survey Report

Survey reports are intended to:

- Evaluate whether relevant specifications have been complied with
- Identify any unusual features which might influence an underwriter
- Provide more detail than an underwriting submission
- Make recommendations for risk improvements

A report which makes clear that a risk is of poor quality can cause an underwriter to:

- Refuse to offer terms
- Charge a higher premium
- Restrict cover

Survey Report Highlight's

Fire Perspective

The survey identifies and comments on:

- Site location, spread of buildings and exposure from the surroundings.
- Brief details of construction and occupation, concentrating on features affecting the fire risk.
- Flammable liquids and hazardous materials use and storage.
- Overview of process carryout and potential fire risks.
- Fire extinguishing appliances, automatic fire detection, fire fighting water supplies and any sprinkler protection or gas extinguishing systems.
- Fire Brigade attendance and access.
- Management procedures including risk assessment, fire safety training, housekeeping and control of contractors.
- Security against arson.

Security Perspective

The survey identifies and comments on:

- Site security and access points.
- Physical security of the building to include construction, doors and windows.
- Access to the building both inside and outside normal working hours.
- Electronic protection devices such as intruder alarms and CCTV.
- Management procedures for locking up, key control and staff instructions.
- Cash retention, safes and valuable equipment.
- Vulnerable areas within the building.

Case Study & Video: Fire From Ice

Quiz