Sonatrach – MOU Project

Course EHS

Site / Lieu: Hassi R' Mel
Period / Durée 25-26/11/2013

Agenda

HSE COURSE

Introduction to HSE

- Introduction and definitions
- HSE Supervisor role and responsibilities
- Hazard assessment and HEMP
- HSE Tools

General Protective Measures:

- Personal protective equipment (PPE)
- Warning Signals

Monitoring HSE in Operations trough HSE Tools applications:

- Human Error hazards and controls
- Fires and explosions hazards and controls
- Mechanical hazards and controls
- Lifting operations hazards and controls
- Electricity hazards and controls
- Working at height hazards and controls
- Confined spaces hazards and controls
- Slips trips and falls hazards and controls
- Movement of Plant and Vehicles hazards and controls
- Groundwork and excavations hazards and controls

Introduction: risk and occupational safety

Safety: Strategies aimed at the prevention of accidents and/or reducing entity of damages by using and designing proper techniques and technologies

Hazard *(P)*: Anything with the potential to cause harm, including ill health or injury, damage to property, plant, products or the environment; production losses or increased liabilities.

Risk *(R)*: Combination of the likelihood (or probability, or frequency) and consequence(s) of a specified hazardous event occurring

$$P = f(M)$$

$$R = f(f, M)$$

TARGET IDENTIFICATION

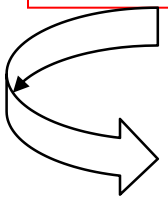
f Expected frequency of the event

M Magnitude (Severity of the event)

Introduction: risk and occupational safety

Likelyhood:

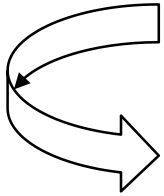
The possibility that a credible event takes place. Usually quantified as an expected frequency of the event



Frequency:

In the specific context is expressed as the probability of the event over a reference time (usually: number of events / year)

M (Magnitude): quantitified as the **severity** of a reference damage



Severity:

Type and entity of damages to plants, equipment ….

Type of injuries, illness, number of days in ospital, permanent injuries …

Introduction: risk and occupational safety

Occupational Safety:

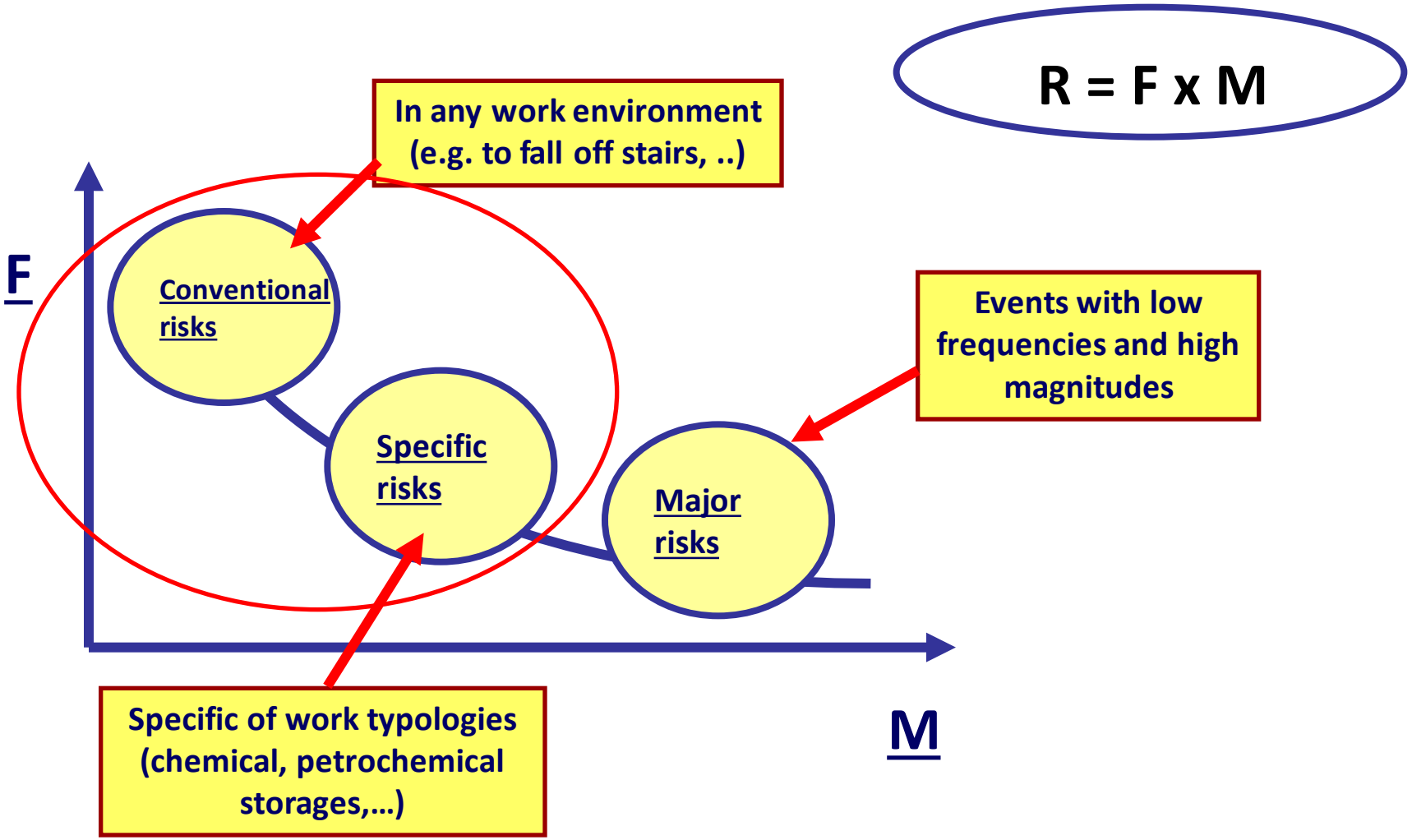
deals with hazards due to accidents at work and to long-term effects of workers exposure to hazards present on workplace (hazardous chemicals, noise, etc.)

Operational Safety:

deals with the management of all hazards present during plant operations

- ***Target***: humans
- ***Frequency***: high
- ***Magnitude:*** low

Introduction: risk and occupational safety



Accident, Incident, Near-Miss Defined

Accident

Unexpected and sudden event causing a psychophysical injury to the worker

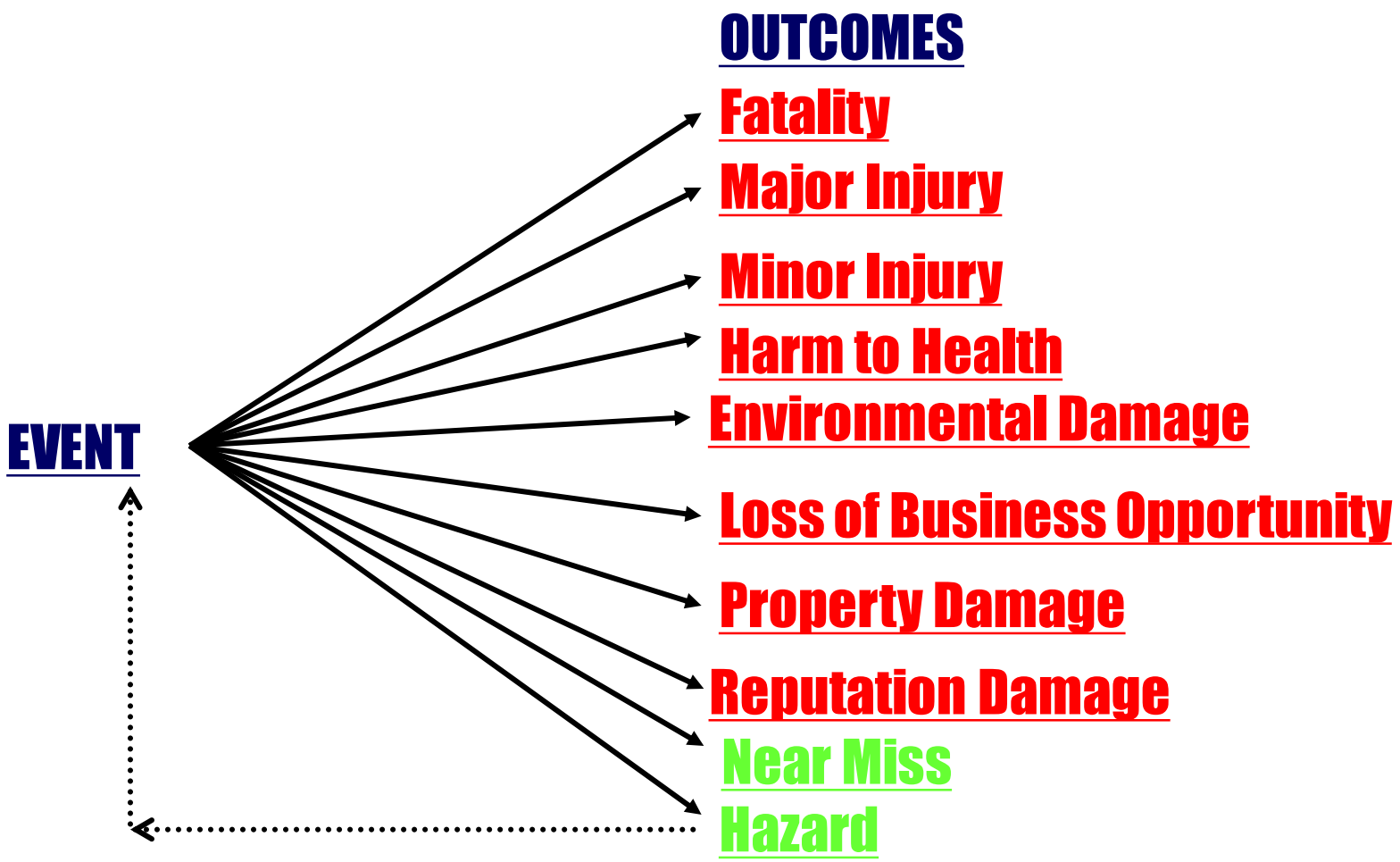
Incident

Unexpected and sudden event which, in addition to disrupting normal work conduction, causes damages to plants, equipment, etc. without involving persons in terms of psychophysical injuries

Near-miss

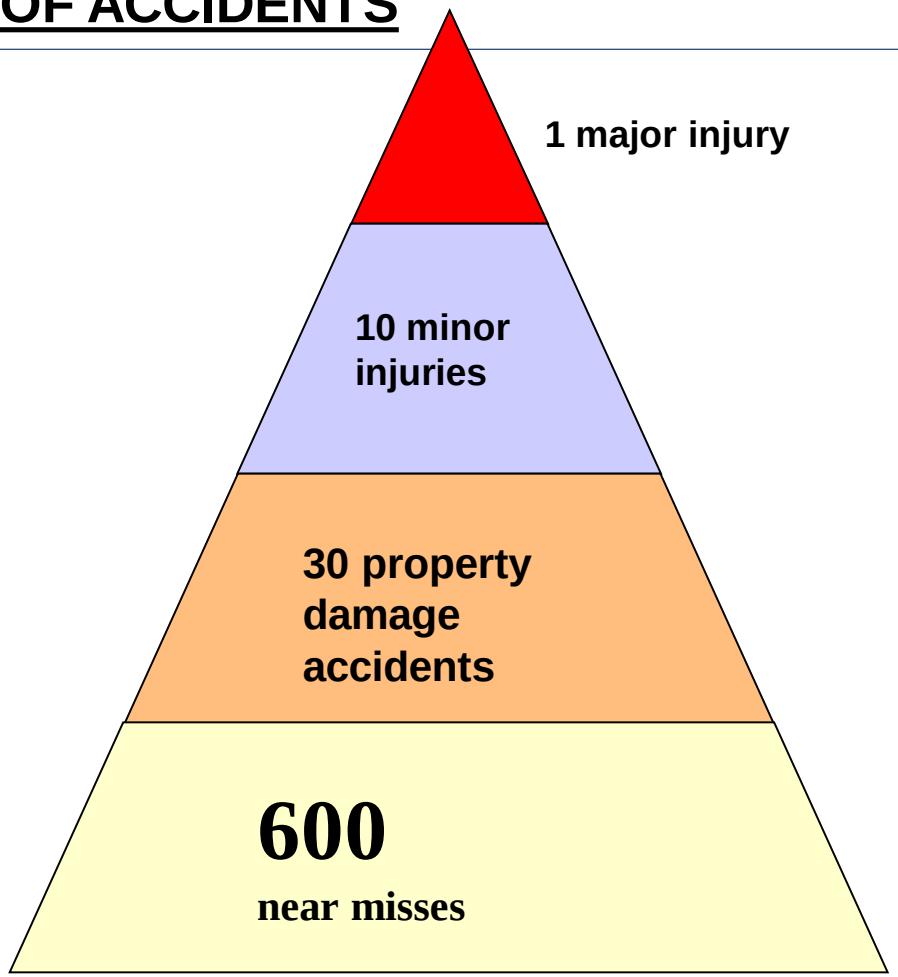
Abnormal event likely to affect normal work conduction and, in adverse circumstances, might have caused an incident and / or accident

Incident, Accidents and Near Miss, Types



THEORY OF ACCIDENTS

Detailed research in 1931 by Heinrich indicated that out of 330 incidents occurring one would result in a major injury, 29 would result in minor injuries and 300 would cause no injury i.e. a "near miss". This 1969 example by F. Bird is made up from averages over a great number of different industry sectors. The same principle applies.

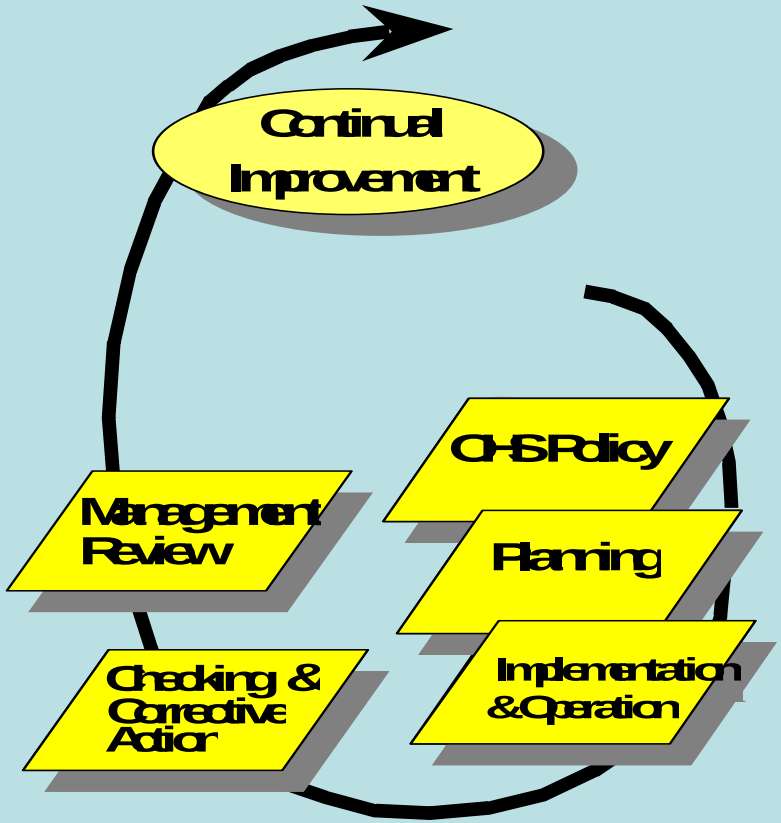


This is why it is vital to control "near misses" which are the potential sources of personal injury and/or damage.

Identification and control of "near misses" leads to a safer work place, fewer incidents and injuries and less damage to property or product.

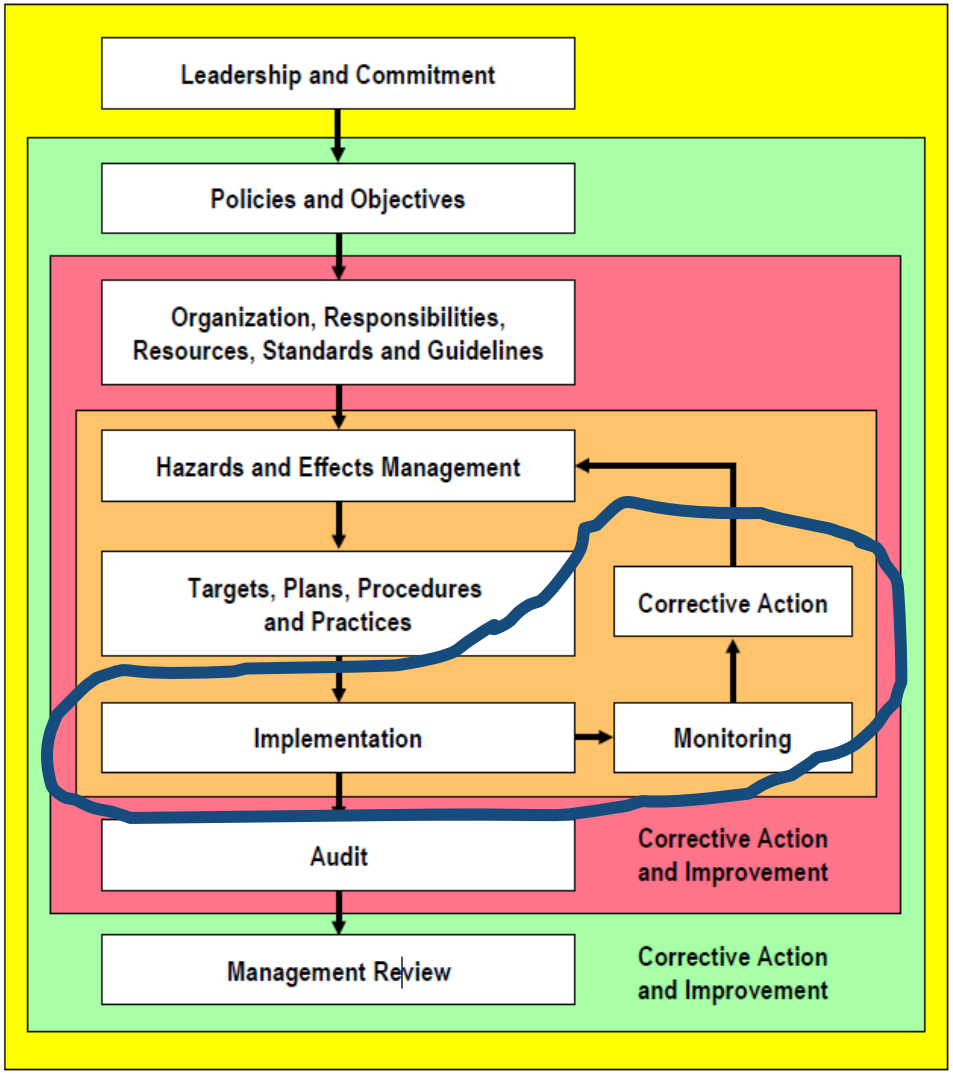
Key Elements of a H&S Management System

OHSAS 18001



1. **OH&S Policy**
   - 1.1. The Health & Safety Policy
2. **Planning**
   - 2.1. Planning for hazard identification, risk assessment and control
   - 2.2. Legal and other requirements
   - 2.3. Objectives
   - 2.4. OH&S management programme(s)
3. **Implementation and Operation**
   - 3.1. Structure and responsibility
   - 3.2. Training, awareness and competence
   - 3.3. Consultation and Communication
   - 3.4. Documentation
   - 3.5. Document and data control
   - 3.6. Operational Control
   - 3.7. Emergency preparedness and response
4. **Checking and Corrective Action**
   - 4.1. Performance measurement and monitoring
   - 4.2. Accidents, incidents, non-conformances and corrective and preventative action
   - 4.3. Records and record management
   - 4.4. Audit
5. **Management Review**
   - 5.1. Management Review

Introduction – HSE management system



Definitions

- Major Injuries:
  - Fracture other than to fingers, thumbs or toes
  - Amputation
  - Dislocation of shoulder, hip, knee or spine
  - Loss of sight
  - Chemical or hot metal burn to eye
  - Electric shock (in certain circumstances)
  - Admittance to hospital for more than 24 hours
  - Unconsciousness or resuscitation
  - Asphyxia
  - Biological agents

Definitions

- Dangerous Occurrences:
  - Collapse of lifting equipment
  - Explosion
  - Contact with overhead power lines
  - Electrical short circuit or overload causing fire or explosion
  - Accidental release of a biological agent
  - Malfunction of breathing equipment
  - Failure of diving equipment
  - Collapse of scaffold over 5m high, or erected near water
  - Collision of a train with any vehicle
  - Failure of load bearing fairground equipment, or derailment or collision of cars or trains
  - Certain incidents involving carriage of dangerous substances by road
  - Unintended collapses of structures
  - Explosion or fire causing suspension of normal work for over 24 hours
  - Accidental release of any substance which may damage health

Definitions

- Diseases:
  - Certain poisonings
  - Some skin diseases e.g. dermatitis, skin cancer, chrome ulcer
  - Lung diseases including asthma, farmers lung, asbestosis, pneumoconiosis, mesothelioma
  - Infections such as leptospirosis, hepatitis, tuberculosis, anthrax, legionellosis and tetanus
  - Other conditions such as occupational cancer, certain musculoskeletal disorders and HAVS

Monitoring HSE in Operations

General Protective Measures

Risk Assessments (HSE tool)

Safe Systems of Work (HSE tool)

Personal Protective Equipment

Signs and Warning Signals

Monitoring HSE in Operations: (Activity-Hazards) List

HSE in Operations (Activity-Hazards) list:

- Human Error – hazards and controls
- Fires and explosions hazards and controls
- Mechanical hazards and controls
- Lifting operations hazards and controls
- Electricity hazards and controls
- Working at height hazards and controls
- Confined spaces hazards and controls
- Slips trips and falls
- Movement of Plant and Vehicles hazards and controls
- Groundwork and excavations hazards and controls

Monitoring HSE in Operations:

Preventative measures that are applicable to all activities:

- Risk Assessments
- Safe Systems of Work
- Personal Protective Equipment
- Signs and Warning Signals

Risk Assessment

- The key to all incident and accident prevention is Risk Assessment
- The hazard that is not identified and evaluated will not be controlled
- The risk assessment provides the basis for implementing controls to adequately reduce the risk to as low as reasonably practicable (ALARP)
- HEMP is the general process by which HSE Supervisor can manage risk assessments

General Protective Measures:
Safe Systems of Work Components

A Safe System of Work

- A method of doing a job which eliminates identified hazards, controls or protects from residual hazards and plans the controlled completion of the work with minimum risk to people, the environment or assets

Safe procedures and Safe working behaviour

- The Task
- The materials involved
- The plant, machinery, equipment
- The workplace
- External environment
- The people

This is referred to HSE Tools.

General Protective Measures:
Personal Protective Equipment

- This section of the module covers the principles of Personal Protective Equipment (PPE)
- The use of such PPE
- The Policy and Standards for the use of such PPE
- Detailed specifications for PPE can be found in – Minimum Requirements and Standards for Personal Protective Equipment (PPE)

PPE are HSE Tools too. The most important difference between PPE and previous HSE tools is that PPE couldn't permit to prevent but only to protect single workers from a hazard.

Personal Protective Equipment: Hierarchy of Controls

Remember that one of HSE aims is to provide a

safe place of work with no harm to people

Hierarchy of effectiveness:

1. Elimination
2. Substitution
3. Engineering
4. Administrative
5. Personal protective equipment (PPE)
6. Welfare and Arrangements

Personal Protective Equipment: Limitations of PPE

- Low level control
- Often just simple barrier between individual and hazard
- Does not remove or reduce the hazard
- Only effective if worn properly
- Can easily be rendered ineffective
- Does not protect others in the area
- May transfer hazard through contamination
- May introduce additional hazards
- Best used as a supplementary protection

Personal Protective Equipment: Principles of PPE Use

PPE should be selected based on:

- Risk assessment
- The nature of the hazard
- Level of protection required
- Equipment performance level
- Compatibility with other PPE
- Personal factors
- Work related factors
- Training/instruction in use, storage and inspection must be provided
- Storage facilities must be provided
- PPE must be maintained to be effective
- Supervision and monitoring
- System for reporting loss or defects

Personal Protective Equipment: PPE Policy

- "PPE is required to be worn by all personnel and visitors on sites"
- Personal protective equipment (PPE) is required for physical and chemical hazards that cannot be eliminated or reduced to acceptable levels through engineering or administrative control measures"
- "When hazards cannot be eliminated or sufficiently reduced by engineering or administrative controls, the use of the appropriate PPE for the specific hazard is mandatory"

Type of PPE

- Eye and face protection
- Head protection
- Hearing Protection
- Respiratory protection
- Hand protection
- Foot protection
- Body protection
- Fall protection
- Flotation Aids

In addition to PPE: Signs and Warning Systems

- Safety Signs are required by law and policy to inform personnel of local area conditions and hazards
- They may be visual or audible
- They may be temporary or permanent but they MUST be in good condition
- Think of some of the signs and warning systems you see regularly

- The shape and colour of the sign is also an indication of the type of information displayed
- Round for Prohibition and Mandatory Signs
- Triangular for Warning Signs
- Square or rectangular for Safety information and Condition Signs

The Hazards and Effects Management Process (HEMP)

The structured hazard analysis methodology involving hazard identification, assessment, control and recovery and comparison with screening and performance criteria." (Source EP 95-0300).

Objective of HEMP

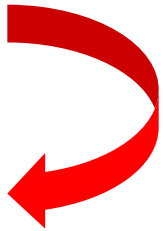
To provide a structured approach towards the analysis of hazards throughout the life cycle of an asset. This is achieved through use of structured tools and techniques that allow hazards to be identified, assessed, and when fully understood in both situation and context, to be controlled and if necessary recovered from if control is lost.

When to apply HEMP

HEMP should always be applied at the following times:

- **At the start of each life cycle phase for an asset;**
- **Prior to any major change (structural, operational, or maintenance) to an asset;**
- **Prior to the execution of an activity;**
- **Prior to the introduction of a new hazard to the operation;**
- **Prior to the start of any contracted operation.**

- **hazards appear to pose a significant threat or;**
- **established controls are known to be inadequate to meet standards or;**
- **continuous improvement in HSE performance is required.**



HEMP PROCESS

1. Identification of Hazards and Effects

A systematic search for hazards and their effects, to include hazardous events, hazards, threats, escalation factors

2. Evaluation of risk

Assessment of hazard and effects to establish probability of occurrence and severity of exposure

3. Recording of Hazards and Effects

Formal record of assessment using pre-defined forms

4. Comparison with Objectives and Performance Criteria

Gap analysis between assessed risk and acceptable risk (against PDO standards)

5. Risk Reduction Criteria

Decision on best approach to reduce risk based upon cost benefit analysis

STEP 1 – Identifying Hazards

- Hazards generally fall into four main groups:

1. PHISICAL
2. BIOLOGICAL
3. CHEMICAL
4. ERGONOMIC
5. PSYCOLOGICAL

Physical Hazard

- Causes damage to the body, e.g.:
  - Working with tools and machinery
  - Working at height
  - Electrical work
  - Exposure to noise or vibrations

Chemical Hazard

- Able to produce health effects, e.g.:
  - Dusts and fibers
  - Fumes and gases
  - Corrosives, poisons

Biological Hazard

- Cause ill health through contact with:
  - Micro-organism (bacteria, viruses, fungi)
  - Insects (mites, parasites)
  - Human, animal waste
  - Sharps (needles, scalpels)

Ergonomic Hazard

- Harm caused by:
  - Poor working posture
  - Poor workstation layout
  - Confined space work
  - Unsuitable equipment

Psychological Hazard

- High pressure responsibilities
- Poor communications (lone workers)
- Working in confined spaces (claustrophobia)
- Long working hours
- Long rotation shifts
- Post-traumatic stress
- Remote location
- Fatigue related sickness

Who can be harmed and how?

- Employees
  - Directly involved
  - Affected by the process
- Non-Employees
  - Visitors
  - Contractors
  - Members of the public

Groups at Particular Risk

- Young people
- New and expectant mothers
- Home and traveling workers
- Disabled persons
- Lone workers
- Maintenance workers

STEP 2 – Evaluating the Risk

- Qualitative vs Quantitative Assessment?
- Risk is a measure of:
  - Likelihood
    - The likelihood that a hazard will cause harm
  - Severity
    - The reasonably foreseeable consequence if that event occurred

Factors affecting the likelihood

- Duration and frequency of exposure
  - How often? For how long?
- Competence of those exposed
  - Properly trained?
- Condition of equipment
  - Use of damaged equipment will increase chance of failure

Factors Affecting the Severity

- Nature and intensity of hazard
  - How far? How high? How heavy?
- Duration and frequency of exposure
  - ill health increases with prolonged or repeated exposure
- Availability of First-Aid
  - Deterioration from delayed treatment
- Numbers exposed
  - Higher numbers of casualties

Consider existing control measures

- Estimation of the risk should be made after consideration of what we are currently doing to remove or control the hazard

Applying a hierarchy to control risks

- Control measure selection based on degree of the risk:
  - The greater the risk, the greater the effort required to control it
  - The greater the risk, the further up the hierarchy you may have to go

Hierarchy of Controls (1 of 2)

- Elimination
  - Do the work a different way?
- Substitution
  - Swap for something safer?
- Engineering Controls
  - Physical controls to separate the worker from the hazard?

Hierarchy of Controls (2 of 2)

- Administrative Controls
  - Procedures, safe systems, training
- Personal Protective Equipment (PPE)
  - Issue if risks remain after considering other control measures (last resort)
- Welfare and Arrangements
  - Rest areas, toilets, washing facilities, first aid, etc.

Risk Reducing Measures (1/3)

- Physical Safeguards:
  - Isolation Systems - Lockouts
  - Barriers
  - Mechanical handling
  - Fit for purpose tools and equipment usage

Risk Reducing Measures (2/3)

- Procedural Safeguards:
  - Operative procedures
  - Job Planning
  - PTW system
  - Pre Job meetings
  - Drills

Risk Reducing Measures (3/3)

- Human Controls:
  - Use of competent, qualified personnel
  - Special supervision
  - Clear understanding of roles and responsibilities
  - Constant task monitoring by Supervisors
  - Motivation and involvement

Calculating the Risks

Risk = Likelihood × Severity

Consider the Likehood

- Likehood can be recorded in the following format:

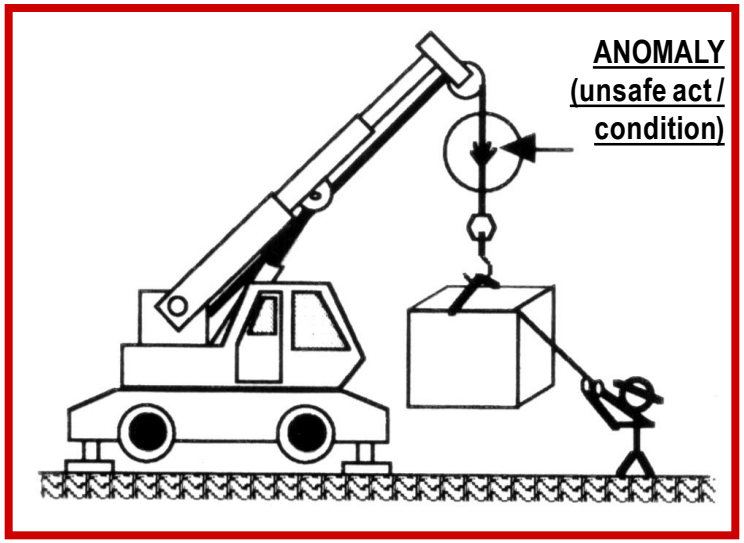
UNLIKELY	1
MAY HAPPEN	2
LIKELY	3
VERY LIKELY	4
CERTAIN	5

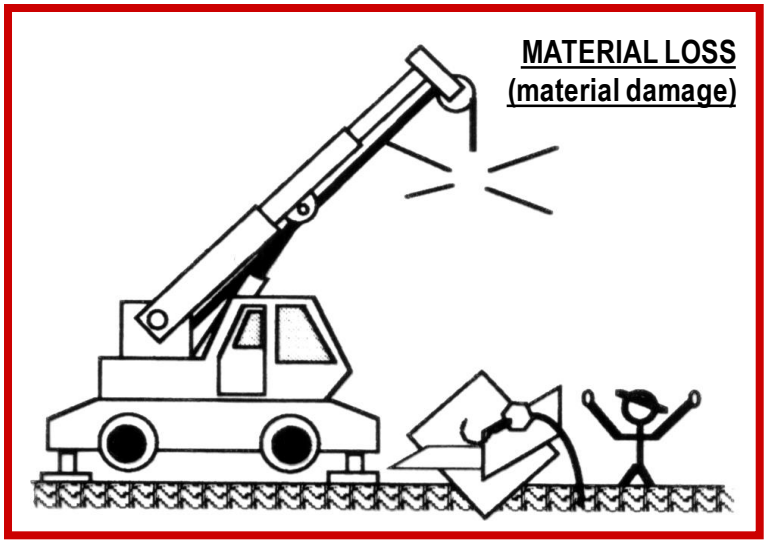
Consider the Severity

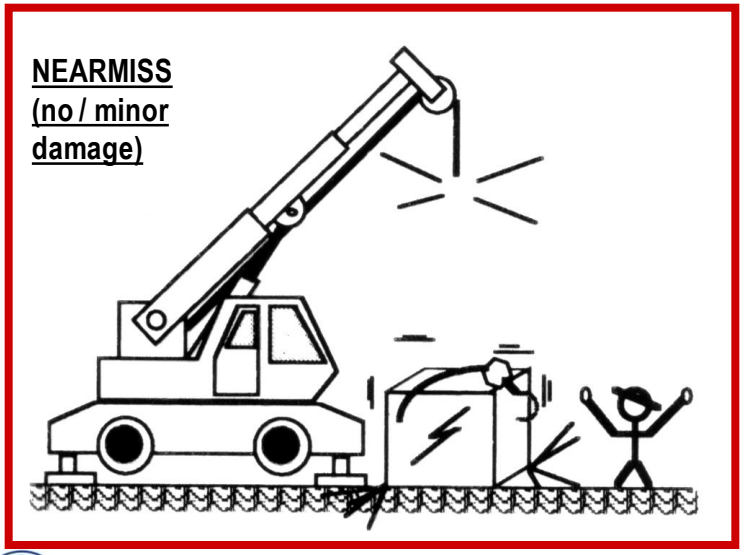
- Severity can be recorded in the following format:

MINOR INJURY (first aid on site)	1
MINOR INJURY (treatment off site)	2
Over 3 day injury	3
MAJOR INJURY (RIDDOR reportable)	4
DEATH	5

Example of severity of an event







STEP 3 – Record your Findings

- To record the results of the identification and evaluation stage for those hazardous events where risk is significant.
- 1. The information can be communicated to others;
- 2. A record exists when challenged by inspection or audit.

- **Key aspects**
  - **Preventive and Protective measures in place**
  - **Evidence of an evaluation of hazards and risks**
  - **Any further action required**

Records must be retrievable

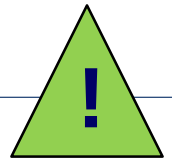
STEP 4 – Comparison with Objectives and Performance Criteria

- To establish the gap between the risk as evaluated in previous stages and acceptable risk as defined in Company standards.
- A list of unacceptable risks ranked against severity of exposure and likelihood of occurrence.
- **HSE Risk Matrix**

Risk Rating Matrix

	Certain (5)	Very Likely (4)	Likely (3)	May Happen (2)	Unlikely (1)
Death (5)	25	20	15	10	5
Major injury (4)	20	16	12	8	4
Over 3 day injury (3)	15	12	9	6	3
Minor Injury (treat. off site) (2)	10	8	6	4	2
Minor Injury (First Aid on site) (1)	5	4	3	2	1

Risk Priority Matrix



SCORE	PRIORITY	ACTION
1 - 4	LOW	This represents a low risk, although control measures must be maintained.
5 - 10	MEDIUM	ALARP zone. Action required soon to control the process. Measures may be necessary in short term.
11 - 25	HIGH	Unacceptable level of risk. The process needs to be reviewed as first priority.

STEP 5 - Additional risk reduction Measures

- Consider?
  - How great is the risk?
  - How good are your control measures?
  - Are you doing enough to prevent/reduce the effect of the harm (ALARP)?

- What more do you need to do?
  - Remember the hierarchy of controls

As Low As Reasonable Practicable (ALARP)

"A risk has been reduced to As Low as Reasonably Practicable when it can be demonstrated (qualitative or quantitative) that the cost of further measures (Time/Effort/Money) clearly outweighs the benefits in the risk reduction they bring about."

Managing Recommendations

- Review meeting and handover
  - Sign-off procedures?
- Line management responsibilities for implementing controls
  - Create action plans
  - Designate responsibilities

Risk Assessment Form

		Risk Assessment Record Form				RISK ASSESSMENT TITLE _____							Form no. 0029-01		
													Date	01-01-2010	
						Location: _____									
		Hazards				Risk									
Ref.	Area	Activity	Hazard Guideword	Hazardous Event	Potential Consequence	C*				L	R	Risk Reduction Measures To be Enforced	Residual Risk Level	Risk Reduction Measures To Be Developed	Action Req'd Y/N
						S	E	A	R						
1.															
1.1															
2.															

* Safety; Environment; Asset; Reputation

Applicable HSE Tools

HSE Tools that are applicable to all activities:

- Risk based approach
- Permit To Work System
- Toolbox Talk
- STOP - Behavioural Based System
- SIMOPS
- Emergency plan

Risk Based Approach

Risk Based Approach

Risk Based approach focuses attention on those aspects of the design that have the highest reliability risk and therefore the biggest reward for successful reliability improvement.

Permit to Work System

Initiation

- Do you need a permit to work for your activity?
- Task Risk Assessment
  - Detailed Scope
  - Emergency plan established and tested
  - All reasonable measures are taken to ensure the safety of those who are or may be affected by the work
  - Work effectively communicated to all those involved

Approval

Permit to Work Issued by a Competent Authority
Simultaneous Operations
    Who else might be affected by the work being undertaken?
Management of Change
Isolations
    Procedure
    Certification
    Process: Locked with chain and padlock
    Electrical: Locked with chain and padlock
    Mechanical: Locked with chain and padlock
    Sanction to Test
    Cascading Isolations

Carry Out

- All equipment must be certified and fit for purpose
- PTW Displayed

  At work site

  In permit office or control room
- A new PTW does not negate the safety conditions of the old one
- Suspended Permits

  Live until cancelled

  Maintained in permit recording system

  Work cannot continue until the issuing authority has verified that it is safe to do so

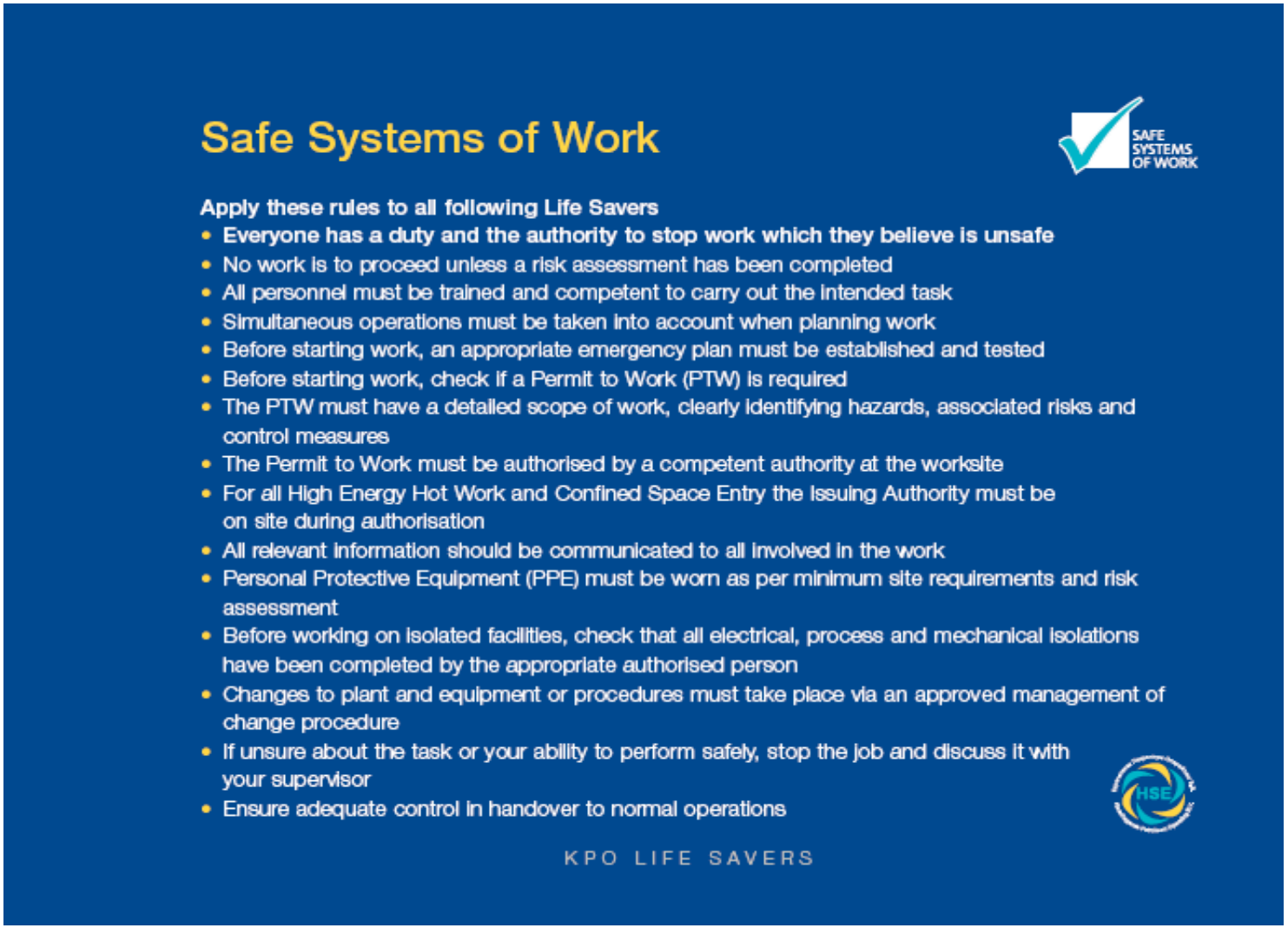
Handover

The Work Permit Procedures may include specific types of permits e.g:

Cold Work Permit
Hot Work Permit
Confined Space Entry Permit
Excavation Permit
Asbestos Removal Permit
High Voltage Access Permit
Explosive/Radioactive Permit
Pressure Systems Permit

→ Ensure adequate handover to normal operations.

Safe Systems of Work



HSE Meetings - Toolbox Talks

Why?

- The open, informal atmosphere encourages questions and discussion that “personalize” the issue of HSE-Safety by focusing on its day-to-day applications.

- Toolbox talks are intended to instruct and support workers about creating and maintaining safer work conditions, and attendance is mandatory.
- There are several facets to successful and useful toolbox talks. As a general rule, the talks are short and they are kept interesting and relevant. The goal is to empower employees so that they can recognize, avoid, report, and correct HSE-Safety hazards.

What

They Encourage HSE-Safety Awareness:

- Other means of getting the safety message across are often too easily ignored. But when a group of workers gets together to discuss the hazards they have encountered and the steps they can take to eliminate them, it increases each worker's safety consciousness.

They Get Employees Actively Involved:

- They demand feedback. They get employees thinking about safety and encourage them to come up with ideas and suggestions for preventing accidents and minimizing the hazards with which they are most familiar.

They Motivate Employees to Follow Proper HSE-Safety Procedures:

- Group meetings are the best places to demonstrate the sense of personal protective equipment, proper lifting techniques, and other specific safety procedures.

What

They Can Nip HSE-Safety Hazards in the Bud:

- A HSE-Safety meeting is the time to pinpoint minor hazards before they result in real problems. It also presents a good opportunity to discuss hazards that are inherent in the environment and that experienced employees are likely to take for granted.

They Introduce Workers to New HSE-Safety Rules, Equipment,

and Preventive Practices:

- In addition to introducing new things, a HSE-Safety meeting is a good time to reinforce the importance of long-standing safety procedures and to remind employees of the reasons behind them.

They Provide Vital Information on Accident Causes and Types:

- Regular meetings are the best way of keeping employees up-to-date on the hazards in their environment and what the company is doing about them. Reading and discussing accidents that have happened to company employees emphasizes the need for safety.

STOP – Behavioural Based Safety (BBS) Systems

Aim

- Effective STOP/BBS programmes promote personnel involvement and the adoption of safe behaviours in the workplace to further improve HSE performance.
- The STOP/BBS programmes support the HSE Policy commitment to implement safe working and fitness to work programmes to pursue the goal of no harm to the health of, or injury to, people and protect the environment and business assets. It does this by active encouragement for personnel to plan and perform observations in the workplace to identify and correct the root cause of unsafe behaviours before they lead to incidents.

Process Flow

- Planning of Observation
- Performing the Observation
- Immediate intervention
- Completion of Observation Card
- Tracking of Observation Data
- Trending and Analysing Observation Data
- Establishing Corrective Actions
- Implementation of Corrective Actions
- Reviewing Performance

SIMOPS

A definition…

- Activities performed by different departments or Contractors that, due to the proximity between their work locations, may generate adverse impact to each other.

Other definition…

- Those activities for which either functional group must advise the other organisation whenever they are to be carried out; Simultaneous Operations (SIMOPS) are defined as any two or more different sets of activities (Macro-activities) carried out, within a defined area, by different organizations (Functional Groups) or under different management systems that, because of their proximity or other critical factors, could interact adversely with each other.

SIMOPS are also:

- Those activities for which dual authorisation is required;
- When Operations (Production and Maintenance), Well Operations, General Projects, Development or a Sub-Contractor (**SIMOPS Originators**) need to undertake or take control of an activity simultaneously;
- When new installed equipment at any location is formally handed over to Operations and General Projects/Development or Sub-Contractor continues work at the same location;
- When an area that is formally handed over to General Projects/Development contains currently operating process plant and equipment and General Projects/Development commences additional work;
- When Workover, Drilling rig or rigless activity operations are in close proximity to a fixed facility (operational or under construction). Examples are activities such as well clean up, testing and flaring. This SIMOPS situation has the potential to significantly increase the risk due to activities occurring in close proximity;
- When exploration seismic activities are performed near to a Unit area.

Emergency Response Plan

Emergency

- Any sudden, abnormal or unplanned situation which requires immediate attention and may endanger human life, the environment or have an adverse effect on company assets and/or reputation.

Why we plan our Emergency Response

- Describe the process of Emergency Response Planning and to provide guidance and reference to the personnel involved in these activities;
- Identify the cross functional roles and responsibilities for organising, implementing and managing the Emergency Response Planning process;
- Introduce standardised tools and methodologies which can allow relevant Departments to effectively manage their activities;
- Describe the interactions and links with other workflows, procedures and processes in order to provide a general framework for Emergency Response Planning process.
- Define methods and approaches for managing the process of identification and definition of appropriate Emergency Response Plan, including occupational health, safety and environmental emergencies, to ensure that:
  - Information relevant to the “residual risks” associated with operational activities are identified;
  - Emergency scenarios are identified and consequences evaluation is carried out during the different phases of the Operations Process and the correct behaviour to manage them is set;
  - Emergency response plans are prepared and kept up to date;
  - Suitable information is given to relevant Authorities.

HSE Inspections Checklists

Why we plan our Emergency Response

- Describe the process of Emergency Response Planning and to provide guidance and reference to the personnel involved in these activities;
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General Protective Measures

Personal Protective Equipment

Signs and Warning Signals

Personal Protective Equipment: Eye Protection

- The eyes are particularly vulnerable
- Many hazards that create risk to the eyes exist in most workplaces especially as the result of failure of other control measures
- Eye protection particularly important as many of these cannot be eliminated
- Monocular individuals need special protective measures
- Contact lens wearers have additional risks from harmful materials

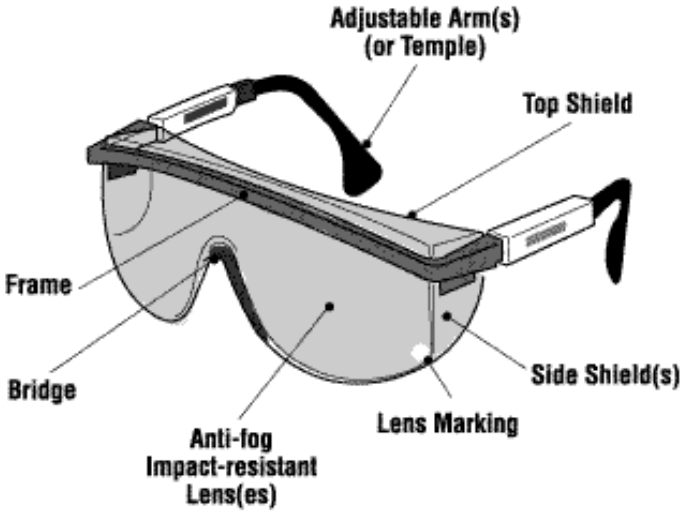
- **Work in all areas outside of offices or living quarters**
- **Specific work activities with increased risks of eye injuries e.g:**
  - **Welding**
  - **Grinding**
  - **Turning**
  - **Drilling**

Types

- ***Spectacles/glasses (with side shields)***
- ***Goggles***
- ***Visors/face shields***
- ***Hoods***
- ***Welders masks/visors***

Spectacle/Glasses

- Do not provide complete protection even when fitted with side shields
- Useful against general hazards e.g. wind blown debris
- Provide protection from low velocity impact from the front
- Not to be used for activities liable to produce high impact particles or splashes of hazardous materials



Goggles

- Protect the eyes against hazards from any direction
- Must be flexible one –piece and capable of being worn over prescription spectacles
- Should be ventilated to prevent misting
- For chemical liquid and vapour hazards shielded or baffled types with anti fog lenses should be used
- Should be replaced when damaged or lenses scratched, marked or etched to such an extent that seeing is impaired

Face Shields/Visors

- Should be fitted to safety helmet of head harness
- Hinged type preferable for intermittent use
- Liquids can splash under visors – may need goggles as additional protection for eyes
- Particles can also get under visors – risk assessment should consider body position for task when visors specified
- Replacement when damaged or when visor damage impairs vision

Hoods

- Used as part of full protective suits or respiratory protective equipment e.g. grit blasting work
- Consist of rigid helmet with tie down front and rear bibs
- A replaceable transparent visor cover should be fitted
- Hood to be fed with clean oil free air
- Replaced when damage affects the helmet integrity of the hood is unable to maintain a positive internal pressure from the available air supply

Welders Goggles/Visors

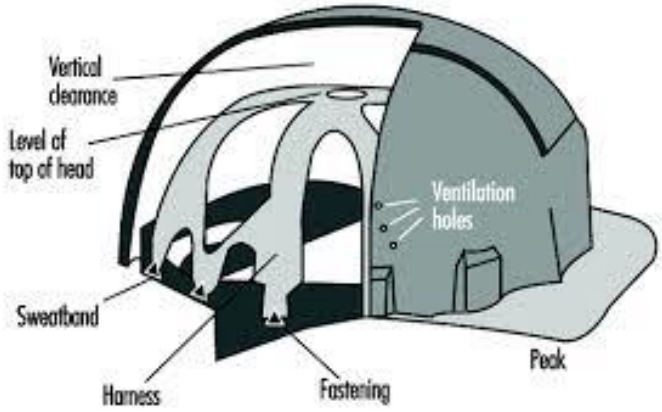
- Protect against radiation damage to eyes
- All people involved in welding (including assistants) must wear protection providing the correct filtration level
- Details of the filtration level required for specific activities can be found in the standards mentioned previously
- Replaced when damage to visor or goggles impairs vision of the level of filtration is reduced

Personal Protective Equipment: Head Protection

- Protection against falling objects and striking head against equipment
- Must be used for the following:-
  - Construction Works
  - Production / Maintenance / Drilling Operations
  - Lifting Operations
  - Warehouse areas
  - Chemical Storage Areas
  - Where head protection is mandatory and sign are posted accordingly

Head Protection Standards

- One piece moulded shell of polyethylene or polycarbonate
- 4 or 6 point suspension (preferably 6)
- Adjustable headband
- Attachment points for ear – muffs and a chinstrap
- No conductive fittings penetrating the shell



Care and Replacement

- Safety Helmets should never be painted or cleaned with solvents
- Safety helmets should not be thrown, dropped or subjected to abuse
- They must not be modified or altered in any way
- Safety helmets should be replaced as follows
  - Every 3 years – polyethylene helmets
  - Every 5 years polycarbonate helmets
  - When head cradle is damaged
  - After damage or a heavy blow

Personal Protective Equipment: Hearing Protection

- Remember noise induced hearing loss is irreversible !!
- If you cannot conduct a normal conversation at 2m you are probably damaging your hearing and should be wearing hearing protection
- Hearing protection must be provided if noise levels cannot be reduced by engineering controls
- The type of hearing protection will depend on the intensity and frequency of the noise
- Wearing should be enforced by supervision, training and signs

Noise: PPE Limitations

- Only effective if worn properly
- People must be trained
- Usage must be enforced
- Must be correct for the noise
- Must be maintained and cleaned

Activities Requiring Hearing Protection

- Working in a mandatory hearing protection area (sign posted)
- Specific jobs in which personal noise dosage is likely to exceed 85dB(A) e.g. Operating loud machinery, pneumatic hammer, electric saw, banging of steel in workshops grinding, etc
- Personnel regularly working in high noise areas i.e Turbine Halls, Compressor Areas and Helidecks are required to use earmuffs and NOT ear plugs

Types of Hearing Protection

- Ear Plugs – mouldable rubber or foam fit inside ear canal
- Ear Muffs - On a headband or fitted to safety helmet
  Should be self adjustable for all head sizes and shapes
- For extreme noise conditions both ear plugs and ear muffs may be required

- Ear plugs should be replaced when they become dirty or have been used for a day
- Ear Muffs should be replaced when the seal is damaged or becomes so brittle it does not seal properly

Personal Protective Equipment: Respiratory Protection

Protection against the inhalation of harmful materials in the atmosphere:-

- Dusts
- Vapours
- Gases
- Fumes

Typical Activities

- Spray Painting
- Grit and Shot Blasting
- Chemical Handling
- Dust Laden Environment
- Power Tool Usage
- Exposure to vapour, gas and fumes

Types of Respiratory Protection

- Disposable paper dust masks
  - Used for NON- HAZARDOUS dusts
  - Level of protection not adequate for hazardous dusts
  - Do not provide protection against gases, fumes or vapours
  - Should be replaced when torn or dirty

Types of Respiratory Protection - 2

- Cartridge/Canister Masks
  - Used with appropriate cartridge
  - Removes low concentrations of specific contaminant
  - They are not for use in oxygen deficient atmospheres
  - Not for use in high or unknown concentration of contaminant
  - Not to be used if unknown contaminants potentially present
  - Not to be used for contaminants that irritate the mucus membranes
  - High humidity can affect performance

Maintenance

- Respirators must be kept clean and hygienic
- User must be properly trained is use inspection and maintenance
- Face piece should be replaced when the rubber perishes, straps are broken or stretched and a food face seal cannot be achieved
- Cartridge replaced when the recommended exposure time reached or at the start of new job/shift
- When it is difficult to draw air through filter or vapours pass through
- Canisters must be stored sealed to avoid contamination or vapour absorption

Personal Protective Equipment: Hand Protection

- Hands are the part of the body most likely to interact with work activity
- Hand/wrist protection used to protect hands against
  - Physical injury- cuts, grazes, punctures etc
  - Burns – hot, cold
  - Chemical agents- burns, skin disorders etc
  - Biological agents
- Protection is generally only adequate against short term exposure
- Barrier creams are an additional precaution not a substitute

Personal Protective Equipment: Hand Protection- 2

- Gloves can increase the risk of entanglement in rotating shafts alternative methods of removal of swarf from drills and lathes should be used
- Gloves will only protect if in good condition they should be inspected before use each time and replaced if damaged
- The type of glove/wrist protection to be used should be identified during the risk assessment

Types of Hand/Wrist Protection

- Cotton gloves for light handling activities
- Leather gloves for heavy handling activities
- PVC gloves for chemical handling
- Rubber Gauntlets (Certified for electrical usage)
- Leather Gauntlets for welding
- Thermal Gloves for extreme temperatures

Personal Protective Equipment: Foot Protection

- Leather or rubber boots (min 250mm high) with steel toecaps
- Oil resistant sole where appropriate
- Integral steel plate in sole for building construction work

Care of Foot Protection

- Foot protection must be stored in a dry area and kept free from damage when not in use
- All boots must be replaced
  - When the toecap is exposed
  - The tread becomes worn or torn
- For hygiene reasons boots are an individual issue and should not be shared

Personal Protective Equipment: Body Protection

- The following body protection will be provided as standard : -
  - Long sleeved flame retardant coveralls
  - Thermal flame retardant coveralls
  - Thermal flame retardant jacket
  - Thermal Socks
  - Thermal Gloves
  - Leather Work Gloves

Care of Body Protection

- All protective clothing is designed to work effectively when undamaged.
- It is the duty of the employee to ensure that their PPE is in good order and will provide the required protection
- The equipment must be worn correctly to achieve proper protection
- The manufacturers instructions must be complied with to achieve full protection

Personal Protective Equipment: Fall Protection

- Only properly designed multipoint harnesses allowed (safety belts prohibited)
- Maximum attachment rope length is 1.2m
- Must be attached above the wearer
- Must be worn:
  - when working above 2m on a non- purpose built access platform
  - when specified on the Permit to Work

Personal Protective Equipment: Safety Harnesses

- Not a substitute for providing a safe place of work
- Do not prevent falls
- Reduce the risk of injury by spreading the impact load over the body
- Must be properly specified and maintained and inspected
- Only work if used properly – training and supervision
- Anchor points must be strong enough to withstand shock loading

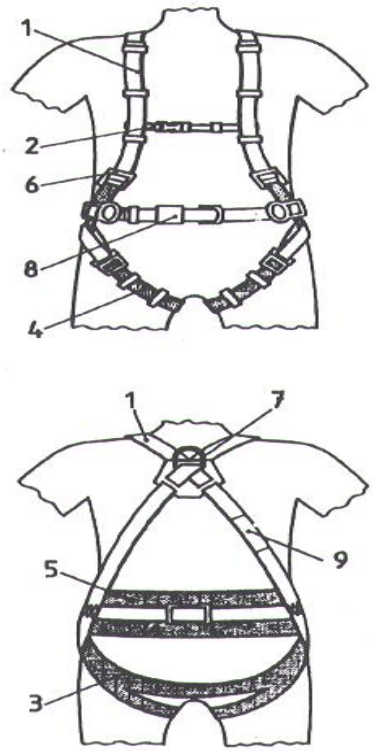
Safety Harnesses - 2

Always

- Use twin lanyard harnesses if you need to move about
- Report any faults immediately
- Never use faulty or damaged equipment

- Check for signs of wear or damage before use
- Ensure lanyard can be attached from a safe position
- Check the lanyard is firmly attached to a static line or a secure anchor point
- Position the anchor point above where you are working

Personal Protective Equipment: Typical Multipoint Harness



1 Shoulder strap
2 Secondary strap
3 Sit strap (Primary strap)
4 Thigh strap
5 Back support for work positioning
6 Adjustment element
7 Fall arrest attachment element
8 Buckle
9 Marking

Flotation Aids

- Work vest used when working over or adjacent to water where full life jacket would make movement difficult
- Life jacket must be self righting and to SOLAS standards

General Protective Measures

Personal Protective Equipment

Signs and Warning Signals

Prohibition Signs

- Prohibition signs are circular and white with a red border and single diagonal line across the pictogram displayed on them
- An additional message is sometime included below to clarify the prohibited action

RED – STOP -- DO NOT ACT

RED BLACK ---- BE CAREFUL – DANGER

Mandatory Signs

- Mandatory signs mean that the information MUST be acted upon
- Blue in colour , circular or rectangular in shape with white lettering

BLUE -- MUST DO – LEGAL

Warning Signs

- Warning signs warn personnel of an immediate danger that exists in the local area
- Yellow with a black border and triangular in shape
- Yellow and black Barrier tape may be used in conjunction with these signs

YELLOW ---- CAUTION – BEWARE

Information Signs

- Information and safe condition signs are green in colour rectangular with white lettering
- They are permanent signs and provide information regarding Emergency Escape,First Aid and other safe conditions

GREEN – GO – SAFE CONDITION

Information Signs

MIXED SIGNALS and COLOURS

Agenda

HSE COURSE

Introduction to HSE

- Introduction and definitions
- HSE Supervisor role and responsibilities
- Hazard assessment and HEMP
- HSE Tools

General Protective Measures:

- Personal protective equipment (PPE)
- Warning Signals

Monitoring HSE in Operations trough HSE Tools applications:

- **Human Error hazards and controls**
- Fires and explosions hazards and controls
- Mechanical hazards and controls
- Lifting operations hazards and controls
- Electricity hazards and controls
- Working at height hazards and controls
- Confined spaces hazards and controls
- Slips trips and falls hazards and controls
- Movement of Plant and Vehicles hazards and controls
- Groundwork and excavations hazards and controls

Human Error Hazards and Control

Human Error: Human Factors

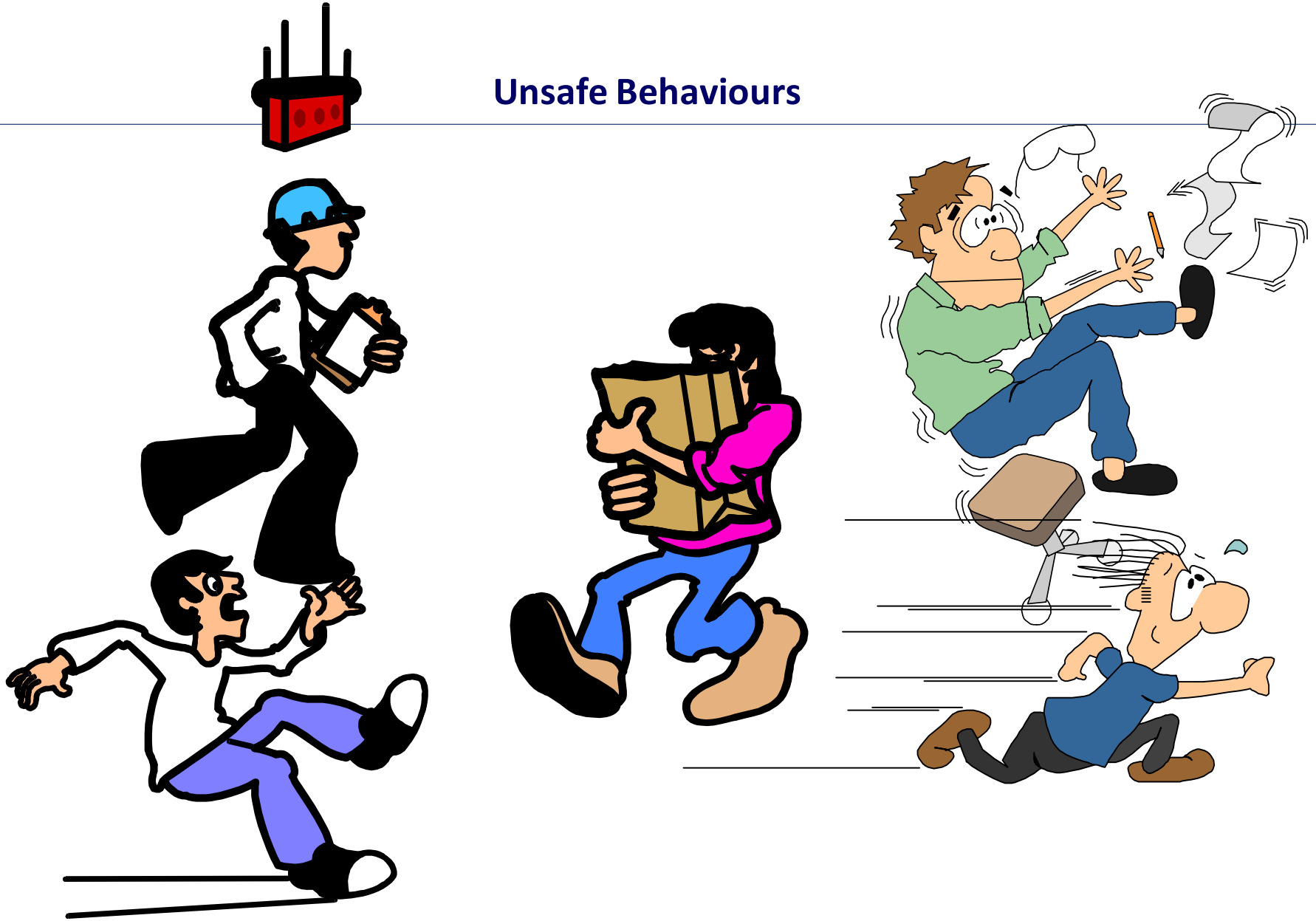
Human factors are recognised as being a contributory cause of many Accidents and lost time injuries.

In **Oil & Gas industry** where there are high standards of inherent safety, human error is more likely to result in production downtime, increased maintenance costs or an impact on environmental performance. In any system where reliability depends on human behaviour or performance there must be a **detailed assessment of the human error potential**.

Human Error: Hazards

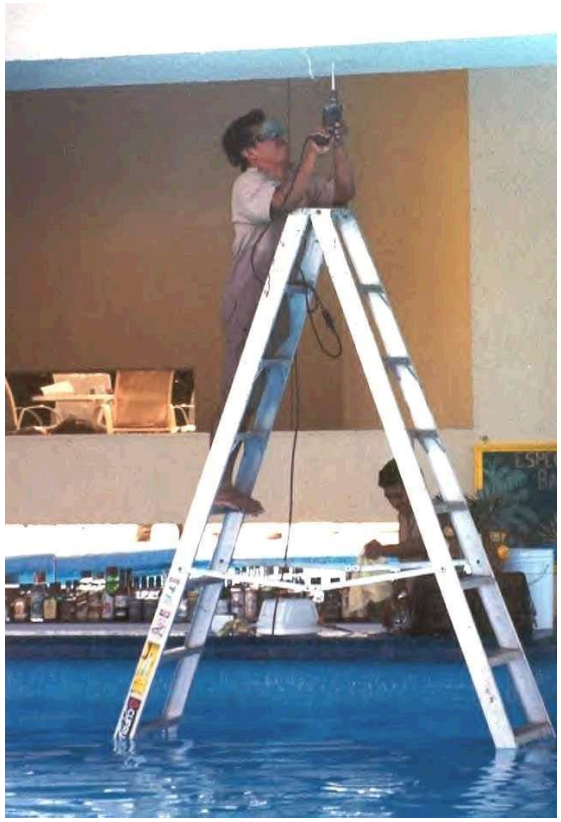
- The potential for error is present in any activity which involved people
- Remember difference between errors and violations
- Risk assessment should include potential for errors
- Controls should minimise risk of errors occurring
- Mitigation of consequences if errors do occur

Unsafe Behaviours



imagination at work

Unsafe Behaviours



People have the best of intentions

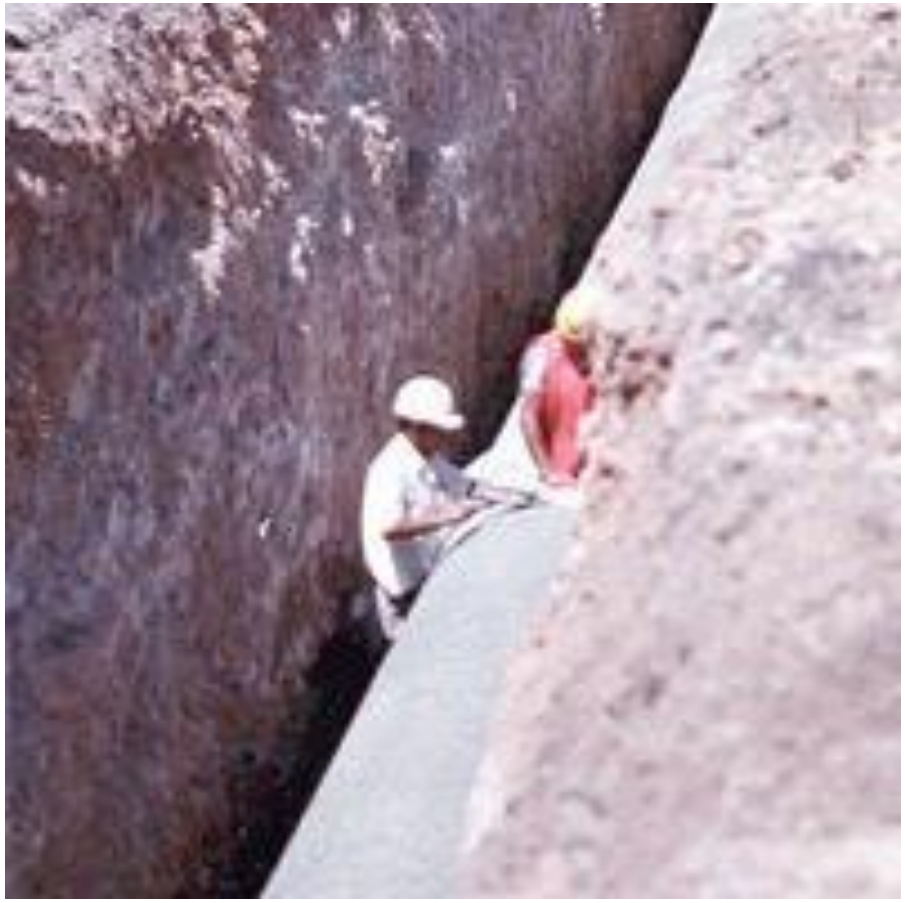
Unsafe Behaviours

We need to ask why?

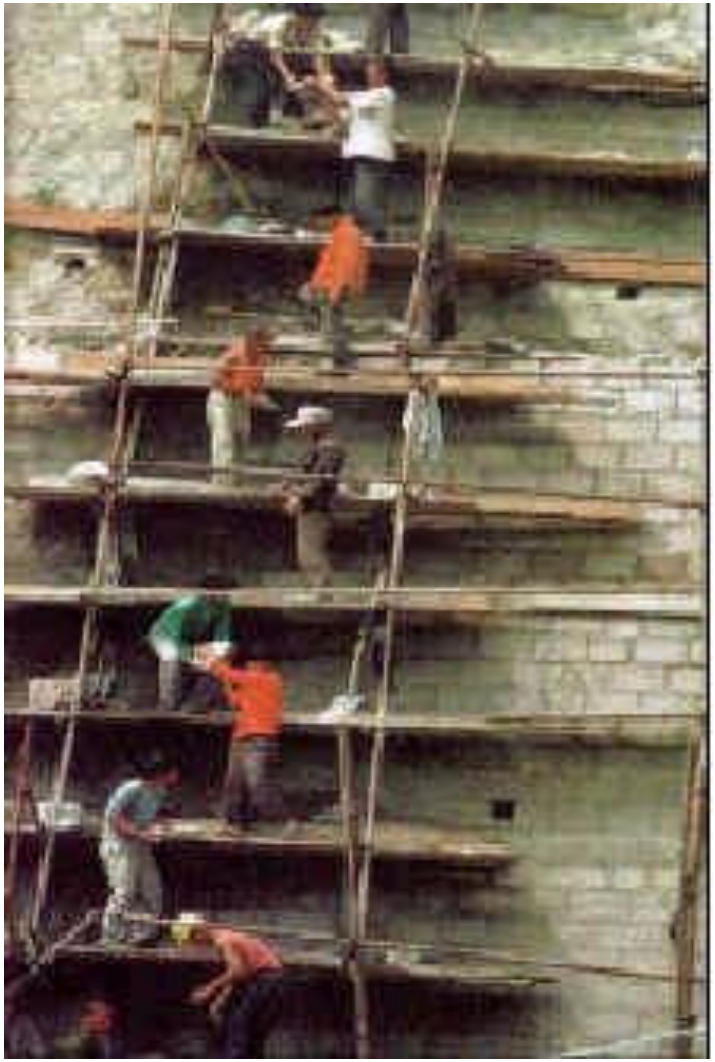
Unsafe Behaviours

Someone decided to leave these areas like this!

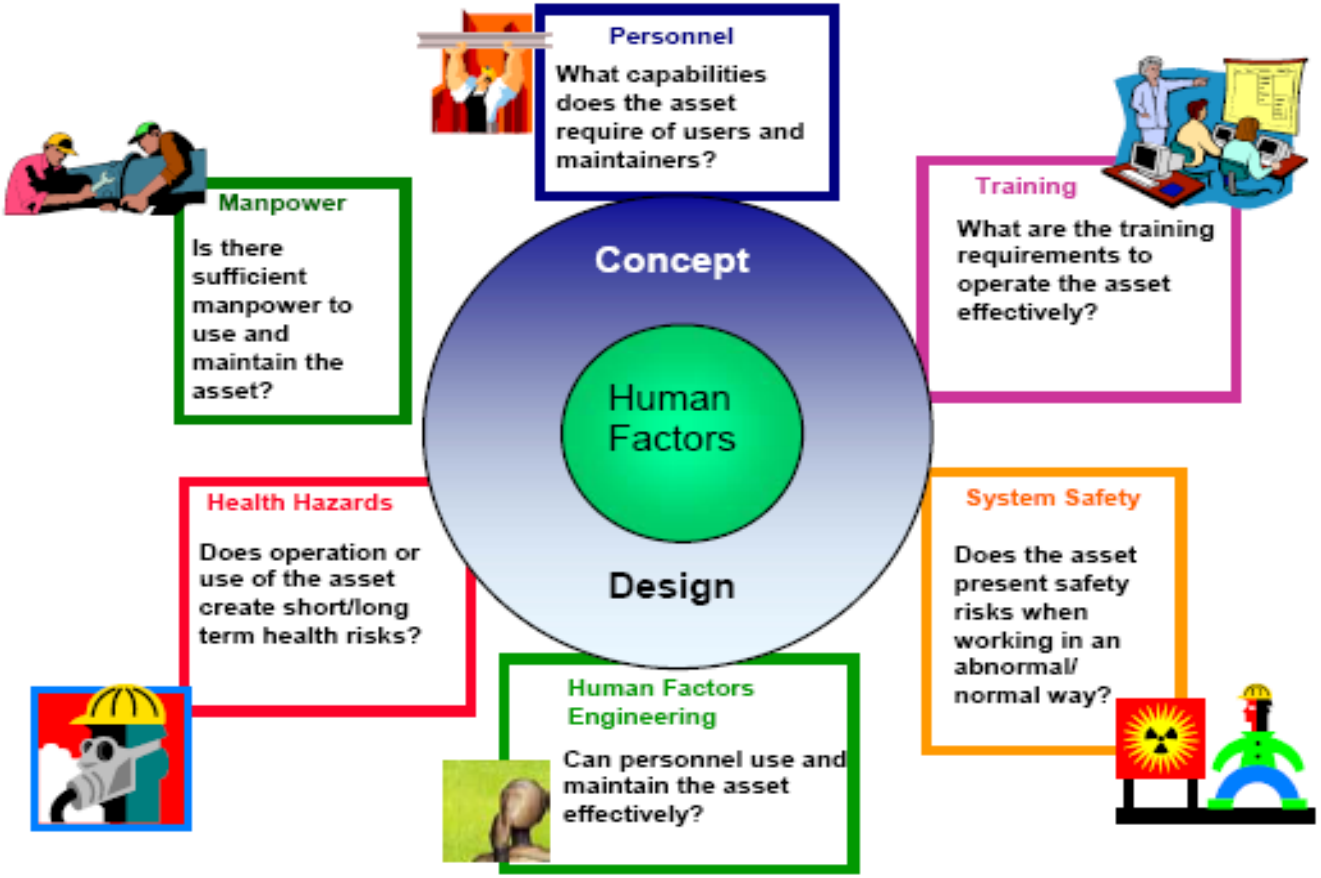
Unsafe Behaviours



Perhaps these guys don't know any better!



Human Error: How to Control it?



Human Error: Control

- HSE Hazards

Should be mitigated by:

- Personnel Selection
- Training
- Procedures
- Monitoring
- Accountability
- Manpower (too less, too many)
- Culture
- System Safety
- Supervision

All these controls are related to **Human Factors**

Human Error: Control with HFE and HFI Tools

HFE and HFI a risk based approach

- **Human Factors Engineering (HFE):**

is the discipline of applying what is known about human capabilities and limitations to the design of products, processes, systems, and work environments.

- **Human Factors Integration (HFI):**

is the process adopted by a number of key industries (notably defence and hazardous industries like oil & gas) to integrate human factor elements into the system engineering process.

Human Error: HFE in Engineering Design

Human Factors Engineering (HFE) in Engineering Design

Effective integration of HFE activities within the engineering design programme can lead to significant savings in terms of reduction in CAPEX (CAPital EXpenditure), engineering hours, rework, and project duration time, with reduced approval cycles.

Effective and human focused designs can mean a reduction in operational and maintenance costs providing lower whole life costs.

Human Engineering utilises the Human Factors Integration methodology (HFI) (referred to also as Human Systems Integration) for implementing human factors in large projects.

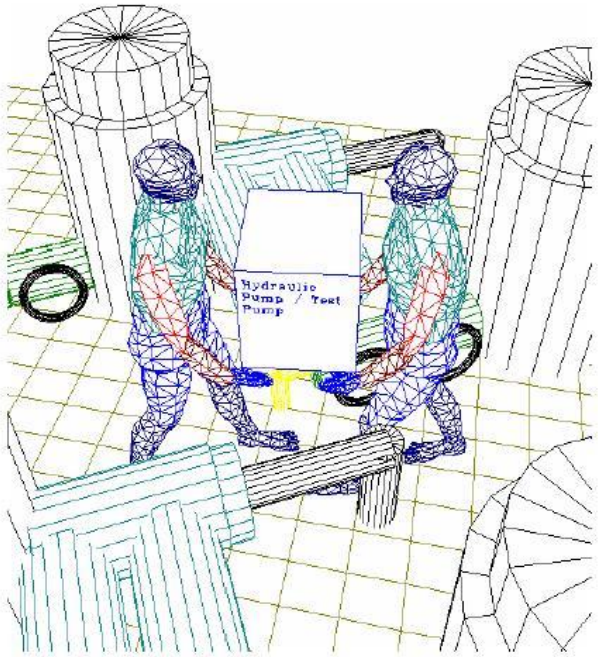
HFI is recognised as industry best practice and is fully compatible with the process specified in most Oil&Gas Companies Worldwide. The processes used to support HFI apply to both engineering design and operational issues.

Human Error: HFI in Project Lifecycle

All issues related to:

- Personnel
- Manpower
- Training
- Health Hazards
- System Safety
- Human Factors

are addressed during the project lifecycle.



The key benefit of HFI is that through a human factors integration plan, issues are formally addressed throughout the project, from the Front End Engineering Design (FEED) stages through to commissioning and handover for operation.

HFI can also be used to manage deconstruction and decommissioning risks.

Human Error: Risk Management

HSE Supervisors role and risk based approach completion.

To manage the risk HSE Supervisors must:
Identify safety, environmental and business critical activities.

To assess the hazards and establish the appropriate risk reduction measures HSE Supervisors must:
Integrate risk assessment processes with existing company practices through tools such as HAZID/HAZOP, Task Analysis, and Error and Reliability Analysis.

To properly prioritise risks in various workplaces HSE Supervisors must:
Identify and prioritise risks which can be solved in the short term and those which need to be included in longer term strategies for improvement.

Human Error: STOP Behaviour Based Risk Management

STOP programs use a combination of methods throgh a three-part behaviuor based approach:

- **Individual self-study:**
  Workbooks are used to introduce basic concepts and begin safety skill development.

- **Field or application activities.**
  Participants practice what they have learned in their own work areas.

- **Group meetings:**
  After viewing a video, participants discuss what they have learned and consider how it can be applied.