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LESSON 5
PS5 Carry out WSH inspections in accordance with organisational inspection procedure
UK15 Organizational WSH inspections

Sub Topic

- Objectives of safety and health inspections
- Types of safety and health inspections
- Inspection checklists
- Inspection procedures
- Follow-up actions

Organisational WSH inspection include

- Objectives of WSH inspections
- Frequency and schedule
- Inspection checklists
- Types of inspection
  - Formal
  - Informal
- Inspection team composition
- Inspection report of findings
- Communication of inspection results
- Follow-up actions
- General Safety and Health

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Safety inspection

What Is Workplace Safety Inspection?

a monitoring function conducted in the workplace to:

- locate and report hazards
- to establish controls; and
- to monitor the effectiveness of these controls

Why Inspect?

Workplace safety inspection is a critical part of a safety and health program:

- to prevent accidents;
- to meet legal requirements;
- to improve work efficiency,

Prevent Accidents

The main objective of the workplace safety inspections is to find and eliminate or control hazards before they cause accidents to employees.

Meet legal requirements

Sections 11 & 12: Workplace Safety & Health Act 2006:

It shall be the duty of the occupier and employer to take reasonably practicable measures to ensure that the workplace is safe and without risks.

WSH (Safety Committees) Regulations:

A safety committee shall inspect the workplace at least once a month or immediately after any accident or dangerous occurrence.

Reg. 5 of WSH (Shipbuilding & Ship-Repairing) Regulation 2008:

1) Where 200 or more persons are employed in a shipyard, it shall be the duty of the occupier of the shipyard to appoint a workplace safety and health auditor to audit the safety and health management system of the shipyard at such time as may be specified by the Commissioner.

2) Where less than 200 persons are employed in a shipyard, it shall be the duty of the occupier of the shipyard to -
   a) conduct a review of the safety and health management system of the shipyard every 12 months

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Conducting an effective safety inspection

Inspections are one of the most effective tools for preventing injuries and illness and for inspections to be effective, they must be conducted on a regular basis and be part of a systematic program aimed at accident prevention.

Following steps will help to achieve an effective safety inspection program at the workplace:

1. Planning
2. Inspection
3. Reporting

Planning

To conduct an effective workplace safety inspection, one must first do a proper planning.

Planning includes the following:

- Layout plan/process flow chart
- Inspection checklists
- Inspection team
- Accident records
- Past safety committee meeting minutes
- Past inspection records
- Inspection Tools/PPE

Inspection

Conducting The Inspection

- Focus on unsafe acts and unsafe conditions.
- Fix unsafe acts and conditions immediately if it is of immediate danger to any person.
- Use checklist as a guide if applicable and take short notes.
- Observe workers and avoid distraction.

Safety Inspections

- An effective safety inspection program will improve worker communication, company morale and, over time, save the employer money.
- safety inspections are aimed primarily at finding and recording unsafe conditions. This narrow focus tends to ignore other causes of incidents, such as unsafe actions and personal factors.
- An inspection program takes planning, preparation and training.

Types of WSH inspection and their requirements

Inspection of temporary electrical installation

- Electrical installation equipment properly earthed to ground.
- Monthly maintenance records by Licensed Electrical Worker (LEW).
- Electrical wires or equipment in good working conditions.
- Residual current circuit breaker installed for all temporary electrical installation to provide earth leakage protection, etc.

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Inspection of scaffold

- Safe-to-use tag provided before use of scaffold.
- Weekly inspection by scaffold supervisor to verify that scaffold is safe to use.
- Scaffold components in good condition and compliance with WSH requirements.
- Proper and stable access way provided, etc.

Inspection of crane

- Crane installed on stable and firm ground.
- Crane certified by Authorised Examiner (AE) before usage.
- Load chart provided to ensure safe loads for varying distance and angles.
- Compliance with permit to work system for lifting.
- Visual inspection for defects of crane hook and lifting gear, etc.

Inspection of confined spaces

- Provision of sufficient ventilation.
- Sufficient lightings provided for access way and working zone.
- Permit to work implemented and complied with.
- Gas checking conducted in compliance with WSH regulations.

Planning of WSH Inspection

An effective WSH Inspection plan should include the following

- Scope of inspection and area of coverage
- Criteria to of inspection
- Inspection
- Location of workplaces
- Areas of coverage
- Frequency of inspection

Factors to consider in planning of WSH inspections:

- Inspection schedule
- Inspection location
- Area of coverage
- Frequency of inspection
  - WSH legal requirements
  - Other may be MPA or other statutory board requirement

Organisational procedures

Frequency of inspection depends on WSH targets set by organization, e.g. daily inspection may include the following :

- working at height
- working in confined space
- lifting operation
- formwork installation
- electrical and mechanical appliances

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Inspection criteria

- WSH legal requirements

  E.g Proper and wide accessway, fall protection for working at height, etc.
- Organisational procedures

  Criteria established by the organisation to achieve set WSH targets, e.g. reduce unsafe practices by half after 3 months.
  - ✓ SWP for working at height
  - ✓ SWP for working in confined space
  - ✓ SWP for lifting operation
  - ✓ SWP for hot-work
  - ✓ SWP for formwork erection

Scope of inspection

- Equipment and processes

  Machinery, equipment and work routine activities are inspected to eliminate hazards and ensure compliance with legal requirements.
- Workplace environment

  Unsafe environment increases the risk of accident occurrence. WSH inspection aims to eliminate hazards and provide a safe workplace environment.
- Workplace practices

  WSH committee members will identify unsafe workplace practices and eliminate them by implementing countermeasures.

Developing an Inspection Program

Develop Standards	Who will inspect? How often? What needs to be inspected?
Inspect	Are regular and special inspections done? Are inspectors looking for hazardous acts and conditions?
Correct unsafe conditions or Acts	What needs to be correct? Who is responsible? When will it be done?
Document	Are inspection reports filed up?
Follow up	Are all items in the inspection report corrected as required?

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WSH inspection checklists

WSH inspection checklists are developed from general WSH checklists (e.g criteria pertaining to common access way, external of the buildings, etc.) or specific work activity checklist (e.g criteria pertaining to hot work, working at height, working in confined space, etc.)

The number of items on the inspection checklist depends on the risk and complexity of the work activity. For example, installing light bulbs on ceilings would require less checklist items compared to working at height.

WSH inspection checklists are reviewed frequently, especially in the event of an accident or a change in work activities, including addition of machinery or equipment.

Elements for conformance:

- **Machine guarding**

  Ensure compliance with WSH requirements for guarding of machines with fast- or slow-moving rotary parts.

- **Material handling**

  Ensure proper handling of materials, especially hazardous or heavy materials, to reduce the risk of incident occurrence.

- **Personal Protective Equipment**

  Ensure proper and relevant use of Personnel Protective Equipment, e.g. chemical glove for handling of hazardous chemicals, leather gloves for handling of metal or sharp materials, etc..

- **Lockout / tagout**

  Ensure correct implementation of lockout / tagout, in accordance with WSH requirements e.g locking of machinery, together with tag provided, etc.

- **Emergency equipment**

  Ensure emergency equipment (e.g. fire extinguisher, hose reel, FM 200 fire suppression system, etc.) is in good condition and not expired for effective response to emergency situations.

- **Fire protection**

  Ensure provision of fire protection equipment (e.g. fire-retardant doors, fire resistant paint, fire blanket) for relevant work activities to minimise damage from fire occurrence.

- **Power tools**

  Ensure that there is no leakage of electricity and that the voltages are in compliance with WSH requirements.

- **Chemicals**

  Ensure proper storage and handling in accordance with the chemical's Safety Data Sheet (SDS) and WSH legal requirements.

- **Safe work practices**

  Ensure that safe work practices are implemented and that all personnel comply with the safe work practices to eliminate the risk of incident occurrence.

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Inspection checklist – working at height (sample)

Measures to be taken to prevent falls		Yes	No
1	Every open side or opening into or through which a person may fall shall be covered or guarded by an effective barrier to prevent falls.	❑	❑
2	Open sides Every open side of a staircase is provided with a substantial handrail and lower rail or other effective means and maintained.	❑	❑
3	Hand/Foothold Secure handhold and foothold is provided for any person who has to work at a place from which he would be liable to fall: (a) a distance of more than 2m; or (b) into any substance which is likely to cause drowning or asphyxiation.	❑	❑
4	If item 3 is not practicable, other suitable means such as a safety harness or safety belt shall be provided.	❑	❑
5	Anchorage If a safety harness or safety belt is provided, then a. there shall be sufficient and secured anchorage b. the anchorage shall not be lower than the level of the working position of the person wearing the harness or belt.	❑	❑
6	Risk of drowning Person who is exposed to the risk of falling into water and of drowning shall be provided with : (a) equipment and means of rescue and resuscitation; and (b) suitable life jackets or other equipment for keeping such person afloat.	❑	❑
Work on Steep Roofs		**Yes**	**No**
7	Where work is being performed on roofs having a gradient greater than 1/4, there shall be provided protection against sliding.	❑	❑
Safety belt/safety harness/safety harness & Lifelines		**Yes**	**No**
8	Safety belt/safety harness, life lines and all devices for the attachment of life lines shall be of adequate strength and of a type tested and approved by a testing body (PSB).	❑	❑
9	Every safety belt/safety harness made available or supplied to any person for his personal protection shall be used by the person in the performance of his work.	❑	❑
10	Anchorage When the use of a safety belt/safety harness is necessary for a person's safety, adequate and suitable means of anchorage for the safety belt/safety harness shall, if practicable, be provided.	❑	❑
11	Where it is not practicable to comply with item 10, a life line securely attached to sufficient anchorage shall be provided.	❑	❑

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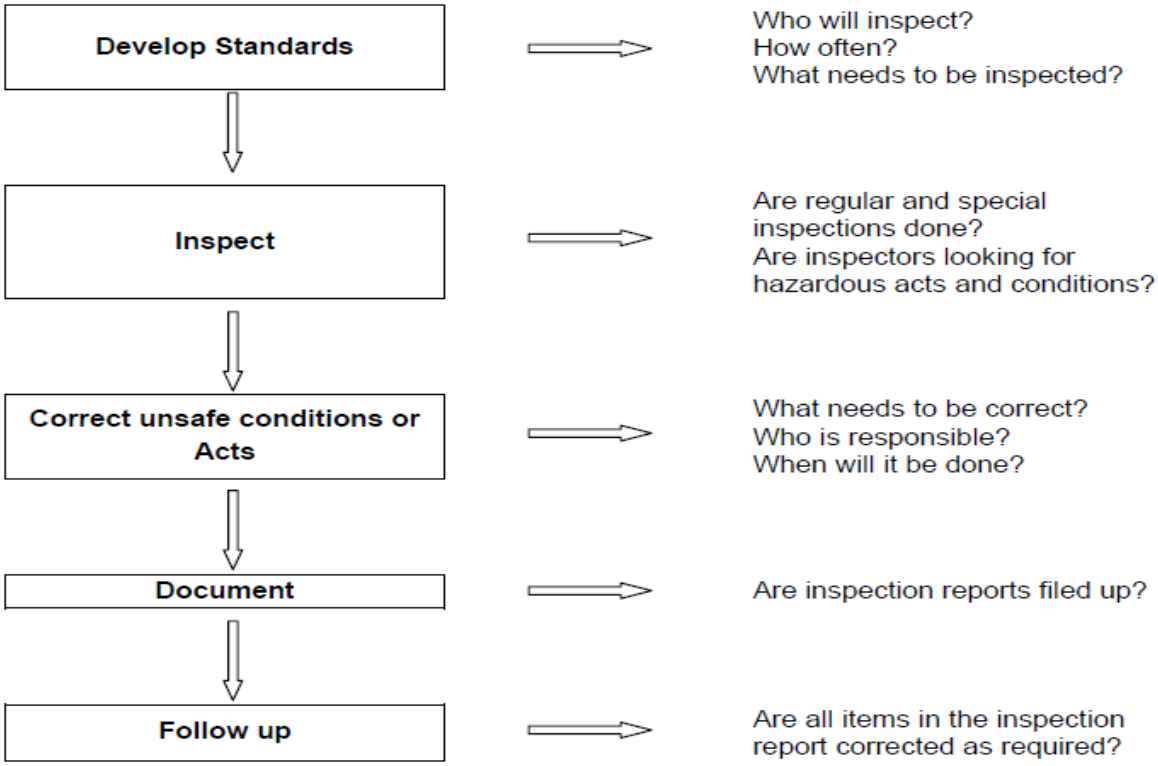
Reporting

- For action to be taken to eliminate or control the hazards identified during the inspection, the management needs to be made aware of the problems in a concise and factual way.
- Good reports help to gain support from management for the findings of inspection.
- An inspection will be effective only if the results are promptly reported to the right person.
- It is therefore also important to identify those persons to whom inspection reports should be sent.

Developing an Inspection Program



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LESSON 6
PS6 Conduct incident investigation and prepare report in accordance with legal and other organisational requirements
UK16 Incident Investigation and reporting
UK5 Overview of WSH management system

UK16 Incident Investigation and reporting

Sub Topic

Accident causation theories

- Heinrich's Domino Theory
- Multi-causation Theory

- Objectives of incident investigation
- Incident investigation process
- Incident reporting procedures
- Format for incident reporting

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Accident Investigation

What is Accident Investigation?

It is a methodical effort to collect and interpret facts and to establish corrective measures that should be taken to prevent recurrence of the accident.

All incidents such as:

a) Near miss
b) First aid cases
c) Lost – Time injuries
d) Fatal Accidents
e) Dangerous occurrences &
f) Occupational diseases should be investigated

Who is to Investigate?

For Non-Fatal:

Supervisor assisted by WSHO or WSH Coordinator

For Fatal, dangerous occurrence and Occupational diseases:

WSHO or WSH Coordinator, Ship Repair Manager & WSH Committee

When the site has no WSHO:

- WSH Committee shall investigate
- WSH Committee is also required to inspect work site after accident or dangerous occurrence

Objectives of investigation

The primary objective of investigating accidents is to establish the ***'Root Cause'*** followed by the implementation of corrective measures to prevent the accident from happening again.

Its purpose should not be to assign blame or push the responsibility to someone else.

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UK16 Incident Investigation and Reporting

Conduct incident investigation and reporting include:

- Objectives of incident investigation
- Accident Causation Theories
  - Heinrich's Domino Theory
  - Multi-causation Theory
- Incident investigation process
- Root Cause analysis
- Corrective actions and preventive actions
- Incident reporting procedures
- Format for incident reporting
- Typical approach in accident prevention

Accident Investigation - Definition of Accident

A workplace accident can be defined as:

An unwanted or undesired event that result in an injury, illness or damage to property, environment or plant.

Examples of unsafe acts

- Using damaged tools or faulty equipment
- Tampering with safety devices, ex. removing safety guards
- Not using PPE
- Not following safe work procedures
- Wearing the wrong PPE
- Taking shortcuts – not using proper access way.
- Unauthorised operation of equipment, machines
- Overloading lifting equipment.
- Speeding with forklift
- Over-riding safety switches

Why employees do unsafe acts

- Lack of supervision
- Lack of training/knowledge
- New employees
- Fatigue/stress
- Peer pressure
- Want to finish job fast
- Lack of safety enforcement

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Examples of unsafe conditions

- Missing/damaged machine guards
- Faulty machines, equipment and tools
- Material on floor
- poor housekeeping
- Exits/stairways/passageways obstructed.

Direct and indirect effects of accidents

Injured Worker

Direct Effects – injury
psychological effects of the injury

Indirect Effects - Loss of earnings
Disrupted family life
Disrupted personal life

Organisation

Direct Effects – loss of human resource
property damage to tools, materials, equipment, etc.

Indirect Effects - loss of business
poor customer relations
negative media coverage
poor reputation and higher insurance costs

Accident Investigation – Investigator, Procedure & Report

Investigator

In most cases, the supervisor should help investigate the event. Other members of the team can include:

- employees with knowledge of the work
- safety officer
- health and safety committee
- union representative, if applicable
- employees with experience in investigations
- "outside" expert
- representative from local government

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Definition of Accident

Accident

An unwanted or undesired event that results in an injury, illness or damage to property, environment or plant.

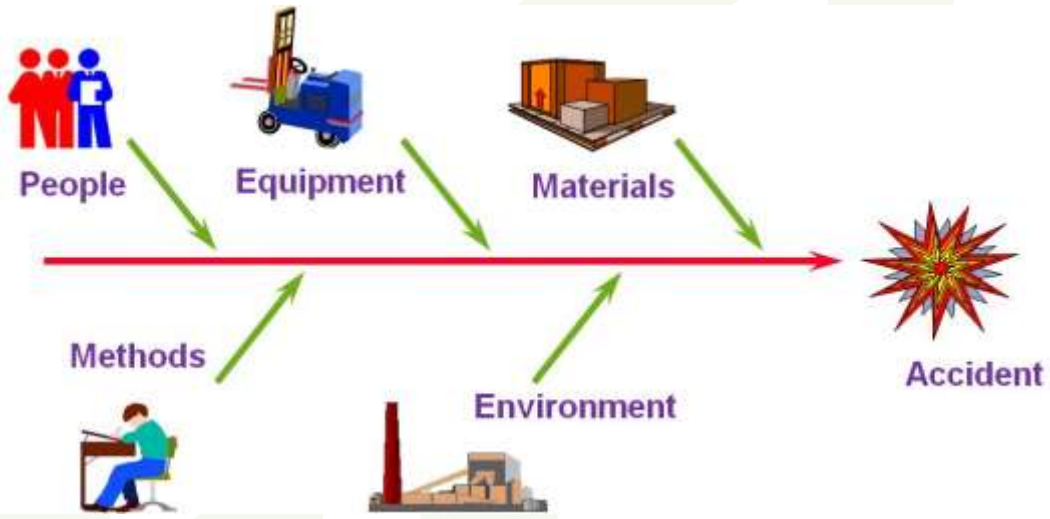
Incident

Incident is defined as an undesired event, which under slightly different circumstances, could have resulted in an accident. Sometimes it is also known as 'Near-Miss'.

Safety

Safety is defined as "the control of accidental losses".

The Five Sources of Loss



Causes of Workplace Accident

- Majority of the workplace accidents are caused by Sub-standard acts of employees.
- Secondary cause of workplace accidents are Sub-standard conditions.

Sub-Standard Acts

Examples

- Taking short cuts-not using proper access way.
- Unauthorized operation of equipment, machines.
- Using damaged tools or faulty equipment.
- Tampering with safety devices; (e.g. Removing safety guards).
- Speeding with forklift.
- Overloading lifting equipment.
- Not following safe work procedures.
- Not wearing PPE or wearing wrong PPE.
- Standing under suspended load.

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Sub-Standard Acts - Why?

- Lack of supervision
- Lack of training/knowledge
- New employees
- Fatigue/stress
- Peer pressure
- Want to finish job fast
- Lack of safety enforcement

Sub-Standard Conditions

Examples

- Missing/damaged machine guards
- Faulty machines, equipment and tools
- Material on floor – poor housekeeping
- Exits / Stairways / Passageways obstructed
- Unguarded opening
- Slippery/wet floor
- Inadequate lighting / Ventilation

Effects of Accident

Injured Worker

Direct Effects - Injury
- Psychological effects of the injury

Indirect Effects- Loss of earnings
- Disrupted family life
- Disrupted personal life

Organization

Direct Effects - Loss of human resource
- Property damage to tools, material equipment, etc.

Indirect Effects- Loss of business
- Poor customer relations
- Negative media coverage
- Poor reputation and higher insurance costs

Accident Causation Models

Many models of accident causation have been proposed, such as:

- Heinrich Domino Theory
- Multi-causation theory

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Heinrich Domino Theory

'The Origin of Accidents' (1928), Herbert Heinrich examined 75,000 industrial accidents and attributed 88% of the accidents to 'unsafe human acts' or 'Sub-standard Acts'.

Underlying principle that people and not things cause accidents.

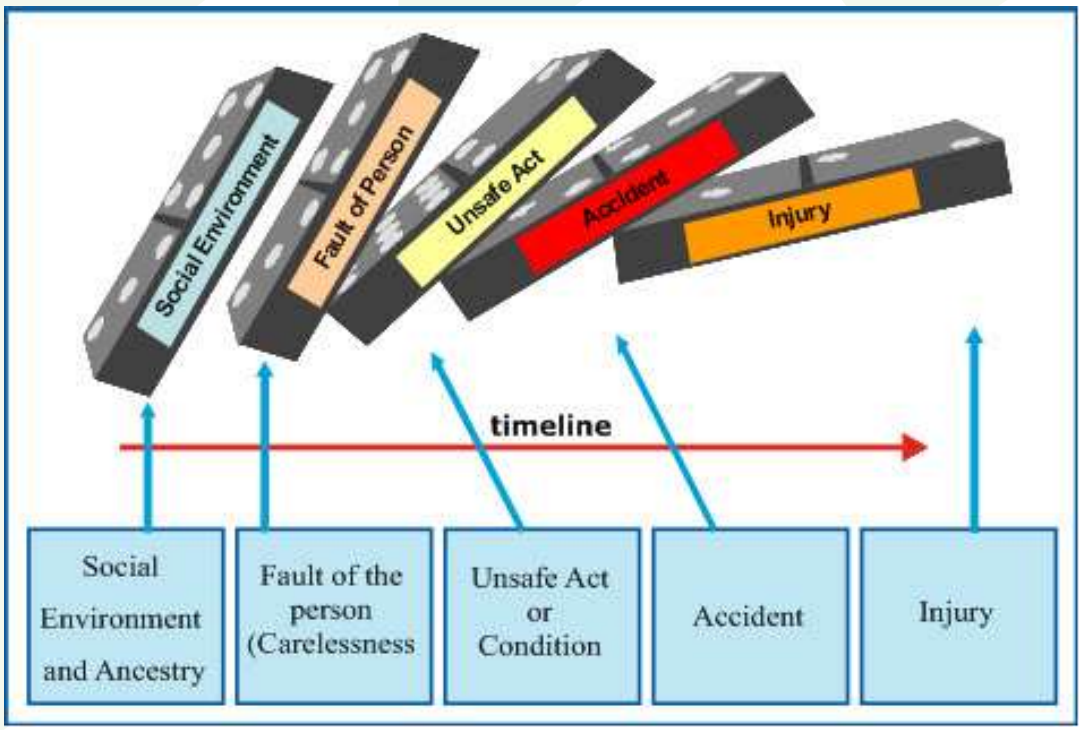
There are five factors or stages in sequence of events:

– Ancestry and social environment - leading to
– Fault of person - constituting the reason for
– An unsafe act or unsafe condition - which results in
– An Accident - which leads Injury.

Heinrich Domino Theory

An injury is the result of a completed sequence of factors and the last being the injury itself.

- Social Environment
- Fault of Person
- Unsafe Act/Condition
- Accident
- Injury



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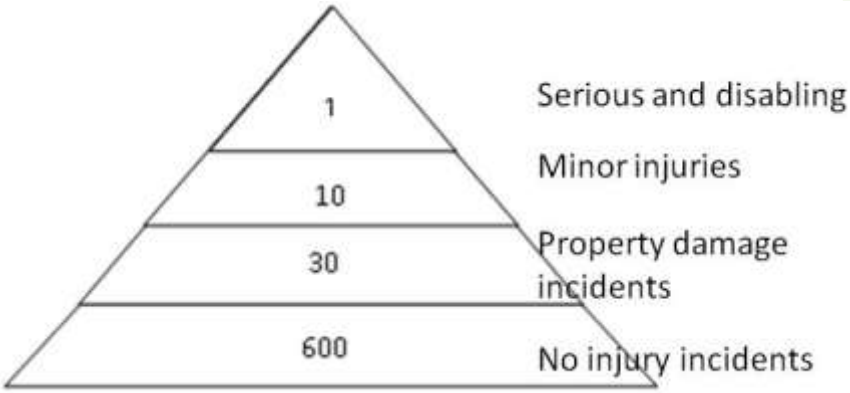
Frank Bird's Domino Theory

Heinrich's theory of domino sequence is updated by Frank Bird Jr. to explain the circumstances that lead to losses (injury) in the chronological order of five dominoes.

1 Lack of control
2. Basic Causes (origins)
3. Immediate causes
4. Accident
5. Injury



Multi-Causation Theory

This theory recognizes that behind every accident, there are a number of contributing factors.

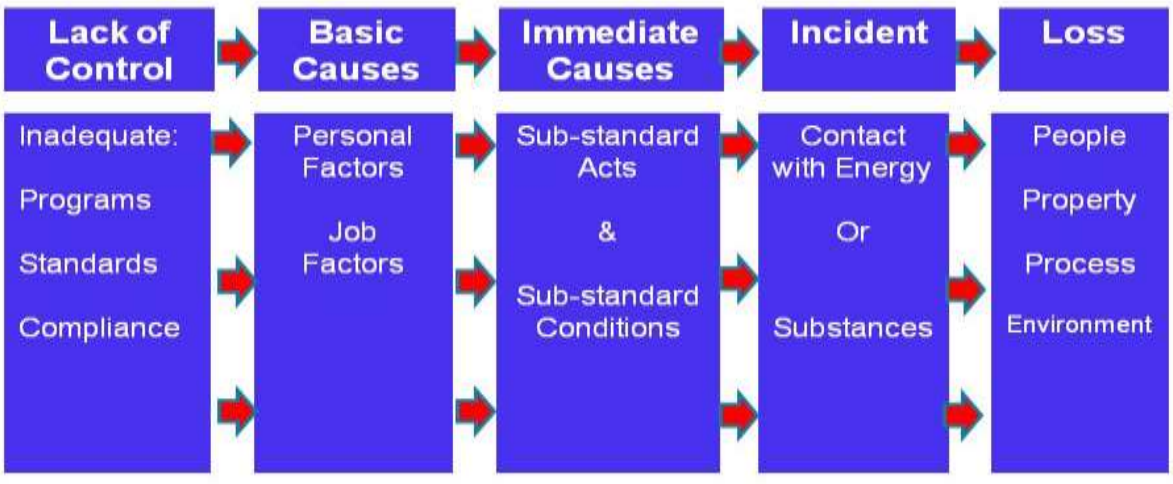
To prevent the accident from occurring again, all these factors must be identified and control measures put in place.

Frank Bird Accident Causation Model

Frank E. Bird, Jr. in hit hook "Practical Loss Control Leadership", proposed a similar accident causation model. These are a relatively simple model yet contain all the necessary key points for a manager to understand how accidents are caused.

Most important of all, the model allows management to trace back systematically all causes of accident and arrive at the point where management control is required, instead of stop short at the removal of unsafe conditions and unsafe acts.

Causes of Workplace Accidents



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Typical Approach in Accident Prevention

Frank Bird Accident Causation Model

Loss

As the model indicates, losses can involve people, property, process, or the environment. The loss could be a personal injury, an occupational illness, damage to equipment or facilities, waste or contamination of materials, disruption of work, environment pollution, etc. In any case, the type and degree of loss are matters of both chance and the actions taken to limit or minimize the loss.

Incident (Contacts)

In the loss causation model, the event that leads to the loss is the incident. This is the undesired contact with a source of energy or substance above the threshold limit of the body or structure, if there is no barrier to stop the exchange, there is a transfer of energy or substance above the threshold limit to the body or structure.

If the level is too high, and is above the limit of the body or structure of that particular form of energy or substance, there would be injury or damage. Forms of energy commonly found at construction sites are kinetic energy, electrical energy, acoustic energy, thermal energy, radiant energy and chemical energy.

Immediate Causes

The “immediate causes” of accidents arc the

circumstances that immediately precede the contact. They usually can be seen or sensed. Frequently, they are called ‘unsafe acts” and “unsafe conditions”, in this model the terms substandard practices and substandard conditions are used. Immediate causes are symptoms of the problems but not the root of it.

Immediate Causes

Sub-Standard Conditions	**Sub-Standard Acts**
Inadequate Ventilation / Lighting	Removing Machine Guarding
Inadequate Guards / Barriers	Operating Defective Machine
Excessive Noise	Service Equipment in Operation
Defective Tools / Equipment	Horseplay
Poor House Keeping	Failure to use PPE

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Basic Causes

Basic causes are the diseases or real causes behind the symptoms; the reasons why the substandard acts and conditions occurred; the factors that, when identified, permit meaningful management control. Just as it is helpful to consider two mayor categories of immediate causes (substandard practices and substandard conditions), so it is helpful to think of basic causes in two major categories:

Personal Factors and Job Factors

Basic causes arc the origins of substandard practices and conditions. However, they arc not the beginning of the causes and effect sequence. What starts the sequence, ending in loss, is 'lack of control".

Frank Bird Accident Causation Model

Personal Factors	**Job Factors**
Inadequate Physical Capability	Inadequate Leadership / Supervision
Lack of Knowledge	Inadequate Maintenance
Lack of Skill	Inadequate Work Standards
Improper Motivation	Abuse or Misuse e.g. Unsafe act condoned by supervisor

Lack of Control

Control is one of the four essential management functions:

Plan, organize, lead, and control. Without adequate management control, the accident cause and effect sequence is started and, unless corrected in time, leads to losses.

There are three common reasons for lack of control:

- Inadequate program:
- Inadequate program standards; and
- Inadequate compliance with standards

Inadequate Program

A safety program may be inadequate because of too few program activities.

Inadequate Program Standards

A common cause of confusion and failure is a standard that is not specific enough, not clear enough, and/or not high enough.

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Inadequate Compliance with Standards

Lack of compliance with existing standards is a common reason for lack of control; in fact, most managers agree that this is the single greatest reason for failure to control accident loss.

Corrective Action

Action taken to eliminate the cause(s) of an existing nonconformity or other undesirable situation.

Preventive Action

Addresses inadequate "conditions" which may produce non-conformances. Preventive actions are usually taken so as to prevent reoccurrence of the problem.

Typical Approach in Accident Prevention

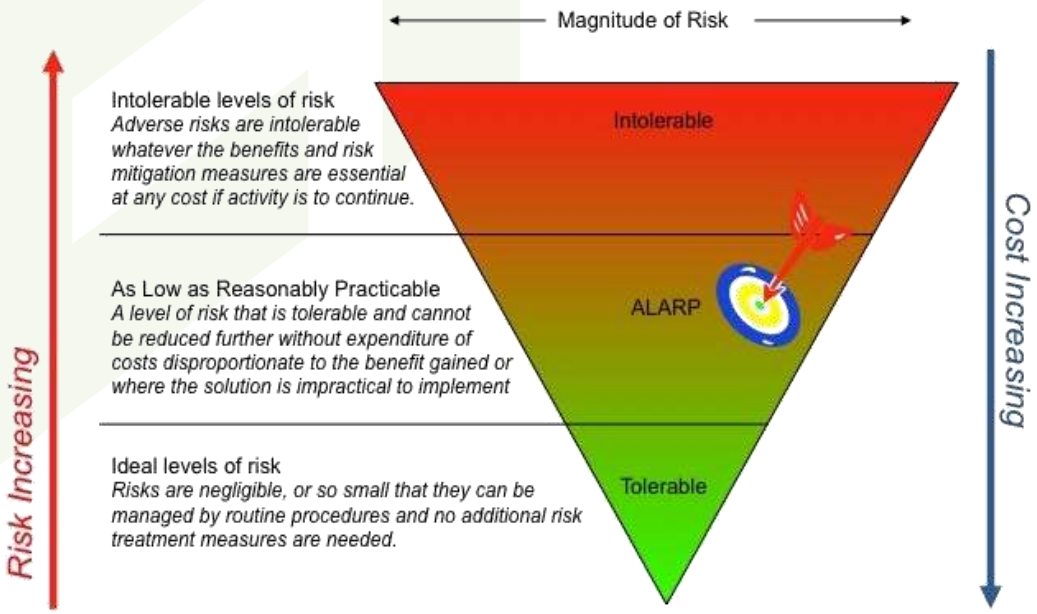
ALARP

ALARP stands for "as low as reasonably practicable", and is a term often used in the milieu of safety-critical and safety-involved systems. The ALARP principle is that the residual risk shall be as low as reasonably practicable.

Approach in CAPA

- Elimination
- Substitution
- Engineering
- Administrative
- Personal protective equipment

ALARP



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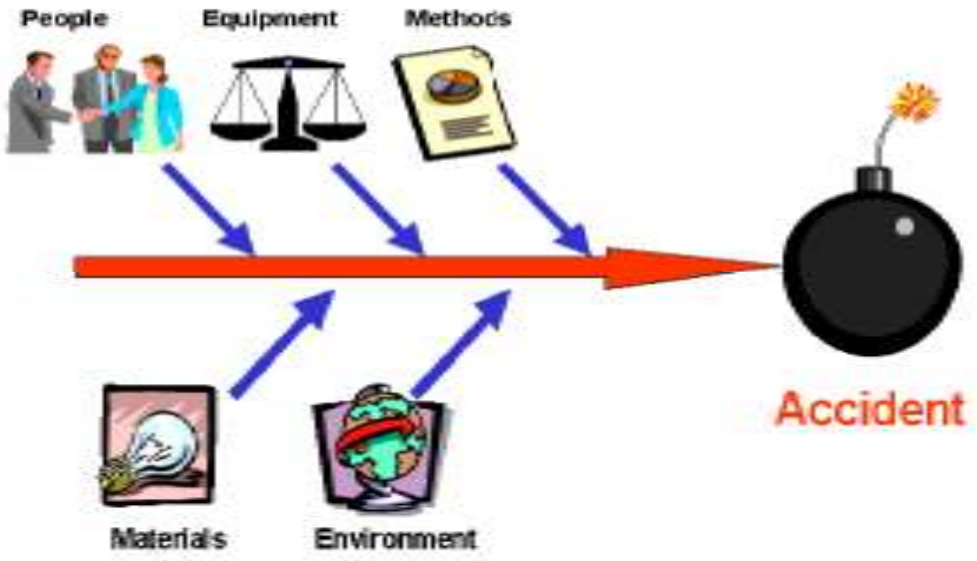
Root Cause Analysis?

Root cause analysis is an analysis that identifies underlying deficiencies in a safety management system that, if corrected, would prevent the same or similar accidents from occurring.



Root cause analysis

People

This element includes not just the workers that are working at the site. We should also look at other human element including the management, sub-contractors' supervisors and workers, clients, visitors, suppliers, and the public.

Let's look at the following examples:

- A careless worker who failed to use safety helmet at the work site bumped his head against a steel bar hanging from the ceiling.

Root cause analysis

- The Ship repair manager is not aware that scaffold system at the shipyard has to be inspected by a qualified scaffold supervisor once in every seven days. As a result, the scaffold collapsed due to overloading; and
- A supplier deliveryman drove his truck into a deep excavation at the site because he was not familiar with the site layout and condition.

It is quite common knowledge that majority (80 to 85%) of accidents are caused by mistakes made by people. As can be seen from the examples above, managing the "people" element and the interactions of people with other element is a very important mean of preventing accident.

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Equipment

This element includes all the tools, machinery, and plants that people work near or with. Fixed machines, vehicles, material handling equipment, powered and hand tools, and so on.

Take note that sub-contractors' and rented equipment, such as air-compressors brought in by painting contractors and mobile cranes hired for a few days usage are equally capable of causing accident, as such they must also be put in proper control.

Unsafe operation of equipment is one of the major causes of accident at the Shipyard . Supervisors should pay particular attention to equipment including tower crane (during erection, operation, and dismantling stage), mobile and crawler cranes, heavy plant and equipment, and hoist.

Materials

This includes any material such as materials, chemical, debris that is produced during the building, repair and maintenance process materials from the site.

Hazardous materials have gained greater attention in recent years. as we are more aware of the health hazards that can he brought by these materials. Information such as the Material Safety Data Sheets (MSDS), safe handling and proper storage procedures should be readily available to effectively control hazards caused by the use of materials

Environment

This element includes all parts of the site and its surrounding:

- Inside the ship enclosure
- equipment and materials, the surfaces on which things stand and moves;
- fluids and air which surround other elements:
- chemical hazards such as mists, vapor, gases, fumes and dusts; weather and atmospheric phenomena:
- Biological hazards such as molds, fungi. bacteria and viruses; and
- Physical conditions such as light, noise, heat, cold, pressure, humidity and radiation.

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Workplace Incident
An unexpected and unplanned occurrence, arising out of or in connection with work which results in one or more workers incurring a personal injury, disease (acute) or death.

Degree of workplace injury defined as:

Fatal
Result in death

Major [1]
Non-fatal, but severe, injuries; They are defined by a combination of factors, including the nature of injury, part of the body injured, incident type and duration of medical leave.

Minor
Non-severe injuries which result in more than three days of medical leave, or at least 24 hours of hospitalisation.

Workplace Injury
Any personal injury, disease (acute) or death resulting from a workplace incident.

Workplace Injury Rate
The number of fatal and non-fatal workplace injuries per 100,000 persons employed.

Occupational Disease
A disease (chronic) contracted as a result of an exposure over a period of time to risk factors arising from work activity.

Occupational Disease Incidence
The number of chronic occupational diseases confirmed by the Ministry of Manpower per 100,000 persons employed.

Confirmed Case of Occupational Disease
One where there is definite evidence that the worker suffers from a disease which is related to his occupation.

Workplace Accident Frequency Rate
The number of workplace accidents per million man-hours worked.

Workplace Accident Severity Rate
The number of man-days lost to workplace accidents per million man-hours worked.

Workplace Fatality Rate
The number of workplace fatalities per 100,000 persons employed.

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[1] Examples include amputation, blindness, deafness, paralysis, exposure to electric current, asphyxia or drowning, hypothermia, burns or concussions with more than twenty days of medical leave, crushing, fractures or dislocations of the head, back, neck, chest & abdomen or hip & pelvis

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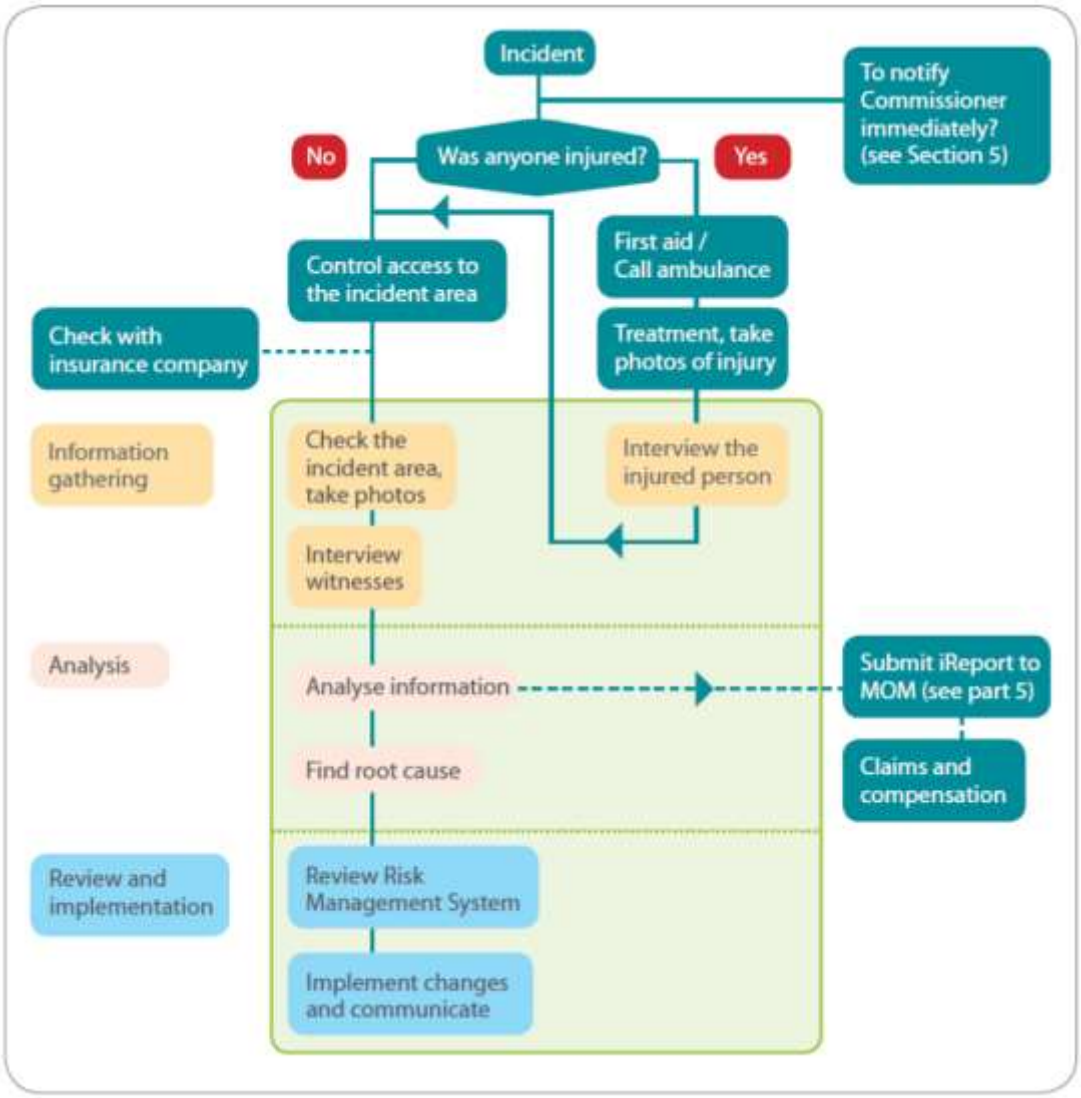

Steps In Incident Investigation

The accident investigation process involves the following steps:

1) Form accident investigation team
2) Investigate accident/incident
3) Identify the causes
4) Establish corrective measures
5) Report the findings and corrective measures

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1) Form Investigation team

Prior to investigating an accident/incident, a team comprising competent persons shall be formed.

Ideally, the investigation shall be done or led by someone experienced and trained in accident investigation techniques, such as a Workplace Safety and Health Officer.

The accident/incident investigation team may include the following members:

- Workplace Safety & Health Officer/Supervisor
- Safety committee members
- Trade Supervisors/foreman
- Department heads

2) Investigate the accident

a) Physical Evidence

- Take steps to preserve evidence and identify all witnesses.
- Take photographs before anything is moved
- Do not disturb the accident scene

Scene investigation

- Most effective method of investigating incident is to incident is to investigate at exact location of occurrence.
- Examine the accident scene
- Things like tire tracks, footprints, spills, scattered or broken parts, splits, cracks around the area where accident occurred should be noted carefully which may help during investigation.
- Distances, sizes, pressures and temperatures are noted along with the location of all pertinent items in the scene diagram.
- Items which will no remain, or which can be cleaned up has to be photographed.
- Details in the training records, equipment, maintenance records and accident records should be checked

b) Interview Witnesses

- Keep witnesses apart
- interview witnesses as soon as possible. If witnesses have the opportunity to discuss the event among themselves, individual perceptions may be lost
- Interview witnesses alone
- The purpose of interviewing the witnesses is to establish what happened.
- Witness statement is very important in finalizing root cause for accident

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Do's (at Interview)	Don'ts (at Interview)
• put the witness at ease • emphasize the real reason for the interview - to determine what happened and why • let the witness talk • make short notes • ask open-ended questions that cannot be answered by simply 'yes' or 'no' • close on a positive note	• intimidate the witness • interrupt • prompt • ask leading questions • jump to conclusion

Sample Questions to Ask Witnesses

Ask open-ended questions such as:

a) What is your name?

b) What did you see?

c) What were you doing before the accident happened?

d) Tell me more about what happened.

e) What do you think was the main cause of the accident?

- Avoid leading questions.
- A leading question contains or implies the desired answer.
- Once you ask a leading question, you are suggesting what the witness saw, for example: Was the light flashing?

Identify the Causes

Having gathered evidence from the accident/incident site, the team shall now evaluate these evidences and establish the causes that resulted in the accident/incident, such as the immediate causes and most importantly the root causes.

Establish Corrective Measures

Having identified the root causes, the team, shall recommend corrective measures to prevent the recurrence of the accident/incident.

Report Findings and Corrective Measures

The purpose of reporting is to document the facts of the accident/incident and to monitor the progress of the corrective measures implemented.

The findings and the lessons learnt shall also be shared with all affected persons working on the site.

Communicating corrective actions

1. Safety Bulletins
2. Safety Talks (Organization basis)
3. Safety Committee Meetings
4. Intranet
5. Safety Training (Induction training, OJT, etc.)

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Report

Report Findings and Corrective Measures

- The purpose of reporting is to document the facts of the accident/incident and to monitor the progress of the corrective measures implemented.
- The findings and the lessons learnt shall also be shared with all affected persons working on the site.

The accident/incident report shall consist of the following:

1. Particulars of the accident/incident
   a) Date and time of the accident/incident
   b) Name of injured
   c) Name of witnesses
   d) Location of the accident/incident
2. Brief Description of the Accident/Incident
3. Immediate and Root Causes
4. Corrective Measures
5. Responsible Parties for Corrective Measures

Accident Investigation – Investigator, Procedure & Report

Incident	Who should report	What to do
A workplace accident that causes the death of an employee.	The employer of the injured worker.	· Notify the Commissioner immediately · Submit the incident report within 10 days of the accident
A workplace accident that causes injury to an employee, who is then: Given more than three consecutive days of medical leave; or Hospitalised for at least 24 hours.	The employer of the injured worker.	· Submit the incident report within 10 days of the accident · If the employee subsequently dies from the injury, the employer must notify the Commissioner as soon as he/she knows of the employee's death.

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Incident	Who should report	What to do
A workplace accident that involves a self-employed person or member of public, causing him/her to: · Die; or · Sent to hospital for treatment of injury.	The workplace occupier	· Notify the Commissioner immediately · Submit the incident report within 10 days of the accident
A dangerous occurrence	The workplace occupier	· Notify the Commissioner immediately · Submit the incident report within 10 days of the accident
An occupational disease	The doctor who diagnosed the disease; and The employer of the person with the disease	· Submit the incident report within 10 days of diagnosis (Doctor) · Submit the incident report within 10 days of receiving the written diagnosis (Employer)

For incidents that require immediate notification:

- Notify the Commissioner of Workplace Safety and Health by calling +65 6317 1111 or sending a fax to +65 6317 1220.
- Provide the following information

  Date and time of the incident;
  - ✓ Place of the incident;
  - ✓ Name and identification number of the injured / deceased, if any;
  - ✓ Name of the employer and occupier;
  - ✓ Brief description of the incident; and
  - ✓ Name and contact details of the person making the notification

Writing the Incident Report

1: Aims & Objectives

Tell the reader what you were trying to do in the investigation

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2: Incident Description

Describe precisely what happened, beginning with the initial incident statement and resisting the temptation to launch straight in with underlying or root causes or inappropriate detail.

3: Methods of Investigation

This section should also contain a summary of the details and the results of any simulations, tests or things you did in the course of the investigation.

4: Findings

T time / **O** organisation / **P** people / **S** similar events / **E** environment / **T** technology

5: Recommendations

In this fuller version, you will want to address not only the root causes but also all the individual contributory causes you found along the way. tie in your recommendations to your findings for clarity's sake.

6. Appendix

Attach a clearly drawn root cause analysis chart as an appendix

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Accident Case Study

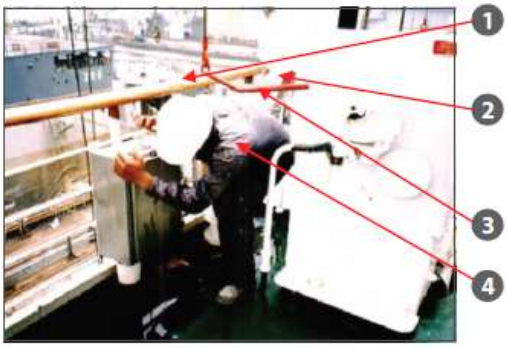
Case 1 - Worker Hit By Metal Handle In Gear Shaft

Description of Incident

The deceased and another member of the ship's crew were winching up wire ropes after a lifeboat had been lowered onto the water for testing. During this process, the wire ropes went out of alignment with the slots of the wire drum. The winch motor was stopped and the deceased used a detachable metal handle attached to the gear shaft of the motor to manually ease the tension of the wire ropes.

Upon completion, the deceased crouched as he made his way out of the narrow space between the shipside railing and the winch drum. The detachable metal handle attached to the gear shaft started to move abruptly, hitting the deceased's head. The deceased co-worker immediately pressed the stop button to stop the winch motor.

Winch system which was used to lower the lifeboat.



Deceased was struck on his head by the moving metal handle when he attempted to get out of the narrow space he was working in.

1. Shipside railing.
2. Constrained space.
3. Metal handle.
4. The deceased's position when crouching out & re-enactment.

Lessons Learnt and Recommendations

Risk Assessment	• Risk assessment should identify unsafe areas and SWPs should indicate safe means of access and egress.
Safe Work Procedure	• SWPs to be developed for both operational and maintenance work.
Equipment and Tools	• A maintenance programme for the periodic inspection and maintenance of equipment and machinery can help track their status and ensure they are in a serviceable state.
Training and Awareness	• All operators should know the SWPs of machinery they are operating.

Learning points from accident case studies

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Case 2 - Surveyor Suffocated Due To Lack Of Oxygen In Confined Space

The Incident

The deceased was inspecting the barge to determine if it was suitable for material transportation. The day before, he had only managed to survey the external areas of the barge. Thus, it was requested that the manholes of the tanks be opened up the following

day for inspection.

The next day, about three hours after conducting the inspections alone, the deceased was found lying inside one of the tanks in the barge. The cause of death was cited as 'suffocation from breathing in a vitiated atmosphere'.

Manhole entry point of port number 6 tank.

Learning points from accident case studies

Root Cause Analysis

Evaluation of loss	• 1 worker killed.
Type of contact	• Suffocation due to lack of oxygen.
Immediate cause(s)	• Unsafe environment.
Basic cause(s)	• Lack of communication/clarity on the scope of the survey work. • Lack of participation of the occupier of the premises in the survey work.
Failure of WSHMS	• Failure to ensure that visitors' scope of work was recorded. • Failure to ensure that arrangements made to ensure such works were done safely. • Failure to put in place an adequate emergency response plan for the rescue of persons in confined spaces.

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Lessons Learnt and Recommendations

Risk Assessment	• Before entering any confined space, all workers should ensure that a permit to work has been issued by a competent person, certifying that all hazards have been assessed and that the confined space is safe for entry. Workers should also check the validity period of the permit.
Safe Work Procedure	• A competent person must test the atmosphere of the confined space for oxygen, flammable and/or toxic gases and/or vapour and certify that the space is safe for entry before commencing work. The atmosphere needs to be monitored constantly to ensure it remains within safety limits while the work is carried out. Among other criteria, the confined space can only be certified safe for entry if: – The oxygen level is within 19.5% to 23.5%. – The level of flammable gas is less than 10% of the Lower Exposure Limit (LEL). – The concentration of toxic vapour and gas is below the Permissible Exposure Limit (PEL).

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Case 3 - Flash Fire in Confined Space

Introduction

On the incident day in September 2007, a team of 6 workers were doing roller painting in a confined space when a flash fire occurred. All workers managed to climb out of the confined space.

However, 4 workers sustained burns while 2 other workers were unhurt. Seven days later, one of the 4 victims succumbed to his injuries due to complication of inhalational injury and extensive burns.

This Lessons Learnt, Case Report analyses and the cause of the incident using the 5M (Machine, Man, Management, Medium and Mission) model.

Recommendations to prevent such incidents from happening are also included.

All workers managed to climb out of the confined space.

Summary of Events

- Ten days before the incident, Employer applied for a confined space permit-to work (PTW) for roller painting and cleaning work in the pontoon tank. The PTW was for the painting work to be carried out within the next 2 weeks.
- The pontoon tank was gas checked for oxygen, carbon monoxide and hydrogen sulphide levels by a safety promoter. It was certified to be safe for entry.
- A week later, spray painting work was carried out for 2 days in the same pontoon tank but applied under a different PTW. Ventilation was provided during the spray-painting work and intrinsically safe hand-held torch lights were used as the only source of lighting.
- This was immediately followed by 2 days of roller painting undertaken by a team of 6 workers, including Worker and Painter.
- n the following morning (the day of the incident), the same safety promoter conducted a gas check and observed no abnormalities. No Lower Explosive Limit (LEL) was detected. The PTW was endorsed for work to be continued.
- The same team of 6 workers then carried out vacuuming and tank cleaning work using thinner (a flammable solvent).
- At around noon, the safety promoter conducted a 2nd gas check and no LEL was detected. He thus endorsed on the PTW for work to be continued.

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- Few hours later, a joint inspection was conducted by Worker together with representatives from the rig's owner, occupier and paint manufacturer to assess the quality of the paint work.
- The inspection ended in late afternoon and Worker was instructed to perform touch up painting at some areas in the pontoon tank

- At around evening time, the workers started roller painting work from a scaffold staging erected in the pontoon tank, with Worker supervising and inspecting the painting work.
- Thirty minutes later, a flash fire occurred in the pontoon tank. All 6 workers managed to climb out of the pontoon tanks. However, 4 of them including Painter sustained burns. A few days later, Painter succumbed to his injuries due to bronchopneumonia (lung infection) complications and extensive burns.

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Case 4 - Flash Fire in Confined Space

Four shipyard workers started roller painting work from a scaffold staging erected in the pontoon tank

Mission

Painting work: The workers were tasked to carry out painting works in a pontoon tank onboard the oil rig. Their tasks include roller painting works, tank cleaning, vacuuming work and touching up of paint in the pontoon tank

Case: Synopsis of Accident

- Exposed filament in light bulb: Slightly before the flash fire occurred, some of the workers heard a “pop” that sounded like breaking glass. The bursting of the light bulb resulted in the exposure of the electrical bulb filament. This was likely due to electrical overloading.
- Exposed electrical wires in electrical cable: The electrical cable of the non flame-proof lighting was also found to be in poor condition with damaged insulation and exposed electrical wires at several locations along the cable

Man

- Emission and accumulation of flammable solvent vapours: One of the workers mixed the paint and the hardener inside the pontoon tank. After which, the mixture was redistributed into 4 smaller drums for 4 other workers.
- All these activities, together with the drying of paint on the tank surfaces caused an increase in the accumulation of flammable vapours in the pontoon tank.

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Medium

- Forced ventilation: Fresh air was supplied into the pontoon tank from an air-cooled dehumidifier blower via a 45cm diameter air ventilation trunk.
- Analysis has shown that the ventilation air flow was sufficient to dilute any accumulation of flammable vapour if there were no heightened painting activity.

Case 4 Synopsis of Accident

The cause of the incident by not instituting safe procedures to eliminate accumulation of flammable vapours / substances

Conclusion

The incident occurred primarily due to failure of Man and Machine, with Management being the contributing factor. Man accelerated the accumulation of flammable vapours by preparing the mixture in the confined space.

- Failure of Machine probably provided the source of ignition from the non flame proof lighting with exposed filament and exposed wires.
- Management also contributed to the cause of the incident by not instituting procedures to eliminate accumulation of flammable vapours / substances, not providing flame proof lighting with proper maintenance on the electrical cable and not having in place a system for continuous monitoring of flammable vapour.
- All these resulted in the occurrence of such incident that resulted in the death of 2 workers and injury to 2 others.

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UK5 Overview of WSH management system

Sub-topic

Legal requirement

- Objectives and characteristics of the 14 elements
- Practical application of the 14 elements
- Key features of SS506 and OHSAS 18001such as PDCA cycle

Overview of WSH Management System

14 Element Safety Management System

1. Safety policy
2. Safe work practices
3. Safety training
4. Group meetings
5. Incident investigation and analysis
6. In-house safety rules and regulations
7. Safety promotion
8. System for the evaluation, selection and control of contractors
9. Safety inspections
10. Maintenance regime for all machinery and equipment
11. Hazard analysis
12. Control of movement and use of hazardous chemicals
13. Emergency preparedness
14. Occupational health programs

Element 1: Safety Policy

<u>System Requirements</u>

An effective Safety Policy shall demonstrate management commitment towards safety and health improvement, its objectives and directions, including goal setting.

- The safety policy shall include the following:
  Emphasis on the importance to protect the safety and health and the general well-being of every personnel working in the workplace.
  - ✓ Accountability for the safety and health function by top management.
  - ✓ Allocation and delegation of duty and responsibility for safety and health from the top management to the line staff.
- The safety policy shall be signed by senior management of the workplace.
- The safety policy shall be effectively communicated to all employees.
- The safety policy should be reviewed at defined intervals and updated.

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Element 2: Safe Work Practices

System Requirements

- Safe work practices shall be established and implemented for the main operation or process which may include but not limited to the list as specified below:
- The safe work practices shall be communicated and made readily available to all relevant employees and contractors.
- The workplace should also maintain the operating procedures for each process.
- The operating procedures should provide the foundation for operator training and should reflect process safety information.

Element 3: Safety Training

System Requirements

- An effective training program shall be established to train employees at all levels.
- Safety Instruction courses and other mandatory safety-training courses shall be provided to all relevant employees.
- All supervisors and workers shall be trained to a competent level expected of their tasks.
- Training shall be provided to all relevant management staff so that they are equipped with the proper understanding of the safety management system and their responsibilities and duties in safety and health.
- Safety orientation shall be conducted for all contractors on the understanding of the company's safety and health policy and its rules and regulations.
- The training programs shall be conducted in languages understood by the trainee.
- The training programs shall be documented and periodically reviewed.
- The company shall maintain a record of all the training received by each employee.

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Safety and Health Training for Shipyards

Description of Persons	Safety Training Course
Workers	Safety Instruction Course (SIC), Safety Instruction Courses (Hot-work Trade) Safety Instruction Courses (Painter Trade) Rigger and Signalman Course Crane Operator Course Forklift Operators course Safety Orientation Course (Manhole) for Workers
Supervisors	SSSC Lifting Supervisors Course Scaffold Supervisors course
Safety Personal	Workplace Safety and Health officer Course (WSHO)
	Workplace Safety and Health Coordinator Course (WSHC) Workplace Safety and Health Auditor Course (WSHA) Confined Space Safety Assessor Course
	Hot work Safety Assessor Course
Ship Repair Manager (SRM)	Safety Instruction Course for Ship repair Managers

Element 4: Group Meetings

System Requirements

- The company shall establish a Safety Committee for the purpose of improving, promoting and reviewing of all matters relating to the safety and health of employees.
- The safety committee shall have a clearly defined charter with prescribed functions and responsibilities.
- The composition, functions and duties of the Safety Committee shall be in accordance with the Workplace Safety and Health (WSH Committees) Regulations 2008.
- The safety committee shall be effectively led by the senior management of the workplace.
- The safety committee shall be given the necessary support and resources so as to achieve the committee's safety and health objectives.
- The company should also establish other group meetings, which may include but not limited to the following:

  - Tool Box Meetings

  - WSH Committee Meetings

  - Safety Improvement Teams111

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Element 5: Incident Investigation And Analysis

System Requirements

- The company shall establish written procedures to ensure that all incidents are reported and recorded promptly.
- The company shall establish written procedures for the investigation into incidents.
- Line managers, supervisors, safety personnel and safety committee members should be included in the investigation team.
- The investigation team shall be adequately trained and equipped with the necessary knowledge and skills for their tasks.
- A system shall be established to ensure that the findings and recommendations of the investigations are effectively and promptly followed through and implemented.

Element 6: In-House Safety Rules And Regulations

System Requirements

- A set of basic safety rules and regulations shall be formulated in the factory to regulate safety and health behaviors at the workplace.
- The safety rules shall be documented and effectively communicated to all employees and contractors.
- The safety rules shall be made readily available to all employees and contractors.
- The safety rules and regulations shall be effectively implemented and vigilantly enforced in the workplace.
- The company shall establish and implement disciplinary or corrective procedures for failure to observe any of the rules.
- The company shall periodically review the safety rules and regulations.

Element 7: Safety Promotion

System Requirements

The company shall develop and conduct promotional programs to demonstrate clearly the management's commitment and leadership in promoting good safety and health behaviors and practices in the workplace.

Safety and Health promotional activities should be organized regularly and should include but not limited to the following:

- Display of Safety Policy at strategic locations in the company premises;
- Conduct safety campaigns with active employees and contractors participation;
- Display of incident statistics and safety performance charts;
- Conduct safety talks;
- Screening of safety videos
- Formation of safety improvements teams;
- Display of safety signs, posters to highlight a particular safety issue;
- Issuance of safety handbooks or brochures to both employees and contractors to safety awareness;
- Conduct first-aid and emergency response exercises and drills.

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Element 8: Contractor Selection & Control

System Requirements

- The company shall establish and document a system for assessment and evaluation of contractors to ensure that only competent and qualified contractors are selected and permitted to carry out contracted works in the company.
- The system shall consider basic safety performance indicators such as contractor's safety policy and safety management system.
- Upon selection of the contractor, the company should maintain a written contract with the said contractor in which the safety and health responsibilities and obligations of the contractor should be clearly spelt out.
- Prior to commencement of work, the company shall ensure that the contractor personnel working in the company are given the proper safety induction training.
- Upon selection of the contractor, the company should maintain a written contract with the said contractor in which the safety and health responsibilities and obligations of the contractor should be clearly spelt out.

Element 9: Safety Inspection

System Requirements

- The company shall develop and implement a written program for formal and planned safety inspections to be carried out in the workplace.
- The program should include safety committee inspection, routine safety inspection, plant and equipment inspection and other special or surprise inspection.
- The company shall develop checklists for identifying workplace hazards.
- The company shall establish procedures to ensure that prompt corrective actions are taken to address or eliminate the unsafe conditions/hazards and substandard behaviors/acts found during the safety inspections.

Element 10: Maintenance Regimes

System equirements

- The company shall establish a maintenance program to ensure that the mechanical integrity of critical plant equipment is maintained.
- The company shall establish a control system to ensure that critical safety devices, which control or monitor the safety of process equipment operation (such as safety alarms, control and shutdown equipment) are tested and maintained periodically.
- The types of equipment, instruments or systems that may be considered as safety critical devices may include but not limited to the following:
  - Pressure relieving devices such as safety valves;
  - Vacuum relieving devices;
  - Shutdown systems – automatic trips;
  - High priority alarms;
  - Pump low-flow recycle loop;
  - Detectors and alarms for accidental release of harmful and hazardous substances and fires, etc.

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Element 11: Risk Assessment

System Requirements

- The company shall evaluate potential accidental scenarios of the processes in the factory premises.
- The company shall review each process to address hazards by recommending action to prevent the effect of the hazards.
- The company shall communicate the hazards and control measures to all affected persons.

Element 12: Control of Movement and Use Of Hazardous Chemicals

System Requirements

- The company shall establish a control program for the management of hazardous chemicals.
- All storage tanks, vessels and containers used to store or contain the hazardous chemicals shall be of good construction, sound material, adequate strength and free from patent defects and shall be properly maintained.
- The storage tanks, vessels and containers shall be provided with proper labels on the external walls with information such as the name and properties of the chemical contained therein and the hazards associated with the chemicals.
- The total inventory of the hazardous chemicals stored in the factory at the process area or at other designated storage areas shall not be in excess of the capacity necessary for production requirements.

Element 13: Occupational Health Programs

System Requirements

The factory shall ensure that for every hazardous chemical used, produced or otherwise encountered in the operations, the following shall be available:

- Information to identify and evaluate the related safety and health hazards. Safety Data Sheet shall be provided for each chemical used;
- Precautionary advice for the safe transport, storage, use and disposal of the hazardous chemicals;
- Safe work procedures in relation to the hazardous chemicals;
- Adequate training for the employees and contractors.

The factory shall establish a Hearing Conservation Program which shall include the following:

- Regular monitoring of noise levels;
- Reduction of noise levels through engineering and administrative control measures;
- Selection, provision and maintenance of suitable hearing protectors and supervision of their usage;
- Pre-employment and annual audiometric examinations of all exposed workers; and training and education of workers.

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Element 13: Occupational Health Programs

System Requirements

The factory shall also establish a Respiratory Protection Program which shall include the following:

- Regular monitoring of air contaminants;
- Reduction of air contaminant levels through engineering and administrative control measures;
- Selection, provision and maintenance of suitable respirators and supervision of their usage;
- Training in the proper use of respirators and education on the health hazards; and
- Ensuring that there is proper fit of respirators.

Element 14: Emergency Preparedness

System Requirements

- The company shall establish procedures to :
  - ✓ Identify emergency situations and their impacts;
  - ✓ Implement emergency response plans for each level of the organization, with clear scope, roles and responsibilities; and
  - ✓ Maintain an emergency response plan
- The emergency response plan shall be documented and effectively communicated.
- The company shall establish a program of drills and exercises to assess the preparedness of the company for prompt and effective response to emergency situations.
- The company shall establish first-aid programs to provide first-aid and emergency treatment to victims of an accident.

Practical Application Of 14 Elements

- The procedures on the application of all elements will be detailed in the SMS manual.
- The essence of these elements in the form of implementation are to be communicated to the persons involved in the workplace during the site induction.
- The effectiveness of implementation will be assessed through inspections and audits.

Voluntary SHE Management Systems :

- SS506 Occupational Safety and Health Management System
- OHSAS18001 Safety Management System
- ISO14001 Environmental Management System

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Safety and Health Management System

Occupier of the following class of factories shall implement SHMS:

a) factories engaged in the processing or manufacturing of petroleum products, petrochemicals products.

b) factories engaged in the manufacture of semiconductor wafers; and

c) factories engaged in the manufacture of fabricated metal products, machinery or equipment and in which 100 or more persons are employed

WSH (Shipbuilding and Ship-Repairing) Regulations 2008

Application

These regulations shall apply to any work carried out in a shipyard or on board a ship in a harbour.

Safety and Health Management System

Occupier to implement a safety and health management system (SHMS) for ensuring the safety and health of every person in the shipyard.

Workplace Safety & Health System Implementation

Where 100 or more persons are employed, the Safety & Health Management system (SHMS)shall be implemented

Need for WSH management system

Good WSH practices do not usually happen by themselves; the organisation has to make it happen. Therefore the organisation which intends to successfully deliver good safety and health has to recognise the business and organisational needs of WSH and employ a structured approach to their functional management, usually through establishing and using a formal WSH management system.

Safety Management System

- The Safety Management System (SMS) is a systematic process for managing workplace safety and health.
- It provides for goal setting, planning and measuring performance.
- It sets out clear management commitments, direction and approaches for workplace safety and health.
- The system needs to be periodically audited or reviewed to ensure continual improvement.

Based on the Plan-Do-Check-Act (PDCA) Methodology

Specifies the requirements for an appropriate WSH policy, objectives, and procedures that accommodate legal, regulatory, customer and organisational requirements.

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Singapore Standards (SS) 506 Occupational Safety and Health Management System

Part 1 – Requirements

Part 2 – Guidelines for the implementation of SS 506: Part 1 : 2009

Part 3 – Requirements for the chemical industry

Elements of WSH Management Systems

1. OSH Policy

- Provide leadership and visible commitment
- To improve safety and health performance
- Essential to continual improvement of safety and health in a workplace.

Elements of WSH Management Systems

2. Planning

- Planning for hazard identification, risk assessment and risk control.
- Legal requirements
- Objectives
- WSH management programme(s)

Elements of WSH Management Systems

3. Implementation and Operation

- Structure and responsibility
- Training, awareness and competence
- Consultation and communication
- Documentation
- Document and data control
- Operational control
- Emergency preparedness and response

Elements of WSH Management Systems

4. Checking and Corrective Action

- Performance measurement and monitoring
- Accidents, incidents, non-conformances and corrective and preventive action
- Records and records management
- Audit

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Elements of WSH Management Systems

5. Management Review

- Be reviewed, at regular interval, to ensure its suitability, adequacy and effectiveness.
- Review include whether WSH policy is still appropriate, update of objectives, risks level and adequacy of control measures, evaluation of performance, and whether changes to the element of management system are required

WSH Management System

Singapore Standards SS 506 – Part 1 deals with Occupational Safety and Health (WSH) Management System requirements

Singapore Standards SS 506 – Part 3 deals with Occupational Safety and Health (WSH) Management System for the Chemical Industries

Legal Requirement

OHSAS 18001 Occupational Health and Safety Management

System Certification is an OH&S standard. It is designed to enable organisations to control risks and improve performance in the area of OH&S. OHSAS 18001 places a proactive and preventative emphasis on risk-control factors by identifying and assessing the likelihood and severity of hazards in the workplace.

OHSAS 18001 Occupational Health and Safety is the most well-known occupational safety management system, instantly recognizable in many countries around the world.

Transition from OHSAS 18001 to ISO 45001

- ISO 45001: The new international standard for health & safety management
- ISO 45001 is a new international standard that specifies requirements for an occupational health and safety (OH&S) management system.

Migrating from OHSAS 18001 To ISO 45001

If your organization currently holds accredited OHSAS 18001 certification, you will have three years from the formal publication of the new standard in which to migrate to the new ISO 45001 standard

In March 2018, ISO 45001 is published

Dimensions to WSH management system

It is not sufficient just dwell solely on the physical hazards and dangers to the individual occupying workplaces, but in fact a number of dimensions are necessary to be considered for a good WSH management system, such as:

- Safety- protecting persons from hazards at the workplace
- Health – protecting persons from illness resulting from the processes, procedures or materials associated with the workplace
- Welfare – providing safe work environment with necessary facilities to main persons' health at the workplace.

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Standards of OHSAS 18001/ ISO 45001: WSH Management Systems

A WSH management system may be implemented with any recognised standards. Some of the common standards are:

(a) The Occupational Health and Safety Assessment Series (OHSAS) Standard
- OHSAS 18001: Occupational health and safety management systems – Requirements
- OHSAS 18002: Guidelines for the implementation of OHSAS 18001

(b) Singapore Standards SS506 Occupational Safety and Health Management System

(c) CP 79 – Code of Practice Safety Management System for Construction Worksites

(d) Workplace safety and health (safety and health management system and auditing

Clause 4: Elements of Safety and Health Management System:

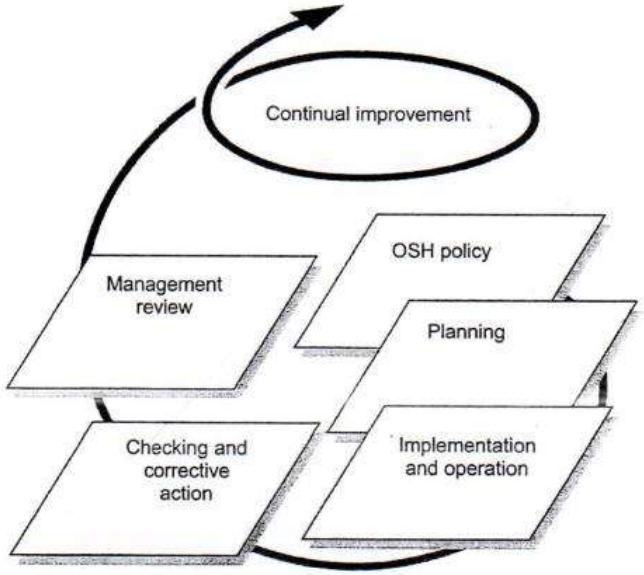

Figure 1 – Elements of successful OSH management

Clause 4.1: General requirements

To fulfill the requirements, the company shall establish, document, implement, maintain and continually improve its OSH management system in accordance with the requirement of this standard. The organization shall define and document the scope of its OSH management system.

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Clause 4.2: OSH Policy

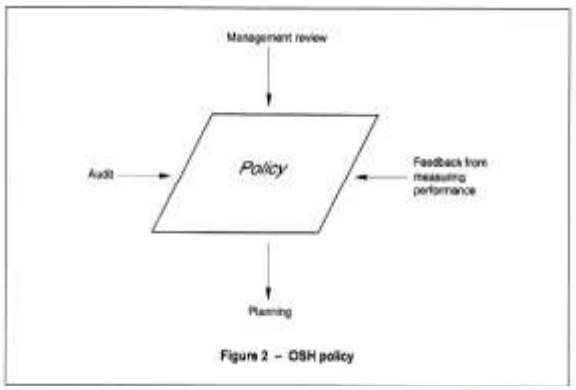

Figure 2 – OSH policy

Clause 4.2: OSH Policy

a) be appropriate to the nature and scale of the organisation's OSH risks;

b) include a commitment to continual improvement and the importance to protect the safety and health and the general well-being of every personnel working in the organisation;

c) include a commitment to comply with applicable OSH legal requirements and with other requirements to which the organisation subscribes;

d) be documented, implemented and maintained;

e) be communicated to all persons working for or on behalf of the organisation with the intent that they are made aware of their individual OSH obligations and responsibility in preventing incidents;

f) be available to interested parties; and

g) be reviewed periodically to ensure that it remains relevant and appropriate to the organisation.

Clause 4.3: Planning

Planning includes for hazard identification, risk assessment and risk control.

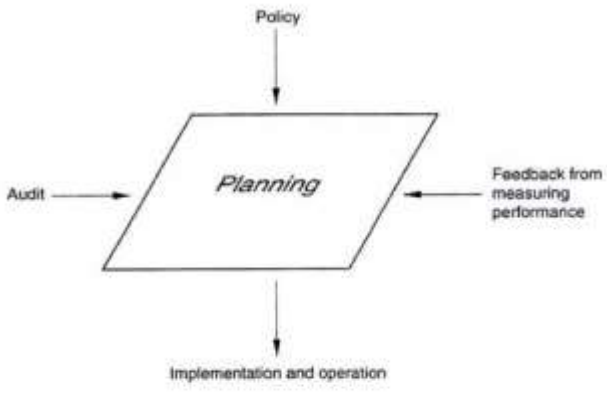

Figure 3 – Planning

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Planning for hazard identification, risk assessment and risk control

Process safety information

a) Information pertaining to the hazards of chemicals used or produced by the process.
   - Safety Data Sheet (SDS) may be used to help meeting this requirement.

b) Information pertaining to the technology of the process.

c) Information pertaining to the equipment used in the process.

Process safety information shall be kept updated and available to relevant parties in the organisation.

Hazard identification, risk assessment and risk control

The hazard analysis shall include:

- routine and non-routine activities;
- activities of all personnel having access to the workplace (including contractors and visitors); equipment and materials at the workplace, whether provided by the organisation or others;
- study on new or modifications to existing process, technology, equipment and use of hazardous substances;
- organised and systematic effort to identify, assess and address the significant risks associated with the process, facilities and the use of hazardous substances in the workplace;

Legal and other requirements

The company shall establish, implement and maintain a procedure(s):

a) to identify and have access to the applicable legal and other OSH requirements, and

b) to determine how these requirements apply to its OSH hazards and risks.

The company shall ensure that these applicable legal requirements and other requirements to which the organisation subscribes are fully addressed in establishing, implementing and maintaining its OSH management system.

The company shall keep this information up-to-date, it shall communicate relevant information on legal and other requirements to its employees, personnel working for or on its behalf and other stakeholders.

Objectives and targets

The company shall establish, implement and maintain documented OSH objectives and targets, at each relevant function and level within the organisation.

The objectives and targets shall be measurable, where practicable, and consistent with the OSH policy, including the commitment to be in compliance with applicable legal requirements and with other requirements to which the organisation subscribes, and to continual improvement.

When establishing and reviewing its objectives and targets, an organisation shall take into account its legal and other requirements, its OSH risks, its technological options, its financial, operational and business requirements, and the views of interested parties.

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OSH management programme(s)

The organisation shall establish, implement and maintain an OSH management programme(s) for achieving its objectives and targets. This shall include documentation of:

a) the designated responsibility and authority for achievement of the objectives and targets at relevant functions and levels of the organisation; and

b) the means and time-scale by which objectives and targets are to be achieved.

The OSH management programme(s) shall be reviewed at regular and planned intervals. Where necessary, the OSH management programme(s) shall be amended to address changes to the activities, products, services, or operating conditions of the organisation.

Implementation and operation

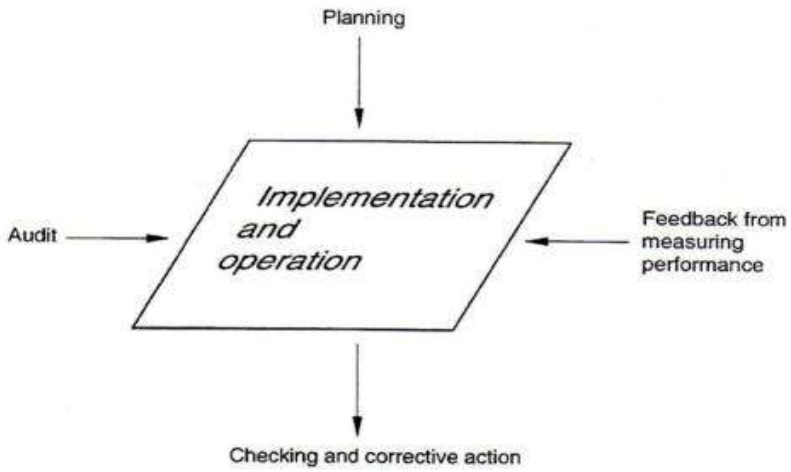

Figure 4 – Implementation and operation

Structure, responsibility and authority and In-house OSH rules and regulations

The OSH organisational structure shall ensure that:

a) the roles, responsibilities and authorities of personnel driving and fulfilling the various safety and health management system requirements are clearly defined, documented and communicated;

b) the availability of resources essential to establish, implement, maintain and improve the OSH management system so as to meet the organisational OSH objectives and targets; and

c) the OSH consistency, accountability and compliance by making arrangements to:

   i) develop and measure the mechanisms used by senior management for review and improvement of the OSH management system;

   ii) promote a safety culture through positive feedback and coaching; and

   iii) facilitate performance assessment of the OSH programmes and use it as part of the continual improvement process.

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In-house OSH rules and regulations

A set of basic OSH rules and regulations shall be formulated to regulate OSH activities and behaviours at the workplace. The rules shall include; but not limited to the following:

a) Operating procedures and safe work practices;
b) Incident and hazard reporting;
c) OSH training requirement;
d) Use of personal protective equipment;
e) Housekeeping and cleanliness; and
f) Fire prevention.

Training, awareness and competence

- The organisation shall ensure that any person(s) performing tasks for it or on its behalf in the workplace shall demonstrate basic competencies in workplace safety and health.
- They should possess sufficient knowledge of safety and health to enable them to recognise potential hazardous situations, to know their responsibilities as per legal requirement and to know their roles in creating safe work and safe working conditions.
- Such knowledge, and that includes competency standards both generic and process-specific, could be imparted through formal courses or on-the-job training.

The organisation shall establish and implement promotional programmes to raise OSH awareness which should include the following:

a) conduct tool box meetings which provide the opportunity for operators and workers to discuss safety and health issues in relation to their work and to review the work carried out to highlight the potential hazards and necessary precautions to be taken;
b) OSH Improvement Teams to work through safety and health related projects for the purpose of improving the physical work environment and to reduce unsafe behaviours;
c) display of the OSH policy and commitment at strategic locations in the workplace;
d) conduct of structured or thematic OSH campaigns with active employees and contractors participation;
e) display of incident statistics and OSH performance charts;
f) conduct of topical OSH talks;
g) screen of OSH videos;
h) display of OSH sign, posters or other visual material to increase OSH awareness or to highlight a particular safety issues;
i) issue of OSH handbooks or brochures to both employees and contractors to increase awareness, as part of personal OSH training;
j) conduct first-aid and emergency response exercise and drills; and
k) organise visits to other organisations to share OSH practices and ideas.

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Annex - Learning Activity

Learning Activity 1.1

Group discussion

Objective
At the end of the activity, learner is to identify the applicable Acts and Regulations, duties and responsibilities of stakeholder in marine industry

Trainer to form groups which consist of 5 members. Member should be selected based on their industrial background and roles in workplace so to have a good mixture for learning.

1. Identify the applicable information and present to the class why they think it is relevant Acts and Regulations to their workplace.
2. Explain importance of ensuring Workplace safety and health
3. Explain the guiding principle of WSH Act
4. Explain duties and responsibilities of Occupier, Employer and person at work

Write down your findings on the flip chart paper and nominate a spokesperson from each group to share the finding to the class.

Learning Activity 1.2

Group discussion

Objective
At the end of the activity, learner is to briefly list 5 key point from the following Regulation

Trainer to form groups which consist of 5 members. Member should be selected based on their industrial background and roles in workplace so to have a good mixture for learning.

1. WSH (Scaffold) Regulation
2. WSH (Risk Management) Regulation
3. WSH (Incident Reporting) Regulation
4. WSH (First Aid) Regulation
5. WSH Confined Spaces) Regulation
6. WSH (Work at Height) Regulation
7. MPA regulations for gas-free certification

Write down your findings on the flip chart paper and nominate a spokesperson from each group to share the finding to the class.

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Learning Activity 1.3

WSH (Shipbuilding and Ship Reapr) Regulation

Group discussion
Objective
At the end of the activity, learner is to list key point of WSH (Shipbuilding and Ship Repair SSR) Regulation

Trainer to form groups which consist of 5 members. Member should be selected based on their industrial background and roles in workplace so to have a good mixture for learning.

Based on WSH (Shipbuilding and Ship Repair SSR) Regulation

1. Explain the process of Permit-to-work system
2. Requirement of Hot work permit system
3. 3 key point from General provision
4. 3 key point from Electrical safety
5. 3 key point from Welding and cutting operations
6. 3 key point from Cranes and lifting

Write down your findings on the flip chart paper and nominate a spokesperson from each group to share the finding to the class.

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Learning Activity 2

Duties and responsibilities of supervisors

Objective
At the end of the activity, learner is to explain the duties and responsibilities of site supervisors.

Group discussion & Presentation

Form the class into groups of 5 members. Members for each group may be chosen considering their work background and experience to ensure a good mix and composition.

Based on your site practice, share with the group and examine the key roles and responsibility of a Marine supervisor.

Use flipchart to pen down the discussion and present to the class

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Learning Activity 3.1

Objective
Identify VSCC Committee formation and Duties and responsibility

Group discussion

To outline types of WSH planning in a marine industry

Group Discussion and Presentation
Form into groups of 5 and assign each group with one discussion topic as shown below.

1. Formation of VSCC Committee

2. Duty and responsibilities of Chairman, Secretary and other members

Write down your findings on the flip chart paper and nominate a spokesperson from each group to share the finding to the class.

Learning Activity 3.2

Group discussion
Form the class into groups of 5 members. Members for each group may be chosen considering their work background and experience to ensure a good mix and composition.

Trainer to explain to learners how to a permit to work form (Annex)
Ask learners to fill up a permit to work form for any of the below work

1) Confined Space entry
2) Hot work
3) Painting
4) Chemical cleaning

Resource: PTW Form

Sample form from WSH Manual for Marine industry. for more detail pls see the manual

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Learning Activity 4.1

Objective
Perform hazard identification and enter into hazards identification form

Group discussion
Form the class into groups of 5 members. Members for each group may be chosen considering their work background and experience to ensure a good mix and composition.

Trainer to explain to learners how to use hazard identification form (Annex A)

Learners to identify the relevant hazards to the work activity at a Marine site and fill up the form and present to the class

Learners to use the form and move about in the classroom to identify the relevant hazards to the work activity and fill up the form and present to the classroom

Resource: Hazards Identification Form

Learning Activity 4.2

Objective
At the of this activity, learners is able to identify hazards in 4 major Marine Trade and recommend control measures

1. Mechanical works
2. Electrical works
3. Confines space Entry
4. Hotwork

Individual Exercise

Trainer to inform learners they are to do this exercise individually, however they can consult each other.

- Write down your findings on the form (LG Annex B&C)

- Ask learners to identify the 4 Major hazards in the Marine site and fill up the form and present to the class

Case Scenario
You are employed by a Marine company as WSH supervisor and below are the various work activities in the site, offices and workshop. These are the photos taken during the first day of work on the site.

You are to identify hazard and and recommend control measures.

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Learning Activity 4.3

Objective
At the of this activity, learners is able to identify hazards in 5major Marine hazards and recommend control measures

1. Surface Treatment and specialize operation
2. Working at heigth
3. Crane operation ad lifting
4. Material Handling
5. Health Hazards

Individual Exercise

Trainer to inform learners they are to do this exercise individually, however they can consult each other.

- Write down your findings on the RA form (LG Annex B&C)
- Ask learners to identify the 4 Major hazards in the Marine site and fill up the form and present to the class

Case Scenario
You are employed by a Marine company as WSH supervisor and below are the various work activities in the site, offices and workshop. These are the photos taken during the first day of work on the site.

You are to identify hazard and recommend control measures

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Learning Activity 5

Objective
At the of this activity, learners is able to identify hazards in 4 major Marine hazards, evaluate risk and recommend control measures

Individual Exercise
Trainer to inform learners they are to do this exercise individually, however they can consult each other.

- Write down your findings on the RA form (LG Annex B&C)
- Ask learners to identify the 4 Major hazards in the Marine site and fill up the form and present to the class

Case Scenario
You are employed by a Marine company as WSH supervisor and below are the various work activities in the site, offices and workshop. These are the photos taken during the first day of work on the site. You are to identify hazard and evaluate the risk level of each activity and recommend control measures.

Learning Activity 6

Group discussion

Objective
At the end of this activity, learners are able to perform a inspection, write down the conformance and recommend corrective and preventive measures.

Trainer to form groups which consist of 5 members. Member should be selected based on their industrial background and roles in workplace so to have a good mixture for collaborative learning.

Participants to discuss and prepare:

- General WSH inspection and report

Participant to share with class their checklist and trainer to conclude the report

Conduct of Learning Activity and Suggested Response

Resource: Inspection photo LG Annex E

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Learning Activity 7

Group discussion

Objective
At the end of this activity, learners are able to investigate incident, gather information, analyses cause and recommend CAPA

Pair discussion and exercise

Task: Based on the case scenario, discuss in pair and collect necessary evidence and information of an incident and submit a report for preventive and corrective action.

Write down your findings and present

Case 1
Surveyor Suffocated Due To Lack Of Oxygen In Confined Space

The Incident
The deceased was inspecting the barge to determine if it was suitable for material transportation. The day before, he had only managed to survey the external areas of the barge. Thus, it was requested that the manholes of the tanks be opened up the following day for inspection.

The next day, about three hours after conducting the inspections alone, the deceased was found lying inside one of the tanks in the barge. The cause of death was cited as 'suffocation from breathing in a vitiated atmosphere'.

Manhole entry point of port number 6 tank.

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Root Cause Analysis

Evaluation of loss	• 1 worker killed.
Type of contact	• Suffocation due to lack of oxygen.
Immediate cause(s)	• Unsafe environment.
Basic cause(s)	• Lack of communication/clarity on the scope of the survey work. • Lack of participation of the occupier of the premises in the survey work.
Failure of WSHMS	• Failure to ensure that visitors' scope of work was recorded. • Failure to ensure that arrangements made to ensure such works were done safely. • Failure to put in place an adequate emergency response plan for the rescue of persons in confined spaces.

Lessons Learnt and Recommendations

Risk Assessment	• Before entering any confined space, all workers should ensure that a permit to work has been issued by a competent person, certifying that all hazards have been assessed and that the confined space is safe for entry. Workers should also check the validity period of the permit.
Safe Work Procedure	• A competent person must test the atmosphere of the confined space for oxygen, flammable and/or toxic gases and/or vapour and certify that the space is safe for entry before commencing work. The atmosphere needs to be monitored constantly to ensure it remains within safety limits while the work is carried out. Among other criteria, the confined space can only be certified safe for entry if: – The oxygen level is within 19.5% to 23.5%. – The level of flammable gas is less than 10% of the Lower Exposure Limit (LEL). – The concentration of toxic vapour and gas is below the Permissible Exposure Limit (PEL).

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Case 2

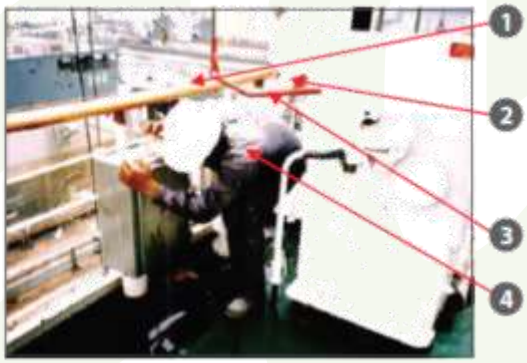
Worker Hit By Metal Handle In Gear Shaft

Description of Incident

The deceased and another member of the ship's crew were winching up wire ropes after a lifeboat had been lowered onto the water for testing. During this process, the wire ropes went out of alignment with the slots of the wire drum. The winch motor was stopped and the deceased used a detachable metal handle attached to the gear shaft of the motor to manually ease the tension of the wire ropes.

Upon completion, the deceased crouched as he made his way out of the narrow space between the shipside railing and the winch drum. The detachable metal handle attached to the gear shaft started to move abruptly, hitting the deceased's head. The deceased co-worker immediately pressed the stop button to stop the winch motor.

Winch system which was used to lower the lifeboat.



Deceased was struck on his head by the moving metal handle when he attempted to get out of the narrow space he was working in.

1. Shipside railing.
2. Constrained space.
3. Metal handle.
4. The deceased's position when crouching out & re-enactment.

Lessons Learnt and Recommendations

Risk Assessment	• Risk assessment should identify unsafe areas and SWPs should indicate safe means of access and egress.
Safe Work Procedure	• SWPs to be developed for both operational and maintenance work.
Equipment and Tools	• A maintenance programme for the periodic inspection and maintenance of equipment and machinery can help track their status and ensure they are in a serviceable state.
Training and Awareness	• All operators should know the SWPs of machinery they are operating.

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Case 3

Case study - Worker crushed by falling object during lifting operations

What happened?

A worker was sleeping near vehicle access road next to steel fabrication block. The road is part of a T-junction. At around 11.55 pm, a 7-ton forklift carrying a concrete block turned left at the T-junction into the road and ran over the deceased.

At near midnight, the deceased and 4 co-workers were sleeping at an open space near fabrication block after they had taken their supper.

The 4 co-workers were sleeping near steel fabricated block. However, the deceased slept at an open path further away from the rest.

Findings: Root Cause

a) Not all workers were informed about the existence of the resting shed (just 100m away). No instruction was given to prohibit workers from resting near the steel fabricated blocks or other work area.
b) The operator's vision was obstructed during operation by the concrete block, but he continued driving forward.
c) There was no lighting around the proximity and the operator did not switch on the 2 headlights.
d) The operator worked from 7.30am till mid-night and fatigue may have compromised his judgment and functionality.

Lesson Learnt

a) Proper management of forklift and human traffic in workplace, e.g. Enforcement of designated resting area for workers.

- **Importance** of safety training and briefings to increase safety awareness and manage workers' behaviour.
- Proper lighting for forklift operations at night.
- Issue of fatigue-adequate hours of rest for workers.

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Case Study Report Form

a) Description of accident
b) Immediate causes
c) Root causes
d) Corrective and preventive actions to be taken by the Occupier.

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Sample forms and checklist

Permit to Work sample

XYZ MARINE PTE LTD	Permit to Work	

Project		Company Name	
Location of work			
Description of work			
Permit validity Period	From (date/time): _____ Till (date/time): _____		

This permit is valid only for the period stated above. The conditions of issue must be complied with throughout the duration of work. This permit may be revoked at any time. You are responsible for the copy of this permit to display at work location till completion of the above work or expiry or revocation of permit and must produce it on request.

STAGE 1 – Application for Permit to Work (PTW) by the permit requester (WAH Supervisor)

I have checked and confirmed that the following WSH measures have been taken to ensure safety and health of persons at work and fully understand the nature of work and the WSH compliances. I will supervise & continuously monitor the works at height and undertake to stop/cease the operation should there be any unsafe condition or potentially hazardous situation arose during the course of work. I undertake to report immediately if there is any incompatible work found in and around the vicinity.

Proper & secure work platforms with toe boards provided (Min.500 mm and 90 mm width respectively)		Hand tools / loose materials carried by workers are secured so as to avoid falling	
Effective guardrails / lifelines provided for workers / scaffolders to anchor their safety belt/harness		Scaffold contractors erected the scaffold if the height of scaffold is 4 meter or above	
Safe access for workers to reach the work platform and proper barricades provided		PE Design and calculation (for scaffold with more than 30 meter height) available	
Standing supervision for workers working at height available		Weekly scaffold inspection conducted by scaffold supervisor and records maintained	
Only metal decking are used as work platform (timber platforms not advisable to use)		Ensure workers are briefed on the safety requirements for working at height	
SWL signboards, scaffold access sign and other warning signboards (if necessary) are displayed		Tool box meeting conducted and records are maintained	
Good housekeeping at working platforms maintained		Safe work method statement / Safe work procedure established and available on site	
Others:			

Legend: √ = Satisfactory / Yes X = Not provided / Not satisfactory / Inadequate / No NA = Not Applicable

Name/ Designation: *Main contractor representative:* _____
(Engineer / Supervisor / Foreman)

Contact No./ : (hp)

Date/Time / Signature: Date/Time / Signature :

.

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STAGE 2 – Evaluation of Permit to Work application by WAH Assessor (WSHO or WSH Personnel)

I have inspected and assessed the vicinity of the above work area to ensure that all reasonably practicable steps have been taken to safeguard the safety and health of the working personnel and preservation of the environment. The said location is safe for intended work.

Name _____
(WSH Supervisor or WSH Coordinator)

Date/Time: _____

Signature: _____

I am satisfied that necessary physical inspection for the above work area and /or process have been conducted and the permit is verified.

Name 姓名: _____
(WSH Officer)
Date/Time: _____

Signatur: _____

STAGE 3 – Issuance of Permit to Work (PTW) by Authroised Manager

I am satisfied that reasonably practicable measures have been implemented through proper evaluation of risks and hazards and enforced, the working personnel are informed of the safety hazards & environmental impacts and protection counter measures to be taken. If incompatible works reported, the above work will be suspended and permit revoked。

Name : **Designation** : _____

Date/Time: **hrs** **Signaturre** : _____

STAGE 4 – Notification of completion of the above work WAH Supervisor

I confirmed that the working at height operation is completed on (date) _____ and (time) _____

Name : **Designation :** _____

Date/Time: **hrs** **Signature:** _____

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10. Permit for Entry into Confined Spaces

(First Time Entry)

S/No
Hull

(Do not enter the space until stages II are duly completed and signed by the respective personnel)

Confined		Open	

S/No
Others

The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel

Vessel's Name:			Location of Work:		
Commencement:	Date:	/ /	Completion	Date:	/ /
	Time:	Hrs		Time	
Types of Paint:	*Brush / Roller / Spray				

Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (it any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the entry into the space and during the course of work in the space:

- ☐ Provision of adequate lighting and ventilation
- ☐ Prominent display of the entry permit
- ☐ Display of the number tags at the entrance to the space
- ☐ Maintenance of escape routes free from obstruction

Name: _____ Designation: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

Stage II: Endorsement by Safety Assessor

I have gas monitored the space and confirm that it is certified fit for entry.
Remarks (if any)

Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor/ Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit

Name: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on ____ / ____ / ____ at _____ hours.
I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: _____ Designation: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Note:
i) This permit is strictly for entry into the space only
ii) It does not entitle the applicant to carry out hot work or any other hazardous work. Separate permits must be obtained to carry out hot work or any other hazardous work.

Sample form from WSH Manual for Marine industry. for more detail pls see the manual

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1. Permit for Hot Work

S/No.		Hot Work shall not to commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.
Hull		

Vessel's Name:	Commencement:	Date: / /
		Time: Hrs
Location of Work:	Completion:	Date: / /
		Time: Hrs

Types of Hot Work: Gouging / Burning / Welding / Pre-heating / Grinding / Others: _____ (specify)*

Details of the Hot Work to be carried out:

Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (it any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall ensure compliance with the under-mentioned requirements prior to the commencement and during the hot work:

Please tick the applicable requirements in the appropriate boxes.

- ☐ Presence of fire-watch with fire extinguishers/ fire hoses
- ☐ Prominent display of hot work signboard
- ☐ Supply of sufficient forced ventilation and provision of adequate lighting
- ☐ Prominent display of the Hot Work Permit with sketch
- ☐ Display of revolving lights

Sketch

Name: Designation:

Signature:

Date: / / Time: Hrs

Stage II: Endorsement by Safety Assessor

I have inspected and confirm that:
1. The hot work area and its surroundings are free from combustible / flammable substances; and
2. The necessary safety requirements have been complied with.

Additional safety precautions to be taken:

I hereby endorse the permit

Name: _____ Signature: _____ Date: / / Time: _____ Hrs

Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I have ensured that there are no incompatible work processes being carried out in the same vicinity at the same time.
3. All reasonably practicable measures will or have been taken to ensure safety and health of person carrying out the work.
4. All persons carrying out the hot work are informed of the hazards associated with it.
5. I confirm that I have co-ordinated the work at the VSCC meeting.
6. I am satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely.

I hereby endorse the permit

Name: _____ Signature: _____ Date: / / Time: _____ Hrs

Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: _____ Signature: _____ Date: / / Time: _____ Hrs

Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on / / at _____ hours.

Name: _____ Signature: _____ Date: / / Time: _____ Hrs

*Delete where not applicable

See overleaf for explanatory notes

Daily Endorsement by SRM
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Day 8
Day 9
Day 10
Day 11
Day 12
Day 13
Day 14

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2. Permit for Painting

	Confined		Open		
S/No Others	The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel				
Vessel's Name:			Location of Work:		
Commencement:	Date: / /		Completion	Date:	/ /
	Time: Hrs			Time	
Types of Paint:	*Brush / Roller / Spray				

Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (it any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process.

Confined Space

- ☐ Prominent display of appropriate signboards at the paint storage area and the space to be painted
- ☐ Co-ordination of painting and storage areas
- ☐ Supply of sufficient forced ventilation
- ☐ No hot work in the space to be painted
- ☐ No hot work within 3 meters of the common bulkheads in the adjacent tanks
- ☐ Provision of adequate flame proof lights with cables in good condition
- ☐ Use of cartridge type respirator/ air fed mask
- ☐ Proper blanking/ isolation of pipelines leading to other compartments

Open Space

- ☐ Prominent display of appropriate signboards at the paint storage area
- ☐ Co-ordination of painting and storage areas
- ☐ Use of cartridge type respirator

☑ *Please tick the applicable requirements in the appropriate boxes*

Name: _____ Designation: _____ Signature: _____ Date: ____/____/____ Time: _____ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the safety Assessor/ Safety Assistant for endorsement.

Stage II: Endorsement by Safety Assessor

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with.
I hereby endorse the permit

Name: _____ Signature: _____ Date: ____/____/____ Time: _____ Hrs

Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I have ensured that there are no incompatible work processes being carried out in the same vicinity at the same time.
3. All reasonably practicable measures will or have been taken to ensure safety and health of person carrying out the work.
4. All persons carrying out the hot work are informed of the hazards associated with it.
5. I confirm that I have co-ordinated the work at the VSCC meeting.
6. I am satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit

Name: _____ Signature: _____ Date: ____/____/____ Time: _____ Hrs

Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: _____ Signature: _____ Date: ____/____/____ Time: _____ Hrs

Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on ____/____/____ at _____ hours.
I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: _____ Designation: _____ Signature: _____ Date: ____/____/____ Time: _____ Hrs

Stage V: Notification of Completion of Work by Trade Foreman / Supervisor

I confirm that the space _____ is certified gas free.

Name: _____ Designation: _____ Signature: _____ Date: ____/____/____ Time: _____ Hrs

*Delete where not applicable

See overleaf for explanatory notes

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12. Permit for Chemical Cleaning of Generators / Motors

Confined		Open	

S/No
Others

The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel

Vessel's Name:			Location of Work:		
Commencement:	Date:	/ /	Completion	Date:	/ /
	Time:	Hrs		Time	
Types of Paint:	*Brush / Roller / Spray				

Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process.

- Prominent display of appropriate signboards at all entrances
- Isolation of *generator / motor beaker and heater circuit in the switchboard
- Supply sufficient exhaust ventilation
- No hot work in the *engine room and boiler room / emergency generator room
- Use of appropriate personal protective equipment by the chemical cleaners and assistants
- Use of adequate flame proof lights
- Workers involved in the chemical cleaning have been briefed on the hazards and preventive measures

Name: _____ Designation: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

Stage II: Endorsement by Safety Assessor

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with.
I hereby endorse the permit

Name: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I have ensured that there shall not be any hot work or any other incompatible work carried out in the *engine room and boiler / emergency generator rooms.
5. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit

Name: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on ____ / ____ / ____ at _____ hours.
I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: _____ Designation: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Stage V: Verification by Safety Assessor / Safety Assistant

I confirm that the *engine room / boiler room / _____ (specify) is / are certified gas free.

Name: _____ Designation: _____ Signature: _____ Date: ____ / ____ / ____ Time: _____ Hrs

Sample form from WSH Manual for Marine industry. for more detail pls see the manual

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Learning Activity 4

WSH hazards and control measures in Marine Industry

Work Activities Trade	Hazards	Control Measures

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Company: LOCATION:		RM Leader:		Approved by	Reference Number
		RM Member 1:			
		RM Member 2:			
Original Assessment Date:		RM Member 3:		Name:	
Last Review Date:		RM Member 4:		Designation:	
Next Review Date		RM Member 5:		Date:	

S/ No	Work Activity	Hazards	Possible Injury / ill health	Existing Risk Control	S	L	R	Additional Risk Control	S	L	R	Implementation Person	Due Date

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Recommended Risk Matrix with numeric rating

Likelihood / Severity	Rare (1)	Remote (2)	Occasional (3)	Frequent (4)	Almost Certain (5)
Catastrophic (5)	5	10	15	20	25
Major (4)	4	8	12	16	20
Moderate (3)	3	6	9	12	15
Minor (2)	2	4	6	8	10
Negligible (1)	1	2	3	4	5

	Classification of Risk Level
	High Risk
	Medium Risk
	Low Risk

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Sample from WSH Manual for Marine industry. for more detail pls see the manual

1. Hazard Identification				2. Risk Evaluation				3. Risk Control		Reference
No.	Task Step	Hazard	Possible Accident / Ill Health & Persons-at-Risk	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)	Document for Reference
1	Transporting of blasting equipment and material by forklift / lorry truck from store to worksite	Moving vehicle	Collision of forklift / lorry truck	• Qualified operator • Working condition of vehicle • Ensure the load is within the safe working load and the C.G of vehicle • Observe yard's speed limit • Ensure clear passageway before operating vehicle • Maintain a clear vision of the operator	5	1	M	• Supervision • Brief to workers	Immediate Supervisor	
		Falling object	Strike by falling object	• Secure load • Ensure clear passageway from surrounding area • Lifting equipment is valid and in safe working condition • Safe working load of lifting equipment	2	2	L	• Supervision • Brief to workers	Immediate Supervisor	

Source: WSH Manual for Marine Industry

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Risk Assessment Form

1. Hazard Identification				2. Risk Evaluation				3. Risk Control		Reference
No.	Task Step	Hazard	Possible Accident / Ill Health & Persons-at-Risk	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)	Document for Reference
2	Setting up of grit-blasting equipment	• Falling of object • Hand / finger injuries • Body injury • Slip, trip and fall	• Same as above • Pinch point areas • Slip and fall on slippery work surface or trip and fall over hoses placed at passageway	• Same as above • Hand gloves • Maintain two-way communication • Using trained personnel • Safe manual handling practice • Maintain clean and dry work place at all times • Do not place blasting hoses at passageway • Hang up of blasting hoses using cable hanger	2 2 2	2 2 2	L L L	• Supervision • Brief to workers • Supervision • Brief to workers • Supervision • Brief to workers	Immediate Supervisor Immediate Supervisor Immediate Supervisor	
3	Blasting operation	• High pressure • Noise • Exposure to dust • Body injuries (during blasting)	• Body injuries • Noise-induced deafness (NID) • Inhalation (respiratory problems) • Overcome by CO • Poor communication between pot man and blaster result in wrong pressurised hose • Surrounding people hit by spent grit	• Physical check on hose condition • Trained personnel • Functional test (gradually turn on) • Protective clothing • Blasting hood (Air-fed) • CO monitoring device installed • Proper marking of hoses and valves • Railings covered with canvas • Highlight in VSCC meeting • Display warning signboard	3 2 2	3 3 2	M M L	• Supervision • Brief to workers • Electrical generated compressed air • Dead Man Switch recommended • Blaster to look out prior to blasting	Immediate Supervisor Immediate Supervisor Immediate Supervisor Immediate Supervisor	

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Risk Assessment Form

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No.	Task Step	Hazard	Possible Accident / Ill Health & Persons-at-Risk	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)	Document for Reference
3.1	Operating of cherry picker	• Moving cherry Picker • Falling of person • Electrocution	• Collision / toppling • Fell from basket • Contact with electrical cables	• Cherry picker in safe working condition • Trained operator: Certification of Cherry Picker to be valid • Travelling path to be cleaned of obstruction and on even ground • Anchor of safety belt • Max. 2 persons operating • Ensure no contact between cherry picker and electrical cable.	5 5 5	1 1 1	M M M	• Supervision • Brief to workers • Supervision • Brief to workers • Supervision • Brief to workers	Immediate Supervisor Immediate Supervisor Immediate Supervisor	
4	Demob	High pressure	Residual pressure in hoses result in body injuries (Strike by) Refer to No.2	• Off main valve • Release existing pressure in the hose	3	3	M	• Supervision • Brief to workers	Immediate Supervisor	

Source: WSH Manual for Marine Industry

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Learning Activity 6 Inspection Report

No	Photo	Violation/Unsafe condition	Recommend Rectification
1			
2			
3			
4			
5			

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No	Photo	Violation	Recommend Rectification
6			
7			
8			
9			
10			

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Sample form

Safety & Health Inspection Checklist (Sample)

Location: _____ Date: _____ Time: _____

Dept Manager/Rep : _____

Inspection Team Members: _____

Item Description	Yes	No	Location /Remarks
1. Housekeeping			
1.1) Are safe means of access provided and maintained?			
1.2) Are sufficient number of fire extinguishers provided, clear of obstruction?			
1.3) Are materials stacked securely & in an orderly manner?			
1.4) Are there dedicated waste containers?			
1.5) Is the work area kept free of oil spills & tripping hazards?			
1.6) Is there a first aid box provided and maintained?			
1.7) Are flammable materials properly segregated & stored away from ignition sources?			
1.8) Is the site clean & hygienic (no mosquito breeding conditions, etc.)?			
2. Safe Work Condition			
2.1) Are conditions of equipment & site adequately safe to carry out job?			
2.2) Is daily toolbox briefing practised?			
2.3) Is RA being carried out for critical jobs as per statutory requirements?			
3. Inspection of Equipment (Check Records)			
3.1) Are lifting tools and shackles tested as per statutory requirements?			
3.2) Are portable hand tools & power tools inspected?			
3.3) Are welding machines, generators, air compressors, welding cables, electrode holders, earthing connections, accetylene cylinders, regulators, oxy-accetylene hoses and flashback arrestors inspected and tagged?			
3.4) Are forklifts and boom lifts inspected and maintained?			
4. Use of Hazardous Chemicals			
4.1) Are Safety Data Sheet available for chemicals used on site?			

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Item Description	Yes	No	Remarks
4.2) Are workers informed of the hazards of chemicals before they are used?			
4.3) Are chemicals stored properly and labelled?			
5. Personal Protective Equipment			
5.1) Are workers provided with Personal Protective Equipment (PPE)?			
5.2) Are PPE of right type for the right job?			
5.3) Are PPE maintained in good condition?			
6. Falling Hazard			
6.1) Are openings properly guarded?			
6.2) Is flooring free from oil, slippery material?			
7. Electrical Hazard			
7.1) Are electrical wires/cables in good condition?			
7.2) Are electrical wires/cables properly dressed?			
7.3) Are safety devices in order?			
8. Tools and Equipment			
8.1) Are gas manifolds, cutting torches & welding sets tested?			
8.2) Are flashback arrestors provided?			
8.3) Are welding holders insulated?			
8.4) Are gas cylinders in secured and upright position?			
9. Any Other Comments _____ _____			

Name: _____ Signature: _____

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Safety Checklist for Rigger (Slinging, Signaling and Lifting)

	Yes	No
1. Before Lifting the Load,		
1.1 Are you appointed as a rigger to carry out rigging and signaling activities in your yard?	☐	☐
1.2 Have you successfully undergone the training in rigging?	☐	☐
1.3 Have you checked that the lifting gears or appliances such as chain blocks, wire ropes, shockles, eyebits and others:		
• Visible defects	☐	☐
• Maximum safety working load	☐	☐
• Date of last test	☐	☐
• Current colour coding	☐	☐
1.4 Have you checked to ensure that the welded eye piece or lifting lug of the load has no visible defects?	☐	☐
1.5 Have you checked:		
• The weight of the load to be carried and confirmed that this is below the safe working load of your lifting gear or appliances?	☐	☐
• The load including all loose items and all lifting attachments are properly secured?	☐	☐
• The pads are placed in areas where the mire ropes are bent around the sharp edges?	☐	☐
• There is one trained person around to give the signal?	☐	☐
1.6 Have you ensured that all the appropriate tag line is attached to the load?	☐	☐
1.7 Have you ascertained the weight of the load which is to be lifted and informed the crane operator of the weight of the load?	☐	☐
2. During Lifting the Load,		
2.1 Have you ensured that the load is properly balanced?	☐	☐
2.2 Has the load been prevented from swinging?	☐	☐
2.3 Are the loose chain or wire rope slings properly secured?	☐	☐
2.4 Are other workers in the vicinity warned of the potential danger?	☐	☐
2.5 Have the workers standing or working below the suspended load being cleared away?	☐	☐
3. When Lowering the Load,		
3.1 Have you ensured that the resting place for the food is suitable, and upon resting, that the load is stable?	☐	☐
3.2 Have you ensured that the chain or wire rope sling is slackened before attempting to remove it?	☐	☐
3.3 After removing the chain or wire rope sling, have you ensured that the shackeled pins are properly secured?	☐	☐

Note:
Upon completion of work, please ensure that all lifting gears or appliances are kept properly
Do not start work unless the above questions are answered YES. If in doubt, please check with your supervisor.

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Safety Checklist for Fire Watchmen

	Yes	No
1. Have you attended the fire watch personnel training?	☐	☐
2. Have you checked and ensured that the area is completely free from flammable substances?	☐	☐
3. Have you checked and ensured that all combustible materials in the way of the affected areas in the adjacent compartments have been removed?	☐	☐
4. Have you been provided with suitable fire fighting equipment?	☐	☐
5. Are the fire extinguishers in serviceable condition?	☐	☐
6. For areas provided with fire hoses, are they charged and ready for use?	☐	☐
7. Upon completion of the work, have you checked the work area and the affected areas in the adjacent compartments for any smothering smoke etc?	☐	☐

Note:
Do not start work unless the above questions are answered Yes.
If in doubt, please check with your supervisor.

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Safety Checklist for Pipe Fitters

	Yes	No
1. Personal Protective Equipment (PPE)		
1.1 Are you fully equipped with the suitable PPE required for this job?	☐	☐
2. Work Tools		
2.1 Are your work tools suitable for the job?	☐	☐
2.2 Are your work tools in good working condition?	☐	☐
3. Entry and Work in Confined Space		
3.1 Is there a valid entry permit displayed at the entrance to the confined space?	☐	☐
4. Working at Height		
4.1 Are the working platforms (scaffoldings) certified safe for use?	☐	☐
4.2 Are proper anchoring points for safety belts provided and used?	☐	☐
5. Hot Work (General)		
5.1 Have you been instructed by your supervisor to do hot work?	☐	☐
5.2 If yes, has valid hot work permit been obtained to carry out the hot work?	☐	☐
6. Pipe / Valve Work (Engine / Room / Tanks / Deck)		
6.1 Before commencing work on the pipe, has the pressure in the pipe been released?	☐	☐
6.2 Has a valid permit been obtained for dismantling piping / valve containing or which has contained all or any other substances that are toxic, flammable or corrosive?	☐	☐
6.3 When dismantling fuel oil pipes / valve in confined spaces,		
• Is adequate ventilation provided?	☐	☐
• Are flame-proof lights used?	☐	☐
6.4 Are drip trays / containers used to contain oil spill when dismantling cargo pipes / valves?	☐	☐
6.5 Are there any leaks / discharge from the pipelines / valves? (If yes, stop the leaks immediately and report to your supervisors)	☐	☐
7. Work on Boilers / Steam Pipes		
7.1 Has a valid permit been obtained for the work on the steam boiler or steam pipes?	☐	☐
7.2 Are steam and exhaust lines / valves completely blown down?	☐	☐
7.3 Are steam and exhaust lines / valves sufficiently cooled before work?	☐	☐
7.4 Are adequate ventilation and lighting provided? (for work inside boilers)	☐	☐
8. Access Opening (E.g. Skylight)		
8.1 Are the openings barricaded before lifting lowering of items?	☐	☐
9. Material Handling		
9.1 Before any slinging or lifting, have you ensured that all chain block / sling wires are tested by an approved person?	☐	☐
9.2 Have you checked with your supervisor to ensure that the engine room's overhead crane has been tested by an approved person?	☐	☐
9.3 Are you trained and authorised to operate the engine room's overhead crane?	☐	☐
9.4 Are you familiar with the lifting operation and procedures?	☐	☐

Note:
Do not start work unless the above questions are answered Yes.
If in doubt, please check with your supervisor.

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Safety Checklist Arc Welding

	Yes	No
1. Before Work,		
1.1 Have you put on the personal protective equipment?	☐	☐
1.2 Safe set up for the operation:		
• Are the welding set and work piece properly earthed?	☐	☐
• Are the cables and connections in good condition and firmly attached?	☐	☐
• Are the gas hoses properly arranged or suspended?	☐	☐
• Is the electrode holder fully insulated?	☐	☐
• Are the electrode holders and cables provided with valid inspection tags?	☐	☐
• Is the low voltage shock preventer functioning?	☐	☐
2. During Work,		
2.1 Is the electrode disconnected from the cables when moving around?	☐	☐
3. After Work,		
3.1 Is the electrode disconnected from the supply cables?	☐	☐
3.2 Is the welding set switched off?	☐	☐
3.3 Have you check work area before leaving?	☐	☐
Note: Do not start work unless the above questions are answered "Yes". If in doubt please check with your supervisor.		

REVISION OF DOCUMENT

This document is subject to revisions and updates. The revision status is indicated at the cover page of this document, and version number is reflected in the footer throughout this document

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