Workplace Safety & Health Manual for **Marine Industries**

WSHCOUNCIL

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1. Publisher's Note

Management of safety and health using a management system approach has been recognised worldwide as one important way to manage safety and health at the workplace. The Workplace Safety and Health (Shipbuilding and Ship-repairing) Regulations also require the occupier of a shipyard to implement and maintain a safety and health management system to ensure the safety and protect the health of every person in the shipyard.

This manual is a joint effort by the Workplace Safety and Health (WSH) Council Marine Industries Committee, Ministry of Manpower (MOM) and Association of Singapore Marine Industries (ASMI) to provide companies in the marine industry with a reference for the management of workplace safety and health using a systemic approach.

The structure of this manual closely follows that of a typical safety management system based on the Plan-Do-Check-Act (PDCA) continual improvement cycle. Each main section of the manual can be matched to a corresponding clause in the Singapore Standards SS506 on Occupational Safety and Health Management System. The manual starts with a introduction, reference standards, and terms and definition. As with the SS506, the key contents are in Section 4, which provides relevant elements of the management system. In particular, sections 5.2: SHE Policy; 5.3: Planning; 5.4: Implementation and Operation; 5.5: Checking and Corrective Actions; 5.6: Management Review; and their subsections provide the bulk of the management system elements. This structure allows easy reference for users, and makes development, implementation, audit and review of the management system easier with respect to that of Singapore and even international safety, health and environmental management standards. Similarly, it also provides easy update, expansion and amendment of this manual to stay in line with the SS506.

The manual contents were developed with close reference to:

- Safety Health and Environmental Manual, 1999, ASMI
- Guidelines on Safety Management System for the Shipbuilding and Ship-repairing Industry
- Workplace Safety and Health (Shipbuilding and Ship-repairing) Regulations 2008
- Current good practices in ASMI companies

Matters relating to implementation and operational controls of safety and health, including the requirements under the SS506 and the WSH (Shipbuilding and Ship-repairing) Regulations can be found in Section 4.4. In addition, useful information such as risk assessment in the marine industry, checklists, training requirements, and so on are included in the Annexes for reference. A mapping of the relevant sections in this manual with the corresponding clauses in other safety and health management systems is also included in the Annex.

The above mentioned structure and content, makes the manual a practical reference for the development and implementation of control measures and management system. It is also suitable for use for audit purpose and by personnel in the shipbuilding and ship-repairing industry, especially those involved in the preparation, supervision and execution of repair, conversion and new building works for all types of vessels in shipyards.

2. Introduction

1.1 Purpose

This manual provides guidelines for the preparation of a company's safety, health and environmental management system. The guidelines are general since an individual company's requirements vary with the size of the company, range of operations, types of vessel handled, management policy, and so on.

The objectives of the manual are to:

- Highlight the important aspects of safety, health and environmental protection to assist companies in planning and implementing management systems in order to satisfy company, legal and social obligations; and
- Assist companies to put in place safe work practices and management systems to enhance their safety performance.

3. Reference Standards

The following reference standards were used during the development of this manual:

3.1 Singapore Standards SS506 Occupational Safety and Health Management System

3.2 ISO 14001 Environmental Management System

3.3 Occupational Safety and Health Assessment Series 18001

The structure of this manual is similar to that of the above standards, which are representative of SHE management systems. Similar to these standards, the Plan-Do-Check-Act continual improvement framework has been adopted for this manual.

4. Terms and Definitions

4.1 Definitions

The following terms are used in this manual with the meanings as shown below:

Accident
An unplanned event resulting in actual ill health or injury, damage to property, plant, ships or environment, production losses or increased liabilities.

Act
Unless otherwise stated, "Act" refers to The Workplace Safety and Health Act 2006.

Action Verbs

Must:	Action which is mandatory.
Should:	Action which is essential unless the company has an equally effective alternative approach.
May:	Action which is at the discretion of the company.
May not:	Action which is prohibited.

Administrative Control
Implementation of any administrative requirement which includes a permit-to-work system, safe work procedures (including that during emergency), warnings and signs, work-rest regime, and so on.

Competent Person
A person who has sufficient experience and training to perform the work required.

Confined Space
An area where dangerous fumes are liable to be present to such an extent as to involve risk of persons being overcome thereby; or "the supply of air is inadequate", or is likely to be reduced to be inadequate, for sustaining life, as defined in Section 25, WSH (General Provision) Regulations.

Contractor
Any company or individual engaged by the shipyard to perform work in the shipyard or to provide labour, equipment, facilities or material to be used in the shipyard.

Designated Person
A competent person appointed in writing by:

- An occupier of a shipyard;
- An employer of persons carrying out work in a shipyard or on board a ship in a harbour; or
- A principal who gives direction to persons on the work carried out by those persons in a shipyard or on board a ship in a harbour, to perform any task or duty prescribed under these Regulations.

Element
An aspect of safety to be taken into account in the comprehensive management of safety within the enterprise. In particular, the list defined in Second Schedule, WSH (General Provisions) Regulations.

Engineering Control

- The application of any scientific principle for the control of any workplace hazard; and
- It includes the application of physical means or measures to any work process, equipment or the work environment such as the installation of any barrier, enclosure, guarding, interlock or ventilation system.

Environmental Aspect
Element of an organisation's activities or products or services that can interact with the environment.

Environmental Impact
Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.

Hazard
A source, situation or act with the potential for harm in terms of:

- Ill health or injury, or both;
- Damage to property, plant or ships;
- Pollution of environment; and
- Production losses or increased liabilities.

Hazardous Work
Any work that is likely to endanger the life of any person in a shipyard or on board a ship in a harbour and includes any type of work which is specified by the Commissioner in writing as hazardous work.

Hot Work
Riveting, welding, flame cutting or burning and includes any other work involving the use or generation of heat or the production of sparks.

Incident
An unplanned event which results in, or has the potential to result in:

- Ill health or injury;
- Damage to property, plant, ships or environment; and
- Production losses or increased liabilities.

In-house Rules
Instructions and prohibitions relating to behaviour, discipline and administration within the shipyard. Organisation, company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration.

Procedure
The step-by-step method for carrying out a task safely and to the quality level required.

Regulation
A statutory requirement issued in association with an Act passed by the Singapore Government, unless otherwise stated Regulation means any regulation made under the WSH (Shipbuilding and Ship-repairing) Regulations 2008.

Responsible Person
In relation to any work carried out in a shipyard or on board a ship in a harbour, it means:

- In the case of a shipyard, the occupier of the shipyard; and
- In the case of a ship in a harbour:
  - The employer of any person who carries out the work; or
  - The principal under whose direction any person carries out the work.

Shipyard
Shipyard includes any dry or wet dock, wharf, jetty and quay, and the precincts thereof.

Risk
The combination of the probability of an incident and its consequences. All WSH risk must be reduced by either making an incident less likely to happen or/ and the consequences less serious to a level that is As Low As Reasonably Practicable (ALARP).

Risk Assessment
The process of evaluating the probability and consequences of injury or illness arising from exposure to an identified hazard, and determining the appropriate measures for risk control.

Safe Work Practices
Any procedure for carrying out work safely, and includes any procedure which is to be taken to protect the safety and health of persons in the event of an emergency. Safe work procedure may take the form of an instruction, whether written, pictorial, or conveyed by training and supervision for safe performance of tasks such as welding, operation of machines, access to work locations. Safe work procedure should also include procedures to be taken in the case of emergency.

Safety
Freedom from unacceptable risk of harm including:

- Protection of people from physical or health hazards;
- Protection of assets; and
- Maintenance of production capability.

System
The organisation, responsibilities, procedures, resources and processes by which an enterprise plans to achieve its policy and objectives. In this document, unless otherwise stated, system refers to Safety, Health and Environmental Management System, which is the means by which the organisation implements its safety, health and environmental policy and objectives.

Principal
A person who, in connection with any trade, business, profession or undertaking carried out by him, engages any other person otherwise under a contract of service:

- To supply any labour for gain or reward; or
- To do any work for gain or reward.

4.2 Abbreviations

ASMI	Association of Singapore Marine Industries
BCD	Building Control Department
CP	Code of Practice
MOM	Ministry of Manpower
MPA	Maritime and Port Authority of Singapore
SDS	Safety Data Sheet
NEA	National Environment Agency
PPE	Personal Protective Equipment
SCDF	Singapore Civil Defence Force
SHE	Safety Health and Environment
SHEMS	Safety, Health and Environmental Management System
SMS	Safety Management System
SRM	Ship Repair Manager
VSCC	Vessel Safety Coordination Committee
v/v.	Concentration by Volume
WSH	Workplace Safety and Health

5. Safety Health And Environmental Management Element

5.1 General Requirements

Administered by the Ministry of Manpower, the WSH (Shipbuilding and Ship-repairing) Regulations require that "the occupier of a shipyard shall implement a safety management system". The elements that should be included in the safety management systems (SMS) are stipulated in the Second Schedule, WSH (General Provisions) Regulations. The element of the mandatory safety and health management system is shown in Annex A-2. Occupiers of shipyards should meet the requirements of the Regulations and establish, document, implement and continually improve the system.

Under the National Environment Agency, organisations that store, use or transport large quantities of hazardous substances are required to implement a safety management system and have it audited by approved auditors.

There are also voluntary SHE Management Systems such as:

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

This manual serves as a management guide for shipyards. It is structured using the typical SHE management system framework of Plan-Do-Check-Act approach for continual improvement. A reference on the correspondence between the various safety and health management systems is show in Annex A-1.

5.2 SHE Policy

The shipyard's management should provide the vision, establish the framework and set expectations, and provide the resources for responsible management of the shipyard's operations. Leadership and visible commitment to improve safety and health performance are essential to the continual improvement of safety and health in the shipyard.

The SHE policy should:

- Be appropriate to the nature and scale of the WSH and environmental risks;
- Include a commitment to comply with legal and other requirements applicable to the organisation;
- Include a commitment to continuously improve the protection of the safety, health and general well-being of every personnel working in the shipyard;
- Be documented, implemented and maintained;
- Be communicated to all employees;
- Be endorsed by senior management;
- Be available to interested parties; and
- Be reviewed periodically to ensure that it remains relevant and appropriate to the organisation.

The SHE should address the following:

- Set a framework for general intentions, direction and approach for which the safety and health of people and the protection of the environment are being managed;
- Recognise that safety and health is an integral part of business performance;
- Consider the interests of the company's stakeholders such as employees, customers, contractors, regulatory agencies, public, and so on and include accountability for the safety and health function by top management;
- Allocate and delegate of duty and responsibility for safety and health from the top management to the line staff;
- Emphasise on the importance of shaping the behaviour of employees and management staff so as to protect the safety and health and the general well-being of every personnel working in the shipyard;
- Commit sufficient resources towards the achievement of safety and health goals and objectives; and
- Instill responsibilities at all levels in preventing accidents through group and personal communication.

5.3 Planning

5.3.1 Hazard Identification, Risk Assessment and Risk Control

5.3.1.1 WSH Hazard Identification, Risk Assessment and Risk Control

Under the WSH (Risk Management) Regulations, employer, self-employed and principal should conduct risk assessment in relation to WSH risks posed to any person who may be affected by his undertakings. The employer, self-employed and principal must take reasonably practicable measure to eliminate the risks. Where elimination is not reasonably practicable, the employer, self-employed person or principal should implement such reasonably practicable measures to minimise the risk; and such safe work procedures to control the risk.

The organisation should establish and document procedures for ongoing identification of hazards, assessment of risks and implementation of control measures. A risk management programme should be established and include the following:

Formation of a Risk Management Team
The team should be lead by a person competent in risk management and comprise persons from relevant functions, with appropriate knowledge and experience. The duty and responsibilities of team members should be clearly defined.

Hazard Identification
The identification process should also include consideration of:

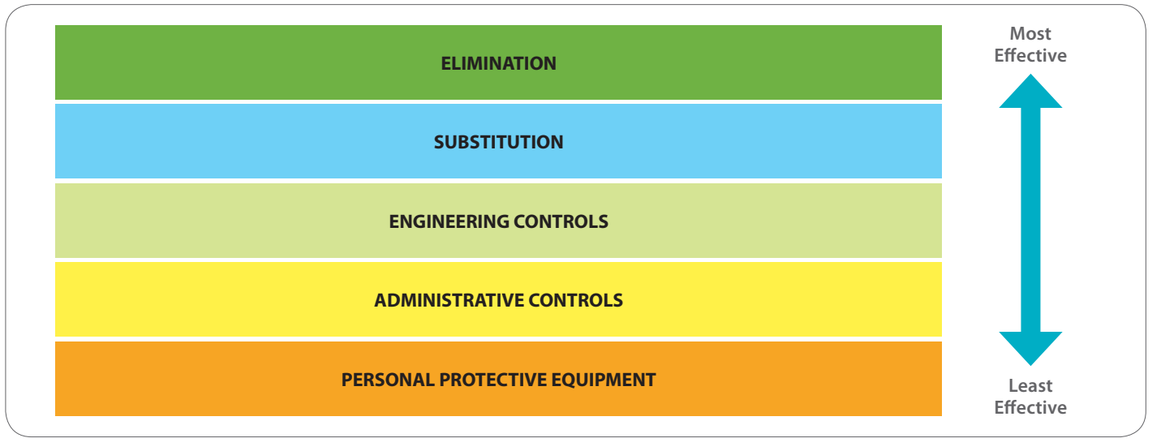
- The way work is organised, managed and carried out, including any changes that has occurred;
- The design of workplaces, work processes, materials, plant and equipment;
- The fabrication, installation, commissioning, handling and disposal of materials, workplaces, plant and equipment;
- The purchasing of goods and services;
- The contracting and sub-contracting of plant, equipment, services and labour including contract specifications and responsibilities to and by contractors; and
- The inspection, maintenance, testing, repair and replacement of plant and equipment.

Risk Assessment

- All risk associated with hazards, including personal health risks, identified should be evaluated, assessed and assigned control priorities based on the established level of risk.

Prevention and Control Measures

- Preventive and protective measures should be implemented in the following order of priority. See Figure below.



The preventive and protective measures should be documented and approved by the shipyard's management.

Training
The shipyard should ensure that the maintenance personnel are trained and competent in the relevant work practices and maintenance procedures.

Documentation and Record Keeping
The shipyard should keep its documentation, data and records concerning the identification of hazards, and the assessment and control of risks up-to-date in the context of on-going activities. Documentation and records keeping should also be extended to cover new developments and new or modified activities, before these are introduced.

Communication and Provision of Information
The shipyard should communicate and inform any persons affected by the risks:

- The nature of the risks involved; and
- The control measures or safe work procedures to be taken to address the risks involved.

Review
The risk assessment should be reviewed and revised:

- At least once every 3 years; and
- Upon the occurrence of any body injuries to any person as a result of exposure to a hazard in the workplace; or
- Where there is a significant change in work practices or procedures.

The MOM "Workplace Safety and Health Management: Risk Assessment – Risk Assessment Guidelines" in Annex C-1 provides guides for the conduct of risk assessment. ASMI recommends the use of the 5x5 matrix for risk assessment. The matrix can be found in Annex C-2.

Risk matrices and templates by members of ASMI during a workshop are available for download as reference at the ASMI website. Eight samples for common operations such as scaffolding, tank cleaning, steel work, painting and blasting, mechanical work, electrical work, marine piping and marine transporting can be found in Annex C-3.

Samples of the compendium of typical hazards in the shipbuilding and ship-repairing industry are also available at the MOM and the WSH Council websites.

5.3.1.2 Environmental Aspects and Impact

Organisations should identify the environmental aspects associated with its activities, products or services and determine those that are significant. Priority should be given to address the significant aspects to minimise their impact.

Examples of environmental aspects may include:

- Releases into water and sea;
- Emissions into the air;
- Use of raw materials, including chemicals;
- Use of natural resources, such as water;
- Use of energy;
- Aesthetics, such as shape, colour, appearance of the environment; and
- Generation of waste from ship repair activities.

The environmental impact of the corresponding aspects should be assessed to identify its significance. This can be done using methods similar to that for risk assessment for safety and health hazards, such as the risk matrix.

5.3.1.3 Risk Register

Organisations should conduct WSH risk assessment and identify the environmental aspects of all its activities. This process should consider normal and abnormal operating conditions, shut-down and start-up conditions, as well as reasonably foreseeable emergency situations.

Organisations should establish records of the WSH risk assessments and identified environmental aspects that list all its SHE risks. This may take the form of a "WSH Risks and Environmental Risks Register".

5.3.2 Legislation, Standards and Codes of Practice

Organisations involved in shipyard activities and ship repair must commit to compliance with all legal and other requirements that are applicable to the activities, products and services. These requirements include the relevant Primary Legislative Status (Acts) passed by the Parliament, the Subsidiary Legislations (Regulations, Notification and Orders) issued by the relevant government agencies, and the applicable Singapore Standards and Codes of Practice. Organisations should also comply with the relevant industrial standards and codes.

To enable compliance, organisations must identify all the legal and other requirements, applicable to their activities, products or services. A procedure(s) should be established, implemented and maintained for identifying and accessing the legal and other SHE requirements that are applicable to it. Organisations should ensure that these applicable legal requirements and other requirements are taken into account during the establishing, implementing and maintaining of SHE management system.

Organisations must ensure that they keep the information on the applicable legal and other requirements up-to-date.

These relevant information on legal and other requirements should be communicated to persons working under the control of the organisation, and other relevant interested parties.

5.3.2.1 Primary Legislation

The following table provides a brief description of the area of application of the primary legislation (Acts) relevant to shipyards.

Legislation	Area of Application
Safety and Health	
Workplace Safety and Health Act (Chapter 354A)	Workplace safety and health of person at work including making provisions for: • General duties of persons at workplaces, such as employers, occupiers, principals, • Persons at work, manufacturers and suppliers, machine installer, and so on; • Investigations, inquiries and reporting of accidents, dangerous occurrences and occupational diseases; • Safety and health management arrangements; • Codes of practice applicable for providing practical guidance with respect to the requirements of this Act relating to safety, health and welfare at work.

Fire Safety Act (Chapter 109A)	Fire protection against safety, persons and property.
Radiation Protection Act 2007	Regulates the import, manufacturing, sales, transport, storage, disposal, possession and use of radioactive materials and irradiating apparatus.
Work Injury Compensation Act 2008	Make provision for compensation of employees due to injury and illnesses arising from work. It provides a simple, low-cost and no-fault system that benefits both employees and employers. Employees can receive compensation quickly without having to prove fault, and employers' liability can be capped. Compensation also includes medical expenses and medical leave wages.
Environment	
Environmental Protection and Management Act, previously titled Environmental Pollution Control Act (Chapter 94A)	Protection and management of the environment and resource conservation including: • Control of – air, water and land pollution; – hazardous substances; – environmental noise; • License and industrial plant works; • Pollution control measures; and • Energy conservation.
Environmental Public Health Act (Chapter 95)	Matters pertaining to environmental public health such as: • Removal of refuse; • Cleanliness in public areas; • Disposal and treatment of industrial waste; • Public nuisances; • Sanitary requirements; and • Health requirements for buildings.
Sewerage and Drainage Act (Chapter 294)	The treatment and discharge of industrial wastewater into public sewers.
Control of Vectors and Pesticides Act (Chapter 59)	• Control on the types of pesticides used for vector control, including pesticides and repellents to ensure that they are safe for use by vector control operators. • Make provisions for labelling requirements for pesticides products. • Register vector control companies and licenses of supervisors and workers.
Prevention of Pollution of the Sea (Amended) Act (Chapter 243) 1996	Prevention of pollution of sea from: • Land and apparatus; • Ships; and • Prevention measures against pollution of sea.

5.3.2.2 Subsidiary Legislation

Below is the list of relevant subsidiary legislation made under the above Acts.

Primary Legislation	Subsidiary Legislation
Safety and Health	
Workplace Safety and Health Act (Chapter 354A)	WSH (Abrasive Blasting) Regulations 2008 WSH (Asbestos) Regulations 2014 WSH (Composition of Offences) Regulations WSH (Confined Spaces) Regulations 2009 WSH (Construction) Regulations 2007 WSH (Exemption) Order WSH (Explosive Powered Tools) Regulations 2009 WSH (First Aid) Regulations WSH (General Provisions) Regulations WSH (Incident Reporting) Regulations WSH (Medical Examinations) Regulations 2011 WSH (Noise) Regulation 2011 WSH (Offences and Penalties) (Subsidiary Legislation under Section 66(14)) Regulations WSH (Operation of Cranes) Regulations 2011 WSH (Registration of Factories) Regulations 2008 WSH (Risk Management) Regulations WSH (Safety and Health Management System and Auditing) Regulations 2009
	WSH (Scaffold) Regulations 2011 WSH (Shipbuilding and Ship-repairing) Regulations 2008 WSH (Transitional Provision) Regulations WSH (Work at Heights) Regulations WSH (Workplace Safety and Health Committees) Regulations 2008 WSH (Workplace Safety and Health Officers) Regulations Factories **Factories Act subsidiary legislation** Factories (Registration and Other Services—Fees and Forms) Factories (Safety Training Courses) Order
Fire Safety Act (Chapter 109A)	Fire Safety (Building and Pipeline Fire Safety) Regulations Fire Safety (Buildings Requiring Fire Certificate) Order Fire Safety (Company Emergency Response Team) Regulations 2013 Fire Safety (Composition of Offences) Regulations Fire Safety (Emergency Response Plan) Regulations Fire Safety (Exemption) (Temporary Buildings in Construction Sites) Order Fire Safety (Exemption) Order Fire Safety (Fire Safety Engineers) (Code of Professional Conduct and Ethics) Regulations Fire Safety (Fire Safety Engineers) Regulations Fire Safety (Fire Safety Managers) Regulations Fire Safety (Flammable Refrigerants — Exemption) Order 2013 Fire Safety (Marine Fire-fighting Fees) Regulations 2013 Fire Safety (Petroleum and Flammable Materials — Exemption) Order Fire Safety (Petroleum and Flammable Materials) Regulations Fire Safety (Pipelines — Exemption) Order 2014 Fire Safety (Premises Requiring Emergency Response Plan) Notification 2013 Fire Safety (Premises Requiring Fire Safety Manager and Company Emergency Response Team) Notification 2013 Fire Safety (Registered Inspectors) (Code of Professional Conduct and Ethics) Regulations Fire Safety (Registered Inspectors) Regulations Fire Safety (Residential Buildings Requiring Fire Certificate) Order 2010 Occupier Or Owner of Industrial Premises to Appoint Fire Safety Managers
Radiation Protection Act 2007	Radiation Protection (Non-Ionising Radiation) Regulations Radiation Protection (Ionising Radiation) Regulations Radiation Protection (Transport of Radioactive Materials) Regulations Radiation Protection (Exemption for Transit, Transhipment and Carriage of Conveyance Equipment) Regulations 2014
Environment	
Environmental Protection and Management Act (Chapter 94A)	Environmental Protection and Management (Boundary Noise Limits for Factory Premises) Regulations Environmental Protection and Management (Control of Noise At Construction Sites) Regulations Environmental Protection and Management (Fees for Licences) Regulations Environmental Protection and Management (Hazardous Substances) Regulations Environmental Protection and Management (Trade Effluent) Regulations Environmental Protection and Management (Vehicular Emissions) Regulations Environmental Protection and Management (Air Impurities) Regulations Environmental Protection and Management (Ozone Depleting Substances) Regulations Environmental Protection and Management (Energy Conservation) Regulations Environmental Protection and Management (Prohibition on the Use of Open Fires) Order Environmental Protection and Management (Registrable Goods) Order
Environmental Public Health Act (Chapter 95)	Environmental Public Health (Registration of Environmental Control Officers) Regulations Environmental Public Health (Public Cleansing) Regulations Environmental Public Health (Cooling Towers and Water Fountains) Regulations Environmental Public Health (Toxic Industrial Waste) Regulations Environmental Public Health (General Waste Collection) Regulations
Sewerage and Drainage Act (Chapter 294)	Sewerage and Drainage (Surface Water Drainage) Regulations Sewerage and Drainage (Trade Effluence) Regulations Sewerage and Drainage (Sanitary Works) Regulations
Control of Vectors and Pesticides Act (Chapter 59)	Control of Vectors and Pesticides (Registration, Licensing and Certification) Regulations
Smoking (Prohibition in Certain Places) Act (Chapter 310)	Smoking (Prohibition in Certain Places) Notification

Prevention of Pollution of the Sea Act (Chapter 243)	Prevention of Pollution of the Sea (Reporting of Pollution Incidents) Regulations Prevention of Pollution of the Sea (Reception Facilities and Garbage Facilities) Regulations Prevention of Pollution of the Sea (Oil Pollution Preparedness, Response and Co-operation) Regulations Prevention of Pollution of the Sea (Hazardous and Noxious Substances Pollution Preparedness, Response and Co-operation) Regulations 2004 Prevention of Pollution of the Sea (Air) Regulations 2005 Prevention of Pollution of the Sea (Sewage) Regulations 2005 Prevention of Pollution of the Sea (Oil) Regulations 2006 Prevention of Pollution of the Sea (Noxious Liquid Substances in Bulk) Regulations 2006 Prevention of Pollution of the Sea (Harmful Anti-Fouling Systems) Regulations 2010 Prevention of Pollution of the Sea (Garbage) Regulations 2012
Hazardous Waste (Control of Export, Import and Transit) Act (Chapter 122A)	Hazardous Waste (Control of Export, Import and Transit) Regulations Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Indonesia) Notification 2005 Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Malaysia) Notification 2005 Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Philippines) Notification 2005 Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Thailand) Notification 2005
Work Injury Compensation Act	Work Injury Compensation Regulations Work Injury Compensation (Workers' Fund) Regulations Work Injury Compensation Insurance Regulations Work Injury Compensation (Fees) Regulations Work Injury Compensation (Composition of Offences) Regulations Work Injury Compensation (Medical Board) Regulations Workmen's Compensation (Exemption of Employers) (Consolidation) Notification Work Injury Compensation (Waiver from Insurance Requirement) Notification
Electricity Act (Chapter 89A)	Electricity (Electrical Workers) Regulations Electricity (Cable Detection Workers) Regulations Electricity (Electrical Installations) Regulations Electricity (Control of Designated Electricity Licensees and Entities) Regulations Electricity (Electricity Generation and Retail Licence) (Exemption) Order Electricity (Electricity Generation Licence) (Exemption) (No. 2) Order Electricity (Licensing of Electrical and Supply Installations) (Exemption) Notification Electricity (Electricity Trading Licence) (Exemption) Order 2009 Electricity (Electricity Trading Licence) (Exemption) Order 2010 Electricity (Export of Electricity) (Exemption) Order 2011 Electricity (Export of Electricity) (Exemption) (No. 2) Order 2011 Electricity (Electricity Licences) (Exemption) Order 2011 Electricity (Contestable Consumers) Regulations 2013 Electricity (Electricity Transmission Licence) (Exemption) Order 2014 Electricity (Electricity Transmission Licence) (Exemption) (No. 2) Order 2014

5.3.2.3 Approved Codes of Practice

The WSH Council has approved Codes of Practices for the purpose of providing practical guidance on safety and health to the industry. The Approved Codes of Practice (ACOP) are intended to be used as a yardstick to assess whether reasonable practicable measures have been taken in regards to the upkeep of safety and health standards at the workplace. A notice of the issue of ACOPs has been published in the government gazette.

Other WSH-related Codes of Practice and Singapore Standards

All the Codes of Practice and Singapore Standards listed above, as well as those in Annex B-2 are published by SPRING Singapore and can be purchased at www.singaporestandardseshop.sg

5.3.3 Objectives and Programmes

Having identified and assessed the WSH risks and significant environmental aspects, the organisation should establish, implement and maintain documented SHE objectives to continually reduce its WSH risks and environmental impacts. Such objectives should be:

- Measurable;
- Consistent with the SHE policy; and
- Take into account the legal and other requirements and SHE risks.

The organisation should establish, implement and maintain a programme(s) for achieving its SHE objectives. To implement these programmes and achieve the objectives, the organisation should define clearly:

- Designation of responsibility and authority for persons accountable at all relevant functions and levels of the organisation;
- Resources allocation; and
- Time-frame by which the objectives are to be achieved.

The programme(s) should be reviewed at regular and planned intervals to monitor progress and ensure achievement of objectives.

5.4 Implementation and Operation

5.4.1 Resources, Roles, Responsibility, Accountability and Authority

The organisation should ensure that persons in the workplace take responsibility for aspects of SHE over which they have control, including adherence to the organisation's applicable OH and OS requirements.

Top management should take ultimate responsibility in SHE and the Management System, and should ensure that:

- Necessary resources to establish, implement, maintain and improve the systems are made available. Such resources may include financial, human resources, specialised skill, technology and infrastructure.
- Staff roles, responsibilities, accountabilities on SHE are defined and authorities delegated for effective implementation of the system.

These roles, responsibilities, accountabilities, and authorities should be communicated to relevant persons and documented in the system.

5.4.1.1 General Duties of Persons at Workplaces as Defined in WSH Act

The following provides a brief description of the duties of persons as stipulated in the WSH Act:

1. **Occupier of Workplace**
   a. Take reasonably practicable measures to ensure that:
      i. The workplace;
      ii. All means of access to or egress from the workplace; and
      iii. Any machinery, equipment, plant, article or substance kept on the workplace, are safe and without risks to health to every person within those premises, whether or not the person is at work or is an employee of the occupier.

2. **Employers**
   a. Take reasonably practicable measures as are necessary to ensure the safety and health of:
      i. His employees at work; and
      ii. Persons (not being his employees) who may be affected by any undertaking carried on by him in the workplace.

   b. The measures necessary to ensure the safety and health of employees at work include:
      i. Providing and maintaining for those persons, a work environment which is safe, without risk to health, and adequate as regards to the facilities and arrangements for their welfare at work;
      ii. Ensuring that adequate safety measures are taken in respect of any machinery, equipment, plant, article or process used by those persons;
      iii. Ensuring that those persons are not exposed to hazards arising out of the arrangement, disposal, manipulation, organisation, processing, storage, transport, working or use of things:
         – in their workplace; or
         – near their workplace and under the control of the employer;
      iv. Developing and implementing procedures for dealing with emergencies that may arise while those persons are at work; and
      v. Ensuring that the person at work has adequate instruction, information, training and supervision as is necessary for that person to perform his work.

   c. Where required by the regulations, give to persons (not being his employees) the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their safety or health while those persons are at his workplace.

   d. Assess risks and take reasonably practicable measures to ensure the safety and health of persons at the workplace affected by his undertakings.

3. **Self-employed Persons**
   a. Take reasonably practicable measures to ensure the safety and health of persons (not being his employees) who may be affected by any undertaking carried on by him in the workplace.

   b. Give to persons (not being his employees) the prescribed information about such aspects of the way in which he conducts his under taking as might affect their safety or health while those persons are at his workplace.

   c. Assess risks and takes reasonably practicable measures to ensure the safety and health of persons at the workplace affected by his undertakings.

4. **Principals**
   a. Take reasonably practicable measures to ensure the safety and health of persons under his direction on the manner in which work is to be carried out. Such persons include:
      i. Any contractor engaged by the principal when at work;
      ii. Any direct or indirect subcontractor engaged by such contractor when at work;
      iii. Any employee employed by such contractor or subcontractor when at work.

b. Take reasonably practicable measures, and provide relevant information, as are necessary to ensure the safety and health of persons (other than a person referred to in subsection (1)(a), (b) or (c) working under the principal's direction) who may be affected by any undertaking carried out by him in the workplace.

c. Take necessary measures to ensure the safety and health of persons at work including:
   i. Provide and maintain for those persons a work environment which is safe, without risk to health, and adequate with regards to facilities and arrangements for their welfare at work;
   ii. Ensure that adequate safety measures are taken with respect to any machinery, equipment, plant, article or process used by those persons;
   iii. Ensure that those persons are not exposed to hazards arising out of the arrangement, disposal, manipulation, organisation, processing, storage, transport, working or use of things:
      – in their workplace; or
      – near their workplace and under the control of the principal;
   iv. Develop and implementing procedures for dealing with emergencies that may arise while those persons are at work; and
   v. Ensure that those persons at work have adequate instruction, information, training and supervision as is necessary for them to perform their work.

d. Assess risks and take reasonably practicable measures to ensure the safety and health of persons at the workplace affected by his undertakings.

5. Persons at Work

a. It shall be the duty of every person at work:
   i. To use in such manner so as to provide the protection intended, any suitable appliance, protective clothing, convenience, equipment or other means or thing provided (whether for his use alone or his use with others) for securing his safety, health and welfare while at work; and
   ii. To co-operate with his employer or principal and any other person to such extent so as to enable his employer, principal or the other person, as the case may be, to comply with the provisions of the WSH Act.

b. Not to wilfully or recklessly interfere with or misuse any appliance, protective clothing, convenience, equipment or other means or thing provided (whether for his use alone or use with others) pursuant to any requirement under this Act for securing the safety, health or welfare of persons (including himself) at work.

6. Manufacturers and Suppliers of Machinery, Equipment or Hazardous Substances Used at Work

a. Take reasonably practicable measurers to ensure that:
   i. Information about the safe use of the machinery, equipment or hazardous substance is available to any person to whom the machinery, equipment or hazardous substance is supplied for use at work:
      – The precautions (if any) to be taken for the proper use and maintenance of the machinery, equipment or hazardous substance;
      – The health hazards (if any) associated with the machinery, equipment or hazardous substance; and
      – The information relating to and the results of any tests or examinations of the machinery, equipment or hazardous substance under paragraph (c) that are relevant to its safe use;
   ii. That the machinery, equipment or hazardous substance is safe, and without risk to health, when properly used;
   iii. That the machinery, equipment or hazardous substance is tested and examined so as to comply with the obligation imposed by paragraph (b).

b. The duties imposed on any person specified in subsection (1) shall:
   i. Apply only if the machinery, equipment or hazardous substance is manufactured or supplied in the course of trade, business, profession or undertaking carried on by the person, whether for profit or not;
   ii. Apply whether or not the machinery, equipment or hazardous substance is exclusively manufactured or supplied for use by persons at work; and
   iii. Extend to the supply of the machinery, equipment or hazardous substance by way of sale, transfer, lease or hire and whether as principal or agent, and to the supply of the machinery, equipment or hazardous substance to a person for the purpose of supply to others.

c. The duties imposed on any person specified in subsection (1) shall not apply to a person by reason only that the person supplies the machinery or equipment under a hire-purchase agreement, conditional sale agreement or credit-sale agreement to another (referred to in this section as the customer) in the course of a business of financing the acquisition of the machinery or equipment by the customer from others.

d. Where a person (referred to in this subsection as the ostensible supplier) supplies any machinery or equipment for use at work to a customer under a hire-purchase agreement, conditional sale agreement or credit-sale agreement, and the ostensible supplier:
   i. Carries on the business of financing the acquisition of goods by others by means of such agreements; and
   ii. In the course of that business acquired his interest in the machinery or equipment supplied to the customer as a means of financing its acquisition by the customer from a third person (referred to in this subsection as the effective supplier), the effective supplier shall be treated for the purposes of this section as supplying the machinery or equipment to the customer instead of the ostensible supplier, and any duty imposed by subsection (1) on a supplier shall accordingly apply to the effective supplier, and not on the ostensible supplier.

e. Where a person designs, manufactures or supplies any machinery, equipment or hazardous substance for use at work and does so for or to another on the basis of a written undertaking by that other to take specified steps sufficient to ensure, so far as is reasonably practicable, that the machinery, equipment or hazardous substance will be safe and without risk to health when properly used, the undertaking shall have the effect of relieving the first mentioned person from the duty imposed by subsection (1)(b) to such extent as is reasonable having regard to the terms of the undertaking.

f. Any person required under subsection (1)(c) to ensure that any machinery, equipment or hazardous substance is examined and tested so as to comply with the obligation imposed by subsection (1)(b) shall be regarded as having complied with subsection (1)(c) to the extent that:
   i. The examination or test has already been carried out otherwise than by, or on behalf of, the person; and
   ii. It is reasonable for the person to rely on that examination or test.

g. For the purposes of this section, an absence of safety, or a risk to health, shall be disregarded in so far as the case in or in relation to which it would arise is shown to be one the occurrence of which could not reasonably be foreseen.

h. In this section, "supplier", in relation to any machinery, equipment or hazardous substance, does not include a manufacturer of those items when supplying, but includes an importer when supplying those items.

i This section shall apply only to machinery, equipment or hazardous substance specified in the Fifth Schedule of the WSH Act.

7. Persons Who Erect, Install or Modify Machinery or Equipment and Persons in Control of Machinery for Use at Work

a. Take reasonably practicable measures to ensure that, the machinery or equipment is erected, installed or modified in such a manner that it is safe, and without risk to health, when properly used.

b. The duty imposed on a person erecting, installing or modifying any machinery or equipment under subsection (1) shall apply only if the machinery or equipment is erected, installed or modified in the course of the person's trade, business, profession or undertaking.

c. Ensure that any machinery or equipment is erected, installed or modified in such a manner that it is safe, and without risk to health, when properly used, shall be regarded as having complied with that subsection to the extent that:
   i. The person ensured, so far as is reasonably practicable, that the erecting, installation or modification was in accordance with the information supplied by the designer, manufacturer or supplier of the machinery or equipment regarding its erection, installation or modification; and
   ii. It is reasonable for the person to rely on that information.

d. Where any machinery moved by mechanical power is used in any workplace, then notwithstanding anything in this Act, it shall be the duty of the owner of the machinery to ensure that:
   i. So far as is reasonably practicable, that the machinery is maintained in a safe condition; and
   ii. That the precautions (if any) to be taken for the safe use of the machinery and the health hazards (if any) associated with the machinery is available to any person using the machinery.

e. Where the owner of any machinery moved by mechanical power has entered into a contract of hire or lease with a hirer or lessee, the duty imposed under subsection (4) shall apply to the hirer or lessee of the machinery instead of the owner.

f. Where the owner, hirer or lessee of any machinery moved by mechanical power has entered into a contract with another person to maintain the machinery, the duty under subsection (4)(a) shall apply to that other person instead of the owner, hirer or lessee of the machinery.

g. Subsections (1), (2) and (3) shall apply only to machinery or equipment specified in Part I of the Fifth Schedule of WSH Act.

8. Ship Repair Manager

a. Take charge of and coordinate all activities relating to the construction or repair of the ship.

b. Approve works carried out on the ship.

9. Workplace Safety and Health Officer (WSHO)

a. To assist the occupier of the workplace or other person in charge of the workplace to identify and assess any foreseeable risk arising from the workplace or work processes therein;
b. To recommend to the occupier of the workplace or other person in charge of the workplace reasonably practicable measures to eliminate any foreseeable risk to any person who is at work in that workplace or may be affected by the occupier's undertaking in the workplace;
c. Where it is not reasonably practicable to eliminate the risks referred to in sub-paragraph (b), to recommend to the occupier of the workplace or other person in charge of the workplace:
   i. Such reasonably practicable measures to minimise the risks; and
   ii. Such safe work procedures to control the risk; and

d. To assist the occupier of the workplace or other person in charge of the workplace implement the measure or safe work procedure referred to in sub-paragraph (2) or (3), as the case may be.

10. Safety Supervisor

a. Ensure that the provision under WSH Act and Factories (Shipbuilding and Ship-repairing) Regulations are complied with;

b. Promote safe conduct of work in the shipyard or on board the ship; and

c. Liaise with the WSHO of the shipyard or the ship's safety coordinator on safety and health matters.

11. Safety Coordinator

a. Ensure that the provision under WSH Act and Factories (Shipbuilding and Ship-repairing) Regulations are complied with;

b. Promote safe conduct of work in the shipyard or on board the ship; and

c. Coordinate all work so that such work could be carried out safely.

12. Scaffold Supervisor

a. Ensure that the scaffold is erected, added to or dismantled in accordance with the Regulation.

13. Other Related Duties of Occupiers and Employers

a. An employer shall not:
   i. Deduct, or allow to be deducted, from the sum contracted to be paid by him to any employee of his; or
   ii. Receive, or allow any agent of his to receive, any payment from any employee of his, in respect of anything to be done or provided by him in accordance with this Act in order to ensure the safety, health or welfare of any of his employees at work.

b. An employer shall not dismiss or threaten to dismiss an employee because the employee:
   i. Has assisted (whether by giving of information or otherwise) an inspector, authorised person or any other public authority in the conduct of any inspection or investigation under this Act for a breach or an alleged breach of this Act, or proposes to do so;
   ii. Has in good faith sought the assistance of, or made a report to an inspector or authorised person in relation to a safety and health matter, or proposes to do so;
   iii. Is performing his duties in good faith as a member of a WSH committee; or
   iv. Has complied with an order made under section 21 or otherwise complied with this Act, or proposes to do so.

c. The occupier of a workplace shall cause to be kept in the workplace the following records:
   i. Every document issued in respect of the workplace by the Commissioner under the provisions of this Act;
   ii. A copy of every notice furnished to the Commissioner as required under this Act; and
   iii. All reports and particulars prepared in respect of the workplace under this Act.

d. Any occupier of a workplace shall ensure that such records referred to in subsection (3) shall:
   i. Be kept for not less than 5 years from the date the records were made or such other period as may be prescribed; and
   ii. Whenever required to do so within that period, produce and make available to an inspector for inspection a copy of the record.

14. Vessel Safety Committee

Plan and coordinate all work that is to be carried out on board the ship so that such work is done safely. The function of Vessel Safety Committee and the duties of its members, including Chairman, Secretary, are as in those stipulated in the WSH (Shipbuilding and Ship-repairing) Regulations.

5.4.1.2 Authorised Persons Under WSH Act

In the WSH Act, various authorised persons, with recognised qualification and training, for types of work includes:

- An authorised examiner for the purpose of carrying out any prescribed examination or test of any:
  - Hoist or lift;
  - Lifting gear;
  - Lifting appliance or lifting machine;
  - Steam boiler;
  - Steam receiver;
  - Air receiver;
  - Refrigerating plant pressure receiver;
  - Pressure vessel; or
  - Any other machinery required by this Act to be examined or tested by an authorised examiner;
    - WSH officer;
    - WSH co-ordinator;
    - WSH auditor;
    - Accredited Training Provider or Organisation.

5.4.1.3 In-house Rules and Regulations

General

- The shipyard should establish a set of in-house safety rules and regulations to regulate safety behaviours and establish procedures to ensure that these rules and regulations are implemented and enforced diligently at the workplace.
- The in-house safety rules and regulations should be documented, effectively implemented and diligently enforced in the shipyard at all times.
- The in-house safety rules and regulations should include, but not be limited to the list as specified in Annex E-1.
- The in-house safety rules and regulations should at least conform to the WSH Act and its subsidiary legislations. In-house rules that are non-statutory should conform to existing standards or industry best practices.

Safety Signs

- The shipyard should establish a system of colour coding and safety signs to draw attention and provide information on potential hazards.
- The use of colour coding and safety signs should conform to existing standards or industry best practices.

Incentive and Disincentive System

- The shipyard should establish an incentive and disincentive system to encourage compliance with safety rules and regulations.
- The shipyard should invoke corrective procedures including disciplinary actions for failure to observe in-house safety rules and regulations. Individuals who blatantly flout or disregard such rules should be subjected to serious disciplinary action or counselling.
- The results of the incentive and disincentive system including the disciplinary actions and corrective measures should be communicated to all employees and contractors.

Communication, Training and Promotion

- The shipyard should ensure that the in-house safety rules and regulations are communicated to all levels of the organisation through safety promotion, training or other means.
- The in-house safety rules and regulations should be made readily available to all employees and contractors.

Documentation

- The shipyard should maintain its documentation and records on the in-house safety rules and regulations.
- The shipyard should update and review the documents periodically.

Review

- The shipyard should establish procedures to periodically review the in-house safety rules and regulations to ensure its relevance and effectiveness. Records of such reviews of in-house safety rules and regulations should be maintained.

5.4.2 Training Awareness and Competency

Every person must be aware of the SHE risks associated with the work being carried out at the workplace. Persons working at the shipyard must be given sufficient training, instruction and information on the measures taken to minimise such risks and be competent in performing their tasks that can impact safety, health and the environment.

The shipyard should establish procedures to identify training needs and provide adequate safety training for all levels of employees including contractors. The safety training should provide management staff with the knowledge and skills necessary for organising and managing WSH programmes; first-line supervisors and team leaders with leadership skills and knowledge to lead, implement and apply WSH activities; and workers with the knowledge, skills and right attitudes to enable them to work safely. The training should also include personal communication techniques of shaping human behaviour and promoting safe and responsible behaviour.

Training should be based on the logical sequence of:

- Training needs analysis—a comparison of a person's skills level with the demands of his or her job and hence the identification of skills shortfalls: The shipyard should establish procedures to identify the training needs of managers, supervisory staff and workers to provide them with comprehensive training on in-house safety rules and regulations, statutory requirements, safe work practices, and other relevant occupational safety and health- related training;
- Training resource identification—internal and external courses;
- Planning—the timing of courses to ensure that people are trained before they have to apply the skills;
- Administration—allocating people to initial and refresher courses and maintaining records of training completed;
- Implementation, including releasing personnel for training;
- Evaluation of training programmes; and
- Monitoring to ensure that the training is achieving the planned results;
- Review of need for refresher training to ensure competency.

5.4.2.1 Types of SHE Training

1. **Mandatory Training**
   Safety training should cover the mandatory requirements for Ship Repair Manager, Safety Supervisor, Safety Coordinator, Safety Assessor, Safety Auditor, Scaffolding Supervisor, Scaffolding Erector, Fire Safety Manager and other occupations.

   See below for a list of course(s) required for various appointments.

Appointment	Courses
Lifting Supervisor	Lifting Supervisor Safety Course
Marine Scaffold Erector	Marine Metal Scaffolding Course For Scaffolders
Marine Scaffold Supervisor	Marine Metal Scaffolding Course for Supervisors
Mobile Crane Operator	BCA: Mobile Crane (Truck Mounted) Operation Course
Noise Control Officer	WSQ: Control Noise and Vibration
Noise Monitoring Officer	WSQ: Monitor Noise and Vibration
Rigger	Rigger Course
Shipyard Supervisor	Shipyard Supervisors Safety Course
Ship Repair Manager	Safety Instruction Course for Ship-Repair Managers
Shipyard Hotwork Safety Assessor	Shipyard Safety Assessor Course, Hotwork Trade
Shipyard Worker (General Trade)	Shipyard Safety Instruction Course, General Trade
Shipyard Worker (Hotwork Trade) – include welder, burner, gouger, pipe worker and steel worker	Shipyard Safety Instruction Course, Hotwork Trade
Shipyard Worker (Painter Trade)	Shipyard Safety Instruction Course, Painter Trade
Signalman	Signalman Course
Tower Crane Operator	BCA: Luffing Jib Tower Cranes Operation Course
WSH Officer	WSQ: Specialist Diploma in Workplace Safety & Health (Level C)

A table on mandatory safety training versus trade-related training matrix is appended at Annex D-1 for reference.

2. **SHE Orientation and Awareness**
   The shipyard should also conduct safety and health orientation courses for new employees as well as direct and indirect (contract) workers.
   They should cover the company's:
   - SHE policy;
   - WSH hazards and risks associated with operation and workplace;
   - Significant environmental aspects and impacts associated with the activities, product or services;
   - Control measure to be taken to eliminate or minimise SHE risks, including:
   - Engineering control available,
     - Safe working systems and procedures;
     - Use of personal protective equipment;
     - Action to be carried out during emergency; and
     - Emergency response procedures, such as fire fighting and evacuation procedures.

3. **Skills Training**
   Apart from courses in subparagraphs a) and b), new employees should also be given training in the skills appropriate to their trades so as to improve their individual performance in their respective trades. There should be sufficient focus given to safety during skills training.

   For example, skills training in welding will develop ability to weld safely as well as to a required skill standard. The trainee should also be taught the safety precautions and hazards involved.

5.4.2.2 SHE Training Programme

There should be an in-house training programme for SHE-related training. Topics could cover:

- General SHE issues, policy, rules and regulations;
- Hazard identification and risk assessment;
- Safe work procedures, including those during emergency situations;
- Permit-to-work, isolations, gas freeing, confined space entry; emergency response;
- Company-specific methods and procedures, such as the safe use of new workshop machinery;
- Topics that are of concern (e.g., eye protection, scaffolding, slips, trips and falls);
- Tool-box or pre-task briefings, highlighting hazards and the method of dealing with them;
- Supervisory demonstrations of particular tasks;
- Development of supervisory skills; and
- Drills and exercises.

Training for Different Personnel at Various Organisation Level

This may include:

- Training for Management Personnel

  All relevant management staff should undergo safety training and be equipped with the proper understanding of the safety management system, safety policy and organisation, statutory requirements on safety, and their duties and responsibilities in safety and health in the shipyard. The training should also provide relevant management staff with tools and techniques needed for managing safety and health effectively at the workplace.

- Training for Supervisory Personnel

  All direct and contractors' supervisory personnel should undergo the necessary training to achieve a better understanding of the safety aspect of work operations to ensure that tasks are carried out safely. All supervisory personnel should also be trained in the skills and methods required to perform their tasks competently and safely, and lead workers in safe work practices.

- Training for Workers

  All new direct and contractors' workers should undergo the shipyard's in-house safety orientation training programme before they are allowed to start work. The shipyard should ensure that no worker is assigned to carry out any high-risk or hazardous job unless he has been provided with the necessary training. The safety orientation training for workers should cover relevant safe work practices, in-house safety rules and regulations, hazard identification in work areas and response to emergency. Safety talks to workers should be conducted on a regular basis to inculcate safety awareness. Safety training programmes should be conducted in languages understood by workers.

Types of SHE Training

The training programme should include types of SHE training such as mandatory safety orientation and courses on awareness and skill training as described in paragraphs 5.4.2.1.

- Training Schedule

  Training courses should be planned in advance and information such as course date, duration, training and assessment methods should be made available to stakeholders as soon as possible. Information provided should include both in-house and external training.

- Competency of Trainers

  The shipyard should ensure that safety training programmes for its workers are conducted by competent or approved trainers.

  The shipyard may use accredited and competent external training providers for safety training, if and when, internal resources are insufficient or not competent to conduct the specific or required training.

  The shipyard may consider qualifications such as Singapore Workforce Development Agency's Advanced Certificate in Training and Assessment (ACTA), or its equivalent, together with relevant experience, as guides to recognition of competency for trainers and assessors.

- Training Records

  The shipyard should document and maintain records of all safety training received by all workers. The safety training records kept should include date of training, topics covered in the training programmes, trainers conducting the training and examination results of the training.

- Training Programme Review

  Safety training programmes should be documented and periodically reviewed.

  Reviews should be done to measure the effectiveness of the safety training, and determine the degree to which the identified training needs are being met.

5.4.2.3 Provisional Identification Labels for New and Inexperienced Workers

All new and inexperienced workers should be identified with identification labels during the provision period.

5.4.2.4 Safety Promotion

Promotional programmes provide an ideal opportunity for involvement of the workforce in shipyard safety, health and environmental protection. This is a vital part of a company's safety agenda, being one of the means by which it communicates its intentions to its workforce.

The main principles to be considered in the promotion programme include:

- Promotion activities must fit into the overall safety management system, addressing specific objectives within the Safety Management System. The initiatives must be kept fresh, for example, posters on the notice board for a month lose their impact.
- Promotion must attract the attention of the target audience and encourage a deliberate change of behaviour or at least cause them to examine their action to ensure compliance.
- Promotion is more effective if target audience sees "something in it for them". For example, a competition is worthwhile if the competitors have a reasonable chance of winning and at the same time, improve their safety behaviour.
- The promotion programme must not distract those involved, particularly the supervisors and Safety Department, from their main tasks.
- The rules for competitions must be clear, fair and adhered to.
- Reinforcement is important. A single initiative, run once and then forgotten, has no lasting positive effect.

Typical promotional activities may include:

Poster Campaigns

These should be deliberate, targeted and live. The posters should target prioritised areas of concern and should be changed frequently, typically every month.

Magazine

A magazine for internal circulation either wholly devoted to safety, health and environment issues or with a substantial section devoted to these topics should highlight items of interest such as messages from senior management showing the management's commitment to safety, major achievements, alerts and lessons learnt based on experience in the industry, progress of SHE initiatives, and personal stories.

Competitions

Competitions, with appropriate prizes to be awarded to participants, may be organised to boost interest and participation rates among workers in the promotional activities. Such competitions should have theme(s) aimed at promoting certain identified safe behaviours, generating awareness or improving safety knowledge so that participants and organisation benefit from instilling safety values.

Training and Publicity

Additional and intensified safety training courses, workshops, seminars, briefing, meeting, feedback and consultation sessions, publicity, and so on, may be organised during the safety promotion period.

Safety Exhibition

Safety exhibitions and road shows can be held to promote safety. Exhibition boards may be displayed at the workplace for viewing by workers during the safety campaign period. Quiz or competition may be incorporated into these exhibitions and road shows to boost interest so that workers are more purposeful when they view the exhibition panels.

Proprietary Initiatives

The company can also launch and implement proprietary initiatives and programmes such as those related to behaviour-based, operational excellence and quality, during safety promotion for the cultivation of safety culture and excellence.

5.4.3 Consultation and Communication

Participation and contribution to SHE practices from all those affected by shipbuilding and repair operations should be encouraged. This can be achieved through consultation and communication processes with regard to SHE hazards, control measures for SHE risks, including safe work procedures, and requirements of management system.

The organisation should establish, implement and maintain a procedure(s) for:

- Internal communication among various levels and functions of the organisation;
- Communication with contractors and other visitors to the workplace;
- Receiving, documenting and responding to relevant communications from external interested parties.

Consultation and communication with stakeholders include SHE matters that can affect WSH and environment, such as changes in material, processes, and procedures; decision on implementation of processes and procedures to manage risks, hazard identification, review of risk assessment and control, and so on.

Consultant and communication processes may include:

5.4.3.1 Small Group Meetings

Small groups meetings should be established to promote communication and co-operation between management, employees and contractors and all affected by operations at the workplace to ensure that issues are addressed and appropriate actions taken to achieve and maintain the shipyard's safety management objectives.

These groups include:

WSH Committee

WSH Committee is one platform representatives from various departments and functions, as well as contractors, work together on safety and health matters. The Factories (Safety Committee) Regulations requires the formation of Safety Committees for the purpose of improving, promoting and reviewing all matters relating to the safety and health of employees. The safety committee also acts as a channel for communicating and imparting knowledge and best practices on safety and health to all personnel in the shipyard.

Vessel Safety Coordination Committee (VSCC)

The WSH (Shipbuilding and Ship-repairing) Regulation requires a Vessel Safety Coordination Committee (VSCC) to be established for a ship where any hazardous work is to be carried out on board or on the structural part of the ship under construction by:

- The shipyard when the ship is in the shipyard; or
- The master, owner or agent of the ship, when the ship is in the harbour.

The VSCC is to meet daily including Sundays and public holidays when any hazardous work is being carried out on the ship and at such time the VSCC Chairman may decide.

The function and composition of the Safety Committee and VSCC and the duties of its members, including Chairman, Secretary, are stipulated in the Regulations and listed below:

- Review and discuss regularly all matters relating to the safety, health and welfare of workers involved in the work;
- Draw up plans for the co-ordination of work to ensure that where different types of work are being carried out at the same time, the types of work are compatible;
- Ensure that all relevant first-line supervisors and the master, owner and agent of the ship or their representatives are informed of the plan;
- Review on a daily basis all work in progress on the ship;
- Plan and co-ordinate the movement and storage of hazardous materials;
- Review on a daily basis the validity of all permits issued;
- Specially monitor all hot works carried out on the ship and ensure that all safety measures are maintained throughout the period of such work;
- Ensure that every confined space is checked:
  - Before any worker enters into it; and
  - Regularly while work is being carried out for concentrations of oxygen, dangerous gases and flammable vapours and review the results of such checks;
- Ensure that every worker is provided with and uses the appropriate personal protective equipment for his work; and
- Make arrangements and determine the locations for the display of safety signs and permits on board the ship.

Tool Box Meetings

Tool box meetings involving supervisors and workers should be conducted before work starts for effective consultation, communication and coordination of work to be carried out on a daily basis.

5.4.3.2 Safety Information

Risk Assessment

The employer, self-employed and principal should provide information to all persons at the workplace affected by the risk arising from his undertaking. The information includes:

- The nature of the risk involved; and
- Any measure or safe work procedure implemented.

Safety Signs and Labels

Safety signs should be provided by the occupier of a shipyard or the master, owner or agent of a ship in a harbour. The safety signs should conform to Singapore Standard SS 508 : Parts 1, 2, 3 & 4.

- Specification for Graphical Symbols—Safety Colours and Safety Signs
  - The safety signs should be in languages understood by all persons working in the shipyard or on board any ship and should be placed at appropriate and suitable locations.
  - All containers in which hazardous materials are stored must be properly labelled with the attendant warning signs in accordance with acceptable international practice.
  - The occupier should provide standardised labels for hazardous materials to indicate their hazardous characteristics, including toxicity and flammability.

Safety Handbook

The occupier of a shipyard should provide a handbook on safety in languages easily understood by workers in the shipyard.

The safety handbook should be an easy-to-read reference on safety aspects of common tasks and behaviour in the shipyard. The target readership should be stated. While the regulation does not specify the contents, it can contain:

- Safety rules for behaviour in the shipyard;
- Safe work practices;
- Company's policy statement on safety, health and environmental protection;
- Hazard identification and SHE risks involved; and
- Risk control measures.

It is not feasible to produce all the specific procedures detailed in the previous section of this Manual, covering different trades and tasks in a "handbook". The rules and general practices can be printed in all relevant languages and illustrations in the form of cartoons, drawings or photographs can help to make the meaning clearer. The handbook can be presented as one composite document (taking care that it does not become too large for convenience) or as separate documents for different groups of workers.

In writing the handbook, it is important to note the following:

- The document is a handbook and should therefore be small enough to handle and use.
- It should be written from the user's point of view. It should be easy for him or her to understand and put into practice. This includes speakers of languages other than English.
- It should contain only information which is essential for the reader.

Typical Contents of Safety Handbook

The typical contents of a safety handbook include:

Introduction

- Company safety policy;
- Objectives of the handbook; and
- Definitions and abbreviations.

Safety Rules

- See section in this manual, refer to Annex E-1.

Organisation for Safety

- Specific responsibilities—management, technical, trade supervision, manual workers, safety specialists;
- Committees constitution and function; and
- Ship's crew responsibilities.

Safety At Work

- Personal protective equipment;
- Permit-to-work;
- Confined space entry, hot work permit, other permits (See section of manual on permit-to-work), gas freeing and monitoring;
- Inhibiting safety systems;
- Lifting and slinging;
- Certification of lifting equipment, crane signals, and so on;
- Manual handling;
- Access;
- Scaffolding, mobile towers, entry into confined space, and so on;

- Surface treatment;
- Cleaning, grit blasting, and painting;
- Electrical—work on electrical installations;
- Use of tools and equipment;
- Electrical, manual and workshop;
- Hazardous materials;
- Ship movements;
- Berthing and unberthing, floating dock, dry dock, slipway, launching, turning propeller and rudder, and so on;
- Ships and on-board systems; and
- Hydraulics, engine and propulsion, sea chest, and so on.

Accidents and Emergencies

- Action in the event of injury or illness; and
- Action in emergency—this should be summarised and contact numbers listed in a prominent place, such as inside the front or back cover for quick access.

Means of Escape

Every workers reporting for work on board a ship should be given a briefing by his supervisor on the safe conduct of work and means of escape and exits in the area of his work.

Safety Data Sheets

All hazardous material brought into the shipyard or on board a ship should be accompanied by a material safety data sheet (SDS). Information provided on the SDS include:

- Characteristics of the hazardous materials;
- Amount of the hazardous materials to be brought into the shipyard or on board a ship; and
- Precautions that may be required to be taken in the handling of such materials.

Where hazardous material is to be used on board a ship, a copy of material SDS should be given to the ship repair manager of that ship.

5.4.3.3 Other Forms of Consultation and Communication

Below are examples of how consultation and communication can be made:

- SHE briefings for employees, and other interested parties;
- Safety handbook;
- Internal magazines;
- Notice boards;
- Hazard communication programmes, such as labelling, safety signs; and
- SDSs and its management system.

5.4.4 Documentation

The organisation should establish and maintain information in a suitable medium (e.g., paper, soft copy) for up-to-date and adequate documentation to ensure effective operation of the SHE management system. The documentation should provide adequate information that describe the elements of the management system and their interactions, and provide direction to related documents.

5.4.5 Document and Data Control

The organisation should establish and maintain procedures for controlling all relevant SHE documents and data. Such documents can include (but not limited to):

- SHE policy;
- Hazard identification records;
- Risk register;
- Legal register;
- Licenses, certificates, permits from government agency;
- Control methods: including process control and machine design, safe work procedures, in-house safety rules and regulations;
- Design drawings;
- SHE programme records;
- Organisation structure;
- Job descriptions and records of SHE responsibilities, accountability and authorities;
- SHE group meeting records;

- Records on communication and consultation with employees and stakeholders;
- Contractor's records;
- Safety Data Sheets;
- Maintenance records;
- Training records;
- Drill reports;
- Inspection and audit records;
- Incident records;
- Operation records, such as permit-to-work;
- SHE performance records;
- Industrial hygiene monitoring reports;
- Medical and health surveillance records; and
- Management review.

The control of safety-related procedural documents is essential to ensure that they are reliable, valid, and an authentic source of information.

This involves the following principles:

- A document should carry information showing:
  - Its identity: document name, and number;
  - The issuing and approving authority;
  - Its scope and application; and
  - Its revision history with revision number and date of revision and effective date.

A circulation list for controlled copies should be maintained so that updates and revisions can be circulated to all copy-holders.

- The document should be withdrawn promptly when it has been superseded or becomes obsolete.
- Controlled documents should be clearly identified and kept updated at all times.
- Uncontrolled documents should also be clearly identified as being "Uncontrolled" and destroyed once their indented purposes are fulfilled.

Documents should be legible, easy to locate and access.

5.4.6 Operational Control

5.4.6.1 General

In general, all operations must be preceded by identification of the hazards involved and assessment of the associated risks. The organisation must then establish, implement and maintain documented procedure(s) to eliminate or control these WSH and environmental risks associated with their work activities, products and services. Such procedures must:

- Stipulate clearly the operating criteria, steps and rationale for carrying out such steps, for the prevention of incidents;
- Address identified SHE risks of goods, equipment and services purchased and / or used by the shipyard;
- Establish engineering standards for the design of workplace, process, installations, machinery, equipment maintenance operating procedures and work organisation, including their adaptation to human capabilities, in order to eliminate or reduce operational risks at their source;
- Communicate control measures to relevant parties including suppliers and contractors. They should be discussed, at the very least, between supervisors and workers, and must be properly communicated before starting work to ensure that workers and other relevant persons involved are clear about the hazards, method of working, the equipment to be used, precautions and procedures to be taken and any need for teamwork and communication.

Operational control should be developed based on risk assessment findings, to eliminate or reduce risks, using the following hierarchy of control:

- Elimination (most preferred);
- Substitution;
- Engineering Control;
- Administrative Control; and
- Use of Personal Protective Equipment (least preferred).

(Note: The meaning of Engineering Control and Administration are outlined in paragraph "3.1 Definitions".)

The following sections (5.6.2.2 – 5.6.2.4) provide guides on typical (not exhaustive) types of operational controls for SHE at shipyards.

5.4.6.2 Safe Work Practices

Shipyards should establish and implement a system of safe work practices to ensure that all works are carried out in a safe manner so as to eliminate or minimise occurrence of incidents.

Safe work practices should be established to reduce and control risks identified by risk assessment techniques, such as job safety analysis, activity-based risk assessment, trade-based risk assessment, and so on.

As a guide, safe work practices should be established for works including but not limited to the following:

- Work on any machinery where fencing has been removed for the purpose of any examination, lubrication or other operations referred to in Section 13 of WSH (General Provisions) Regulations;
- Work at a place where a person is liable to fall a distance of more than 3 meters or into any substance that is likely to cause drowning, poisoning, chemical burns or asphyxiation;
- Work in any confined space;
- Work involving application of heat, or the potential generation of any source of ignition, where any explosive or flammable substance is liable to be present;
- Work on process, plant, vessel or machinery that is liable to produce or give off any corrosive, toxic or flammable substances;
- Work in compressed air environment or underwater;
- Functional testing of pipelines and valves (mechanical, electrical, pneumatic or hydraulic);
- Hydrostatic or pneumatic pressure testing of pipelines and equipment;
- Pressurised testing of any pressure vessel or pipe;
- Spray painting;
- Dismantling of any pipe or equipment containing steam or substances that are flammable, toxic or corrosive;
- Any repair or maintenance work carried out on a pressurised hydraulic system;
- Radiography work;
- Grit blasting work;
- High pressure jetting;
- Erection and dismantling of scaffolds;
- Installation of equipment;
- Chemical cleaning;
- Electrical work;
- Explosive powered tools; and
- Crane and lifting operation.

5.4.6.3 Permit-to-Work System

The permit-to-work is the key control over hazardous operations in shipyards. Permit-to-work systems are implemented to:

- Ensure that due regard has been taken to ensure safety, health and welfare of workers.
- Prevent incompatible work from being carried out at the same time in the shipyard or at any locations on board the ship and ensure that necessary safety precautions are taken and enforced when such work is being carried out.

To contribute effectively to safety, the permit-to-work procedure must be rigorously applied in all its stages. Annex B-1 on "A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations", summarises the legislation on permit-to-work. Annex E-4 on Permit-to-Work Formats shows layouts for mandatory permit forms.

Operations Requiring Permit-to-Work

The requirements on permit-to-work procedure are specified in Part IV of the Regulations and it applies to the list of "high-risk works" listed in Regulation 17, as shown below:

- Work which involves use of any hazardous, volatile, corrosive or flammable chemical, material or solvent in significant quantities;
- Spray painting work;
- Grit-blasting work carried out in a confined space;
- Testing or dismantling of any pipe or equipment that contains, or had contained, oil or substances that are flammable, toxic or corrosive; or contains steam;
- Ballasting and de-ballasting of a ship;
- Repair or maintenance work carried out on the hydraulic system of a ship;
- Bunkering and transferring of fuel oil;
- Radiography work; and
- Such other work the Commissioner may specify in writing to the occupier of the shipyard or the master, owner or agent of the ship or the employer or principal of the person carrying out the work.

The permit-to-work procedure consists of stages described in Part IV of the Regulations. A summary is provided below:

	Stage	Responsibility		Action
		Shipyard	Ship in a harbour	
1	Implementation of Permit-to-Work	Occupier	Master, Owner, or Agent of Ship	• Implement a permit-to-work system. • Appoint a safety assessor (a WSHO or competent person).
2	Prohibition of high-risk works without a permit	Occupier, Employer, or Principal	Employer or Principal	• Ensure that no high-risk works is carried out without a permit.
3	Application of Permit-to-Work	Supervisor or foreman of person who carry out the high-risk work		• Apply permit-to-work in such form and manner required by ship repair manager. • State measures which will be taken to ensure the safety and health of the person who carries out the high-risk work. • Address the permit to the ship repair manager and submit to safety assessor.
4	Evaluation of Permit-to-Work	Safety Assessor		• Assess whether all reasonably practicable measures have been taken to ensure the safety and health of the persons who will be carrying out the high-risk work. • Inspect the site (including its surroundings) where the high-risk work is to be carried out together with the supervisor or foreman of the person who is to carry out the work to ensure that the high-risk work can be carried out with due regard to the safety and health of the person or any other person at work in the shipyard or on board the ship in the harbour who may be affected. • Endorse the permit-to-work if satisfied that the high-risk work can be carried out with due regard to the safety and health of the person at work. • Exercise due diligence when performing evaluation and endorsement of permit-to-work.
5	Issue of Permit-to-Work	Ship Repair Manager		Issue a permit-to-work in relation to the high-risk work if he is satisfied that: • There has been a proper evaluation of the risks and hazards; • No incompatible work which may pose a risk to the safety and health of the person who is to carry out the high-risk work and other persons at work in the shipyard or on board the ship in the harbour will be carried out at the same time and in the same vicinity as the high-risk work; • All reasonably practicable measures will or have been taken to ensure the safety and health of the persons who carry out or are to carry out the high-risk work; and • All persons who are to carry out the high-risk work are informed of the hazards associated with it.
6	Posting of Permit-to-Work	Supervisor or foreman of person who carry out the high-risk work		• Clearly post a copy of the permit-to-work, including where possible a sketch of any area where the high-risk work is permitted, at the work area. • Ensure that the copy is not removed until the date of expiry or date of revocation of the permit-to-work or on completion of the high-risk work.
7	Monitoring of High-risk Work	Ship Repair Manager		• Continually review the progress of all high-risk work carried out pursuant to any permit-to-work issued.
		Supervisor or foreman of person who carry out the high-risk work		• Ensure that the measures necessary to ensure the safety and health of the person at work are taken and are in place at all times during the validity period of the permit-to-work; and • Inform the SRM of the completion of the work.

To assist with the preparation of company procedures, reference should be made to the text of the sections on permit-to-work in the MOM publication "A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations" included in Annex B-1.

Safety Checklists

A ready-to-use guide in the form of checklists on the safety measures to be taken by the relevant trade workers would be very useful. One way is to obtain checklists for various trades published by ASMI and distribute these to the workers. These are attached in Annex E-5.

5.4.6.4 Design and Engineering

A company should have clearly defined standards for all design and engineering work. Major contracts will already contain agreements on the basis of the standards to be applied. The design process must include the provision for systematic risk assessment including:

- The identification of hazards, both in shipyard operations and the ship's crew in operation of the ship;
- Assessment of risk associated with these hazards; and
- Management of risk by avoidance of the hazard altogether, reduction by mitigation measures or by the provision of PPE or other means of protection.

The general principles which should be considered include the following:

- The design for construction, reconstruction, repair, refitting, finishing or breaking up of vessels must be:
  - Capable of being implemented safely;
  - Capable of safe testing, including shell tests and other high pressure tests, safe for ship's crew to operate; and
  - Safe to maintain, whether in a shipyard or at sea.

The work of designers and engineers should be consistent and in accordance with the company's practice and standards.

- There should be procedures for design work, checking and risk assessment to be followed by designers and engineers to achieve the above.

5.4.6.5 Safe Access

Scaffolding and Staging

The WSH (Scaffolds) Regulations details the requirement to be met by scaffolding and staging. It also includes the requirements for materials and construction of scaffolds, and for scaffold erectors, supervisors and professional engineers. The MOM approved *Codes of Practice CP 14: 1996 Code of Practice for Scaffolds* and *CP 20: 1999 Code of Practice for Suspended Scaffolds* provide requirements related to scaffolds.

Hazards

Falls

The scaffolding or staging must not only provide access to work places at a height but also incorporate protection against falling.

Falling Objects

Care must be taken when working at heights to prevent objects falling and causing injury or damage.

Collapse

Scaffolding or staging may collapse, for example, through inadequate construction, failure of the ground or the structure to which it is anchored, or overloading. This is likely to cause injury, not only to persons using the scaffold but also to persons on or around the work site, and also damage to the surroundings.

Procedures

The company must ensure that legal requirements are met, including design, construction, supervision, certification, and registration of the scaffold.

The company's procedures must include provision for the training of scaffold supervisors and erectors. The procedures must take into account the use of the scaffold, for example, to avoid overloading with equipment or accumulations of blasting grit.

Mobile Tower Scaffolding

There should be procedures covering erection, use and dismantling of mobile tower scaffolding which must conform to Regulation 56 of the Factories (Scaffolds) Regulations.

Hazards

Falls

As for scaffolds and staging in the above.

Falling Objects

As for scaffolds and staging in the above.

Collapse

As for scaffolds and staging in the above.

Movement

The tower scaffold may move if it is erected on uneven ground or not properly secured by brakes.

Procedures

The procedures should cover aspects such as:

- Construction
  - The height of the scaffold does not exceed eight times the lesser of the base dimensions of the scaffold;
  - The scaffold is effectively tied to the building or a rigid structure to prevent toppling when the height of the scaffold, excluding the handrails and their supports at the uppermost lift, exceed three times the lesser of the base dimensions of the scaffold; and
  - No more than two work platforms are used on the scaffold at any time.

- Stability
  - They should be used only on level ground;
  - If necessary, adequately weighted at the base; and
  - They should be used on a firm and even surface.

- Locking
  - Wheels should be securely braked; and
  - Provided with casters with a positive locking device to hold the scaffold in position.

- Movement
  - They must not be moved while someone is on the work platform; and
  - Should only be moved by applying force at or near the base.

Aerial Work Platform

Aerial work platforms cherry pickers—used to carry out work at height with less extensive preparation than scaffolding and staging used typically for work such as spray painting, blasting, job inspections and steel-work repairs.

Hazards

Working at Height

Risk of falling or dropping objects.

Failure in Service

Risk of personnel falling or being stranded or equipment falling during failure of the equipment.

Procedures

Preparation

Check that:

- The ground surface is firm and level;
- All safety devices are operating correctly;
- The lifting systems and directional controls are operating correctly;
- There is no visual defects in the equipment falling during failure of the equipment.

Operation

- Only authorised and trained personnel should operate the serial work platform;
- Safety harness must be worn and anchored to the basket guardrails;
- The Safe Working Load (SWL) must not be exceeded at any time;
- The boom should be used only for lifting personnel and their immediate tools; and not for carrying materials or equipment;
- Should not be operated on a slope;
- In the event of leaks, damage and malfunctions, stop operations immediately and report to maintenance authority.

Dock Arm

The use of dock arm as a means of access to a ship in a dry-dock must be covered by procedures relevant to the company.

Hazards

Mechanical Failure

Inadequate maintenance may cause failure in use with consequent risk to users.

Unauthorised Use

Operation by personnel who are not trained in its use may cause serious injury.

Procedures

Pre-operation

The following actions should be included in the procedures:

- Grease the moving parts regularly;
- Check hydraulic leads;
- Check for corrosion of the dock arm rails;
- Check for damaged or missing handrails; and
- Check for mechanical or electrical malfunction of the controls.

During Operation

- Only trained personnel should operate the dock arm;
- The operator must be at the controls whenever the dock arm is in use;
- Check that there is no obstruction along the travelling path of the dock arm;
- Maintain communication between operator and personnel on the working platform before raising or lowering the arm;
- Personnel on working platform must anchor their safety belts to the handrail;
- Only two personnel may be on the working platform at any one time; and
- There must be enough clearance between the working platform and ship-side to avoid a collision.

After Operation

- The dock arm must be anchored at the designated location;
- The power to the dock arm must be switched off and the control key removed; and
- Any damage or malfunction of the dock arm must be reported to the maintenance authority.

5.4.6.6 Hot Work

Hot work permit is required for cutting, burning and welding operations. It is applicable to any operations involving the use or generation of flame, heat and / or sparks. These operations include cutting, burning welding and so on.

Cutting, Burning and Welding

This includes hand-held electric arc and gas operations, automatic profile-cutting machines and others using high temperatures to cut, burn or weld metal, whether on board a vessel or in a workshop.

Hazards

Ignition Source

These operations are an ignition source. The permit-to-work must demonstrate that appropriate precautions have been taken to ensure the area is free of gas, flammable sludge or film adhering to surfaces, and that no other structure or operation is at risk from the cutting, burning or welding. There should be a person available as fire watchman to raise an alarm in the event of fire and apply immediate fire-fighting measures.

Hazardous Substances

Hazardous substances may be entrained in the metal surfaces of tanks and vessels or may be present on the other side of a metal plate from the hot work location. These may be released as gases or liquids and cause fire or toxic atmospheres.

Tripping Hazard

Hoses and leads should be arranged so that tripping hazards are avoided.

High Temperature

In addition to the fire risk, there is the possibility for wearers of contact lenses to find their eyes becoming dry. This may result in permanent damage.

Fumes

Some metals generate toxic fumes when being welded. The procedure should take account of ventilation requirements, even in the open air.

Confined Space

Cutting, burning and welding often take place in confined spaces such as tanks, lockers, engine space, steering flat, and so on. The permit-to-work must take into account the need for gas freeing and regular checking.

Equipment Hazards to Worker—Electric Shock, Gas Escape, Explosion or Fire

Equipment used on site, whether owned by the shipyard or contractors, must be inspected to ensure that it is safe and capable of the standard of workmanship required. There should be a procedure for checking equipment on arrival and for regular safety and maintenance checks thereafter, in accordance with legislation and company policy. There must be a record of checks of equipment, hoses, leads, and electrode holders.

Quality Failures

The procedures should provide for adequate quality checks on the work done, whether visual checks or non-destructive testing.

Sub-standard Workmanship

Persons using cutting, burning or welding equipment, whether hand-held or by workshop machine, must have demonstrated that they have the skills required to meet the shipyard's quality standards. For each specific task, the instructions must be precise, adequate and understood. The procedures for issuing work should cover this aspect. The fire watchman person also requires skills in the use of firefighting equipment.

Procedures

The proposed hot work to be carried out is an agenda item for the VSCC meeting. The VSCC must ensure that all persons involved are aware of the work being done and that no incompatible work is carried out. The permit-to-work must provide a safeguard against incompatible work.

The procedures for any such work must provide for such actions:

Protection Against Fire

Check that there is no flammable material, gas or dry woodwork which could catch fire; and that surfaces which have been in contact with hydrocarbons or toxic substances are completely clean.

Isolation

If any pipes are still in service, ensure that they are de-pressurised, gas-freed and free from flammable substances or residues before they are subjected to any heat which could cause a rise in pressure and possible rupture.

Personal Protection Equipment

The PPE required must be specified either in the procedures or permit-to-work or both. This includes:

- Eye protection by helmet, mask or goggles;
- Provision of appropriate breathing apparatus or adequate ventilation if there is a risk of dangerous fumes, particularly if working in a confined space; and
- Other protective clothing according to the actual work environment.

Other Precautions

Protect any electrical, hydraulic and pneumatic lines nearby. Make sure that other people are not at risk from the welding or cutting operation.

Gas Cutting and Welding

Hazards

General hot work risks are as detailed above and include the following:

Gas Escape

The escape of oxygen, acetylene or LPG can cause a hazardous atmosphere which may result in fire or explosion. Acetylene or LPG escape can also cause oxygen deficiency which may result in asphyxiation.

Procedures

Gas hoses, torches, blowpipes, pressure regulators, nozzles, connections, flash-back arrestors and nonreturn valves must be inspected at least as often as the current legislation requires. Any equipment not complying with company and statutory requirements must be withdrawn and not used until it has been inspected and approved by a competent person. The procedures should specify safety precautions, such as disconnecting hoses from a manifold during breaks and at the end of the task and shift; isolation by valves alone is not adequate to prevent possible leakage.

Electric Arc Welding

Hazards

General hot work risks are as detailed in paragraph i) above and also include the following:

Electric Shock

While the voltage is low, wet skin or standing in water can increase the risk of shock.

Electric Arc

Exposed conductors or faulty connections can cause arcing with the possibility of overheating and fire.

Procedures

Welding transformer equipment, electrode holders, welding cables, connectors and low voltage shock preventers must be inspected at least as often as the current legislation requires. Any equipment not complying with company and statutory requirements must be withdrawn and not used until it has been inspected and approved by a competent person.

The procedures should specify safety precautions, such as:

- Checking the condition of all equipment before work;
- Checking that suitable connections for the earth lead (not pipe-work containing flammable liquid or gas, hydraulic lines, cables and conduit, chains, wire ropes or scaffolding) are provided;
- Ensuring that the electrode is stowed in a position where it cannot come into contact with the metal structure when not in use; and
- Switching off the welding machine during breaks.

Grinding

Hazards

As detailed above in the section: Cutting, Burning and Welding; and also includes the following:

Eye Injury

Particles of metal from the work-piece or from the grindstone may cause eye injury.

Noise

Hearing loss may result from persistent exposure to high noise levels during grinding.

Other Injury

A grindstone can break and cause facial injury.

Procedures

Company rules and procedures must specify the precautions to be taken when grinding, whether using a fixed bench grinder or a portable electric or air-driven grinder.

The precautions include, as appropriate:

- The PPE which must be worn,
- Training in the use of the relevant grinder,
- Permit-to-work unless the grinding is a normal workshop operation, and
- Confined space entry and gas freeing.

5.4.6.7 Confined Space Entry

The company must have procedures and resources to carry out its obligations under the WSH (Confined Spaces) Regulations.

Confined Space means any chamber, tank, manhole, vat, silo, pit, pipe, flue or other enclosed space, in which —

(a) dangerous gases, vapours or fumes are liable to be present to such an extent as to involve a risk of fire or explosion, or persons being overcome thereby;
(b) the supply of air is inadequate, or is likely to be reduced to be inadequate, for sustaining life; or
(c) there is a risk of engulfment by material;

Hazards Related to Confined Space

Dangerous Fumes

Risk of being overcome.

Inadequate Supply of Air

Inadequate oxygen, to sustain life.

Inadequate Lighting

Structural: members, debris; sludge and other items may make access hazardous, particularly before lighting is adequate for the work to be done.

Assumptions of Safety

A confined space may have been used previously for harmless purposes such as water ballast but may be hazardous because of contamination by leakage of hydrocarbons or by microbiological action.

Procedures:

Resources

When any person enters or carries out any work in a confined space, the Employer and/or Principal shall comply with the regulations strictly. Under the legislation, the responsible person has to ensure safe entry/working in confined spaces. These include:

- Identification/ record/ warning signs/ information of all confined spaces at the workplace;
- Evaluation of the need for entry into the confined space;
- Safe means of access to and egress from the confined space;
- Safe practices for opening the entrance of a confined space;
- Sufficient and suitable lighting for entry into or work in a confined space;
- Adequate ventilation of the space to sustain life before entry and during work in a confined space;
- Procedures and control of entry into a confined space including gas testing;
- Safety and health training on working in confined spaces for workers and supervisors;
- Emergency rescue operations in confined spaces which include the establishment of a rescue plan and provision of rescue equipment for confined space;
- Appointment of a confined space attendant; and
- The worker is fit to work in confined spaces.

Record of Entry

Persons entering a confined space should record the fact, for example, by a tally box or board located close to the point of entry. Each person should leave an identification card or tag in the box or on the board when entering and retrieve it when leaving.

Procedure

WSH (Confined Spaces) Regulations makes provisions for the restriction and steps to be taken for entry into confined space. In accordance with Section 40B (3) of the WSH Act, MOM has approved *SS568:2011, Code of Practice for Confined Spaces* as the applicable practical guidance for safety and health for such work. It will be used as a yardstick to assess whether reasonable practical measures have been taken in regards to the up keep of safety and health standards for confined space entry.

The written procedures outlined in SS568 for control of entry into confined space should include:

- Evaluation of the necessity and purpose to enter into a confined space;
- Risk Assessment;
- Measures for eliminating or controlling the hazards prior to the entry into a confined space including safe work procedures, need for isolation of the confined space and the appropriate safety equipment to be used;
- A valid entry permit;
- Types of atmospheric testing required and interpretation of results of the tests; and
- Means to prevent unauthorised entry into a confined space including the display of warning signs.

It also contains guides on ventilation, training, confined space attendant and rescue operation.

5.4.6.8 Surface Treatment

High Pressure Water Jetting or Steam Cleaning

Hazards

High Pressure and Temperature

These operations use high pressure and high temperature jets to treat the metal surface. These jets are hazardous to people and electrical, hydraulic and pneumatic equipment. The workers must be aware of the hazards and follow company procedures including the use of appropriate PPE, to avoid injury. Pressure settings must be correct for the work. The lance must not be directed at any part of the human body.

Debris

Water jetting and steam cleaning are used to dislodge surface particles which can be propelled through the air. This may cause injury (particularly to the eyes) to the worker or to persons nearby.

Trip Hazards

The pump and its supply lead or hose and delivery hoses should be located where they will not cause an obstruction to people.

Emergency Escape

The equipment and its leads and hoses must not obstruct an emergency escape route or the close off fire doors, bulkhead doors or other safety-critical protective provisions.

Noise

Where the equipment generates a high level of noise, provision must be made for hearing protection for the worker involved and of other personnel in the area.

Procedures

PPE

Specify the PPE to be used by workers involved in this work. This will include waterproof clothing, waterproof boots and goggles or face mask.

Preparation

Specify the checks on the equipment and the workplace to be carried out by the worker or his supervisor to ensure that other personnel cannot be injured by the operation. Barriers and warning signs should be erected around the area or work carried out at a time when other workers are not within range.

Operation

- Specify the method of working.
- Review the particular hazards and measures to reduce risk.
- Set up and check the equipment.
- Stop up pipes, valves, ducts, ventilators, and so on.
- Provide precautions to be taken during breaks.

Shot Blasting, Grit Blasting and Chipping

The company must implement procedures which fulfil as a minimum, the provisions of the Factories (Abrasive Blasting) Regulations S 204/74.

Hazards

Air-borne Debris

Eye injuries and health problems may result from the blasting medium or particles from the surface being treated.

Noise

There may be a high level of noise from the operation.

Contaminated Air

An air-fed mask must be supplied with suitable quality of air (refer to section 5.4.6.15 on acceptable air quality limits).

Procedures

MOM has laid down noise control provisions for personnel using blasting equipment. The precautions include the following:

- A blasting helmet should be equipped with silencers or other noise reducing devices to lower the noise level inside the helmet to less than 85 dBA.
- Pressure reducing devices are required to maintain the breathing air in the blasting helmet at a pressure within the range recommended by the supplier.
- The blaster should use suitable earplugs. Hearing tests should be carried out for all blasters before employment and at yearly intervals.

Spray Painting

Section 45 of the WSH (Shipbuilding and Ship-repairing) Regulations covers spray painting. This should form the minimum requirement in the company's procedures. Points to be considered in the procedures should include the following hazards and procedures.

Hazards

Fire and Explosion

The vapour given off by spray painting is flammable and may build up, particularly when working in a confined space.

Residual Vapour

After the painting operation is completed, the atmosphere cannot be assumed to be safe until it is properly ventilated, tested and the paint surface is dried or cured completely.

Health Problems

The vapour may be injurious to health.

Procedures

The permit-to-work must ensure that no incompatible work is done in the area, particularly hot work. The permit-to-work procedures should also cover work done by the ship's crew. Such work must be controlled to ensure that it is compatible with tasks being carried out by shipyard personnel.

Preparation

The intention to carry out painting must be discussed at the VSCC; it should be made clear that no hot work may be done at the same time at the vicinity. The worksite must be made safe. If it had contained flammable or toxic substances, any gas, sludge, and film adhering to surfaces in the vicinity must be cleaned. The atmosphere must be tested before and during the painting operation.

Permit

The permit for painting should follow the company's permit procedures.

Hazardous Substances

Paints and solvents must be accompanied by a SDS. This must be brought to the attention of persons receiving, transporting, storing, using and disposing of such materials and to their supervisors. The provisions stipulated in the SDS should be adhered to.

Procedures

- Adequate ventilation must be maintained so that the space is gas free. This eliminates the danger of fire and paint intoxication.
- Electrical equipment must be suitable for use in a hazardous atmosphere and securely bonded to earth.
- Signboards should be prominently displayed around the work area, for example, No Smoking, No Hot Work and Spray Painting in Progress. All pipelines to other compartments should be blanked off.
- Lighting and electrical equipment must be suitable for use in a flammable atmosphere.
- Painters should use an approved type of air-fed mask.

Completion of Task

Once the painting operation has ended, the relevant personnel should be informed. After painting, a confined space must be made safe by ventilation and checked for the presence of flammable or toxic gases before subsequent operations begin, particularly hot work. This applies also to hot work on the opposite side of bulkheads, tanks, decks, etc and so on.

Use of Hazardous Substances

This includes substances which are toxic, corrosive, volatile, explosive, irritant, carcinogenic and allergenic. These substances must be subject to procedures covering their purchase, receipt, transport, storage, handling, use and disposal. See under Section 5.4.6.15 on Occupational Health Hazards.

5.4.6.9 Testing

Pressure Testing

Hazards

High Pressure

Pressure testing of vessels, pipework, valves, pressure relief valves and tanks involve high pressures generated by compressors, pumps or hydrostatic head. Where high pressure is applied, there is a hazard of injury or drowning from loss of containment. There is also the danger of injury from projectiles.

Procedures

Barriers

When pressure testing is in progress, procedures should require that barriers are erected to prevent unauthorised entry to the area concerned.

Risk Assessment

Before commencing testing operations:

- The hazards should be identified;
- Their associated risk assessed;
- If necessary, means to mitigate the risk put in place; and
- The operation should be monitored to protect people, plant and ship or work area.

Use of Compressed Air

The pressure must be correct for the work to be tested. Gradual application allows the responsible personnel to spot failures before the released energy becomes dangerous.

5.4.6.10 Radiography

Hazards

Radiation

Radiation is a health hazard. The hazard may be invisible and its effects may not be apparent for a considerable time after exposure.

Procedures

Control of Sources

Procedures should specify the method of controlling the movement and use of radioactive sources, recording these movements and accounting for their removal from the company's premises. The procedures should also specify the actions to be taken in the event of an exposed source, a lost source and damage to the protective container.

Health Monitoring

Workers involved in radiography must be trained and qualified in the work. Where the work is not done by a specialist contractor, procedures must specify:

- The training required;
- The routines for monitoring any dose received; and
- The action to be taken in the event of an excessive dose.

Where the work is done by a contractor, the company should satisfy itself that the contractor has adequate procedures in place for the protection of its own and other personnel nearby.

5.4.6.11 Diving

Hazards

Asphyxiation

A loss of air supply which can be caused by failure of air-line apparatus, exhaustion of a self-contained breathing apparatus cylinder or interruption of supply through an air-line pipe, can result in asphyxiation.

Bends

A failure to observe diving procedures for the rate of return to the surface may cause bends or nitrogen release in the diver's blood on decompression.

Snagging and Abrasion

Air-lines and communication lines can be snagged on underwater objects or abraded on rough surfaces.

Poor Visibility

The inshore water in which shipyard divers operate is often cloudy possibly leading to disorientation or difficulty in carrying out the work involved.

Hazards from Other Activities

Other activities in the vicinity of the diving operations can result in dropped objects, endangering a diver's safety.

Procedures

Preparation

- Divers and their support team must be trained and qualified in the work to be done.
- Briefing of divers must be adequate to ensure that they are aware of conditions underwater, including local hazards such as currents, intakes and outflows, submerged objects and dock machinery.
- The work plan must show clearly the work to be done.
- The life support systems must be checked and in good order.
- The surface team must be aware of activities being carried out.

Systems

There must be procedures for the maintenance and operation of the life support systems. These systems should include means of communication The systems available should include the minimum diving equipment required to carry out one (1) diving operation with one (1) diver in the water (as described in WSH Council's *Technical Advisory for Inland/Inshore Commercial Diving Safety and Health*):

- Sufficient air supply for diver (air MUST be breathing grade, in accordance with BS EN 12021:1999) provided from a suitable source; vessel air and industry air compressors are not acceptable;
- Independent sufficient air supply for standby diver;
- Emergency air supply for diver and standby diver;
- Suitable breathing apparatus for diver;
- Suitable breathing apparatus for standby diver;
- Emergency bailout cylinder for diver and standby diver;
- Safe means to enter the water;
- Safe and suitable means to exit from water and recover an unconscious diver;
- First aid and medical equipment;
- Personal diving equipment; and
- A decompression chamber.

For more information regarding diving at work, See *SS511: Code of Practice for Diving at Work*.

5.4.6.12 Ship Movements

Ship Crew Briefing

Hazards

Incompatible Operations

Ships' crew may have tasks which are not compatible with shipyard's work. The crew's work is subject to the same permit-to-work procedures and VSCC control as work done by shipyard personnel.

Unfamiliarity with the Shipyard

Ships' crews are unlikely to be familiar with shipyard's layout, the company rules and the need for precautions related to other work in progress. This can lead to misunderstanding and infringement of the company's rules and procedures.

Procedures

Briefing

The company should have a clear briefing document explaining matters such as:

- Company rules, particularly regarding smoking and access to the shipyard;
- Procedures for bringing materials and equipment into the shipyard;
- Function of the VSCC and requirement for representation by the ship's master;
- Operation of the permit-to-work system;
- Rules and procedures for transferring or discharging cargo, bunker fuel, slops, ballast and bilge contents;
- Precautions regarding propeller turning, rudder movements, hydraulic systems operations, winches, anchors, steam system operations, inserting and fire protection systems, and so on; and actions to be taken in an emergency.

Slipping and Launching

Hazards

Loss of Stability

Any loss of stability at time of launching is a serious hazard to the vessel and to the personnel involved.

Collision

There is a danger of collision of newly launched vessel with other craft in the area or with fixtures such as quays, dolphins, buoys or floating docks.

Failure of Gear

During slipping and launching operations, any winches or other mechanical gear used must be in good working order to prevent injury or damage from uncontrolled movement of the ship, cradle or other equipment.

Procedures

Preparation

The company should have generic procedures for slipping and launching, and a plan for each individual operation, taking into account the following:

- Nature of the vessel;
- Vessel's dimensions and gross weight;
- Conditions at the time;
- Position of the slip;
- Means of control of the vessel in the water;
- Provision for contingencies;
- Water clarity and depth, warping and berthing required; and
- Maintenance of winches, and so on.

The plan must include consultation with the Maritime and Port Authority of Singapore (MPA) and obtaining its authorisation. It should include a thorough risk assessment, covering all the risks and means of eliminating or mitigating those risks.

Launch Procedure

The launch procedure including allocation of duties to company personnel, contractors, ship's crew and representatives, should be prepared well before the launch. It should also cover the presence of distinguished guests. The procedure should cover (depending on the size and nature of the vessel, type of slip, method of control, etc.) the following:

- Allocation of duties;
- Layout of moorings and lines;
- Tug assistance;
- Port supervision and pilotage;
- Chock removal; and
- Restraint after launch and so on.

Berthing and Unberthing

Hazards

Hazardous Materials

Previous or present cargo, bunker fuel, hydraulic oil, lubricating oil, paints, solvents, and so on, must be declared.

Stability—Reason for Berthing

A vessel arriving for repair may have a fault which is hazardous. For example, its manoeuvrability may be affected, or it may have damage which affects its stability or its integrity may be breached, resulting in leakage and pollution.

Procedures

Preparation

The company should have procedures for the arrival of the vessel, including information such as:

- The name and call sign of the vessel;
- Country of registration;
- Overall length, draught and beam of the vessel;
- Estimated time of arrival;
- Nature of cargo, flash point and quantity;
- Distribution of cargo on board;
- The work to be done, such as tank cleaning, hull ,repair, and so on; and
- Need for tug assistance.

In addition, MPA's procedures should apply.

Shipyard Equipment

There should be information on the shipyard's berth layout, bollards, quick-release hooks and depth of water.

Berthing

There should be procedures for handling the vessel on arrival, including mooring, gangways and towers, connection of services, means of communications, and so on. The master and crew must be briefed on the shipyard's rules using the briefing document detailed above.

Dry-Docking and Flooding

Hazards

Damage to Ship

A ship may be damaged through failure to follow a fully prepared docking plan, for example, through windage, current, failure of mooring systems, collision with other vessels. It is important that crew and shipyard personnel are fully briefed on the plan. A ship may be improperly set on blocks, particularly if it is not flat bottomed.

Injury and Drowning

Operations at a quay-side or dock-side are subject to the risk of injury from contact with mooring lines and winch equipment. There is a risk of falling in the water and possible drowning.

Falls

There is a risk of injury from falling into the dock when it has been drained of water. During the process of establishing access to the ship or vessel using a dock arm or gangway, the risk of flooding is particularly high.

Premature Flooding

See Section 5.4.7.3.b) vii) on Accidental Flooding of Dry Dock or Floating Dock.

Procedures

Preparation

- Dock Master: When vessel-docking instructions are received from the responsible authority, confirm the docking with the vessel's agent (if the vessel is at anchorage) or the Captain (if the vessel is in the yard).
- Provide a vessel-docking plan for the block arrangement.
- Ensure that personnel affected are familiar with the emergency and evacuation procedures.
- Check the vessel before docking.
- Dock Master: Instruct the dock operator to flood the dock, if it is not already flooded.
- Deploy the line handler and mobilise tugs and machinery.

- Check electrical and cooling lines and other relevant systems and ensure that they are operational. If the yard has an intermediate dock, inspect it for structural damage or defects.
- Inspect all rubber seal installations, pumps and electrical high water level sensors and test them to ensure that all is in working order.
- Ensure that the bilge pump is ready to be operated manually should the high-level water sensors fail.
- Close the drain sump valves on both sides of the dock.
- Install polypropylene ropes at the 15m mark from the intermediate dock gate. Side-wall markings of 15m, 10m, 5m and 0m should be clearly marked and visible.
- Ensure that life buoys are in place and in good condition.

Docking

- Manoeuvre the ship into the dock according to the plan.
- Instruct divers to check alignment of the vessel shaft and forward. Place additional packing for a non flat-bottom vessel.
- When vessel is in position, instruct the dock operator to pump the dock dry.
- When the dock is dry, check that vessel is set correctly on the blocks. Repack vessel if necessary.
- Install the gangway to vessel.

Docking in Floating Dock

Hazards

Damage to Ship

A ship may be improperly set on blocks, particularly if it is not flat bottomed.

Drowning

Operations at a quay-side or on a floating dock are subject to the risk of failing in the water.

Falling

There is a risk of falling on to the dock floor from the sides.

Premature Flooding

See Section 5.4.7.3.b.vii) on Accidental Flooding of Dry Dock or Floating Dock.

Procedures

Preparation

- Dock Master: When vessel docking instructions are received from the responsible authority, confirm the docking with the vessel's agent (if the vessel is at anchorage) or the Master (if vessel is in the yard).
- Provide a vessel-docking plan for the block arrangement.
- Check the vessel before docking.
- Dock Master: Instruct the dock operator to flood the dock.
- Deploy the line handler and mobilise tugs and machinery.
- Check electrical, cooling lines and other relevant systems and ensure that they are operational.

Docking

- Manoeuvre the ship into the dock according to the plan.
- Instruct divers to check alignment of the vessel (shaft and forward). Place additional packing for a non flat-bottom vessel.
- Dock Master: When vessel is in position, instruct the dock operator to pump the dock dry.
- When the dock is dry, check that vessel is set correctly on the blocks. Re-pack the vessel if necessary.
- Install the gangway to vessel.

5.4.6.13 Transfers of Fluids between Tanks and to Shore

Ballasting and Deballasting

Hazards

Stability

The stability of the vessel is the responsibility of the ship's officers but the company must approve the operations to be carried out.

Draught

There must be sufficient draught for the operations to be carried out, taking into account the sea and tide conditions to prevent grounding. Excessive freeboard may cause problems (e.g., with mooring lines) in high wind.

Capacity of Shore Tanks

Deballasting into shore tanks requires the cooperation of the shipyard personnel to avoid exceeding tank capacity.

Other Operations On-board

Operations must be coordinated to ensure that personnel engaged in other operations are not endangered.

Procedures

Communication and Approval

The transfer of ballast into shore tanks or the transfer of ballast between tanks on board requires procedures to ensure that company personnel are not at risk and that the arrangements for transfer to shore are understood and followed. Each transfer must be subject to specific information and agreement.

Cargo Movements, Bunkering and Transferring of Fuel Oil

Hazards

Stability

As above for ballasting and deballasting.

Hydrocarbons

The movement of hydrocarbons including volatile components involves risks of loss of containment, fire or explosion.

Simultaneous Operations

The movement of cargo while at a berth must only be carried out subject to the work schedule as agreed at the VSCC meeting.

Procedures

Cargo Movements

There must be procedures in shipyards to which this requirement applies, covering:

- Communication between ship and yard personnel;
- Agreement on planned movement and safety of other work being carried out;
- A risk assessment to ensure that hazards have been taken into account and provided for; and
- The effect on other work in progress, particularly the risk from operating pumps, pipe work, inverting system, and so on.

5.4.6.14 Use of Tools and Equipment

Electric Tools

This includes portable drills, sanders, grinders, saws, and so on. Legislation relating to such equipment is contained in Regulation 54.

Hazards

Electric Shock

Damaged, poorly maintained or wrongly used tools can cause electric shock, which are potentially fatal. Mains voltage electric tools used in wet weather are particularly hazardous.

Trips on Leads

Trailing leads across walkways and decks can cause trips.

Rotating Parts

Rotating parts can catch clothing. They can also whip about if not properly controlled, for example, on starting or when catching on some part of the work.

Reciprocating Parts

These can catch on the work and jerk dangerously.

Procedures

Use of Tools

Companies should have procedures for:

- Issuing of hand tools;
- Using bench tools;
- Ensuring that users are competent;

- Checking a tool and its cable and plug before use;
- Checking that appropriate guards are in place and in good condition;
- The use of PPE appropriate to the job;
- The use of hand tools including a prohibition on use outside their capacity or specification;
- Switching off power supply when tool is not in use and disconnecting hand tools when they are not being used;
- Inspecting hand tools on their return to store; and
- Regular inspections.

Pneumatic Hand Tools

This includes air-driven drills, grinders, and so on.

Hazards

Compressed Air

Faulty couplings, damaged hoses and unauthorised interference with the tool can cause serious injury from the release of compressed air.

Trips on Leads

Trailing hoses across walkways and decks can cause trips.

Rotating Parts

Clothing can be caught between rotating parts. Rotating parts can also whip about if they are not properly controlled, for example, on starting or when catching on to some part of the work.

Reciprocating Parts

Reciprocating parts can be caught on the work and jerk dangerously.

Procedures

Use of Tools

Companies should have procedures for:

- Issuing of hand tools;
- Ensuring that users are competent;
- Checking a tool before use;
- Using of hand tools including restrictions on use outside their capacity or specification;
- Inspecting tools on their return to store; and
- Regular inspections.

Workshop Machinery

This applies to machinery in the shipyard and also to equipment operated on contractors' premises. It includes lathes, boring machines, drills, grinding machines, cutting, bending and folding machines, forging and casting equipment, and all other fixed workshop equipment. It covers manually operated, numerically controlled and profiling machines.

Hazards

Moving Parts

Hands and clothing can be caught in the moving parts, particularly when setting up or maintaining machines or if the guards are faulty or disabled.

Unsecured Work-piece

Unless the work-piece and tool are, properly secured by clamps, vice, and so on, there is a danger of injury.

Damage to the Work

Inexpert or careless work can cause extensive damage to work in progress.

Procedure

Guards

Companies must ensure that the machinery are properly guarded in accordance with provisions made under the WSH (General Provisions) Regulations. Procedures for maintenance and lubrication should include provision for times when the guards are disabled.

Operation

Company rules must limit the operation of machinery to persons who are appropriately trained, experienced and supervised. The instructions for a specific task should include an assessment of risks involved and means of avoiding or mitigating that risk. Where a change to an instruction becomes necessary, the change should be approved by a supervisor.

5.4.6.15 Compressed Air and Gases

Compressed Air

Hazards

Failure of Hose or Coupling

This can release a jet of compressed air which can cause serious injury. A hose and tool-lance, jet, and so on, can whip about causing injury to personnel or damage to equipment.

Failure of Valve

A hand-held control valve sticking open can cause an uncontrolled jet of compressed air. A valve failure at the manifold can leave equipment live when it is expected to be depressurised.

Horse-play

Applying a jet of compressed air to the body can cause deaths.

Procedures

Condition of Equipment

Procedures must ensure that equipment is inspected at regular intervals, and at least as often as any relevant legislation demands.

Use of Equipment

There should be procedures covering the use of compressed air and signs should warn of any hazards involved. Operations involving compressed air should be preceded by an assessment of risks involved in the particular situation.

The use of equipment must be restricted to persons properly trained and qualified.

Compressed Gases

Hazards

Toxic Gases

Some gases are toxic or asphyxiating when present at a concentration greater than the permissible exposure level.

Escape of Flammable Gas

A concentration of flammable gas between its flammable limits can cause fire or explosion.

Procedures

Condition of Equipment

Procedures should ensure that the equipment is inspected at intervals which satisfy relevant legislation. This is specified in Regulation 54(3) for welding equipment.

Use of Equipment

Gas cylinders must be colour-coded to conform to the *Singapore Standard 152: Identification of Contents of Industrial Gas Containers*. This stipulates a colour code system for gas cylinders. The colours for hoses are defined in *SS510: Code of Practice for Safety in welding and cutting (and other operations involving the use of heat)*. See table below for details.

Gases Hose	Hose Colour	Cylinder Colour
Acetylene	Red	Maroon
Oxygen	Blue	Black
LPG	Orange	Grey*

* May vary from company to company.

There should be procedures covering the use of compressed/ dissolved gases and including aspects such as:

- Permanent and temporary storage precautions;
- Handling gas cylinders (keeping upright in trolleys, quads, etc);
- Marking and segregating when empty;
- Protecting from impact, especially on valves, regulators, flashback, arrestors and non-return valves;
- Inspection before use to ensure no damage to fittings or hoses; and
- Certification of hoses at stipulated intervals.

5.4.6.16 Transport and Materials Handling

Forklift Trucks

Hazards

Unauthorised Use

Unauthorised personnel can cause serious injury or damage by driving forklift trucks without the necessary training or qualification.

Failure

Mechanical or electrical failure can make a forklift truck very dangerous. Such failures may involve brakes, tyres, lights, motor or engine, hydraulic lifting systems, and reversing signal.

Procedures

Maintenance

There must be maintenance procedures and records to ensure that the equipment is regularly inspected, lubricated and maintained in accordance with the manufacturer's instructions.

Pre-use Checks

There should be a programme of checks carried out by the driver before using the forklift truck for the first time on a shift, covering the operation of the controls, condition of hoses, oil levels, coolant level, overhead guard, and so on. A sample "Forklift Safety Checklist" is attached in Annex E-12.

Security

Unauthorised personnel are not allowed to use the truck. For example, the immobiliser key should be removed when the truck is unattended.

Instructions

There should be shipyard-specific instructions on the use of forklift trucks defining where they may be used, who may use them, and the types of trucks to be used for different purposes. Particular care should be taken when carrying wide loads such as tubulars. A side-lift is preferred to avoid hazards to personnel or assets at the side of a roadway.

Crane Operations and Lifting Equipment

These topics are contained in:

- Sections 19 to 22 of the WSH (General Provisions) Regulations;
- Part IX Material Handling Equipment in the Regulations;
- The Factories (Operation of Cranes) Regulations;
- *SS536:2008 Code of Practice for Safe Use of Mobile Crane;* and
- WSH Council's *Code of Practice on Safe Lifting Operations in the Workplace.*

There are guidance notes issued by MOM for application as an Approved Crane Contractor which include the standard application form and a Personnel Data Sheet. This information is available at the MOM website. The notes stipulate the requirements to be satisfied by the contractor and Crane erectors.

The WSH (General Provisions) Regulations defines lifting machine as including crane, crab, winch, teagle, runway, transporter, piling frame and any suspended scaffold capable of being raised or lowered by climbers or winches. This is a comprehensive list and includes, for example, mooring winches. Under the WSH (Operation of Cranes) Regulations, only those crane contractors approved by the Commissioner of Workplace Safety and Health are allowed to carry out the installation, repair alteration or dismantling of a mobile crane or tower crane.

A shipyard intending to carry out the installation, repair, alteration or dismantling of a mobile crane or tower crane on its own must apply to the Commissioner to become an Approved Crane Contractor. The MOM has issued a guide on the application as an Approved Crane Contractor, setting out the criteria for approval as an approved crane contractor, approved crane erector and the erection team.

Hazards

The lifting and transport of heavy loads is responsible for many accidents in industry. The availability and enforcement of the company's procedures should reflect this concern.

Crane Failure

A brake failure can result in a dropped load. A failure of the limit switches and overload prevention systems can result in operation outside safe limits and crane failure.

Inadequate Maintenance

This may result in any of the above or in a structural failure. Other failures may include a seized sheave, inefficient engine, jammed line or worn bearing and stewing ring.

Shared Load

Where lifting devices are used in tandem, there is a risk of unequal load sharing and potential overload failure.

Planning and Risk Assessment

A failure to plan the details of a task adequately may result in injury and damage. For example, a mud door assessed on the basis of the weight of metal may cause a chain block to fail because the enclosed mud accounted for 150% extra weight.

Procedures

Procedures should detail:

- The use of crane;
- Methods of slinging; and
- Signalling:
- Training requirements; and
- Inspection and maintenance of slings.

Preparation

Before operating a mobile crane, the checks should include:

- All mobile cranes in operation should have a valid MOM certificate;
- Before taking over the crane, the operator should check for operations adjacent to the work site;
- The hook should have a safety catch which should be in good working condition;
- A checklist should be completed covering all operator-accessible and safety-critical items, such as engine oil level, operation of controls, safety interlocks, brakes, electrical systems;
- There should be no signs of undue wear and damage on the wire ropes; and
- There should be no significant oil leakage.

Operation

- Ensure that the operator is trained on the appropriate type of crane and has a valid license.
- On road cranes, extend the stabilising outriggers fully and ensure that they are resting on firm ground.
- Operate only with a trained signalman.
- Ensure that the signalman has an uninterrupted view throughout the lift or, if that is not possible, use more than one signalman, each in full view of the other and able to communicate effectively with the crane operator.
- Ensure full visual and, if possible, voice communication between the signalman, crane operator and riggers.

5.4.6.17 Electrical Safety

Annex B-1 on "A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations" in this manual includes the requirements for electrical safety in the Regulations.

Hazards

The general hazards arising from electrical installations and equipment include:

- Electric shock
  - The use of equipment in unsuitable circumstances (too high a voltage or in wet surroundings);
  - Inadequately maintained equipment;
  - Damaged equipment; and
  - Unqualified entry to power distribution systems.

- Physical injury
  - Hands or clothing being caught in rotating parts;
  - Inadequate guards; and
  - Misuse of equipment.

Procedures

Rules and practices should be publicised for the use of particular types of tool or equipment and for particular operations (such as entry to switchboard panels) should be provided, including, provisions for safety.

Electrical installations and equipment must comply with the following:

- Regulation 14 of the WSH (General Provisions) Regulations;
- Electricity Act and its relevant subsidiary legislation;
- Part VII of the WSH (Shipbuilding and Ship-repairing) Regulations;
- The maximum voltage allowed for use in confined locations (55V AC. or 110V DC);
- The provision of earth leakage circuit breakers;
- Low voltage shock preventers should be used on electric arc welding sets;
- The use of heavy duty industrial plugs and sockets;
- Earthing of metal parts; and
- SS571: Code of Practice for energy lockout and tagout is applicable to prevent inadvertent turning on of energy sources during installation, troubleshooting, repair, and maintenance.

See also Section 5.4.6.14 of this manual on Use of Tools and Equipment.

5.4.6.18 Personal Protective Equipment

PPE should be used as a provision of last resort for control for WSH risks. It is the least preferred method of control in the hierarchy of control as mentioned in section 5.4.6.1. It is should be used in conjunction with other methods of controls.

Types of PPE

The types of PPE needed should be specified in the permit-to-work or work procedures. It includes:

- Protective clothing such as:
  - Safety helmets when there is a need to protect the head from obstructions such as pipework and falling objects;
  - Air-supplied blasting helmets;
  - Overalls, boots and gloves;
  - Aprons to protect from projectiles, particularly hot slag, and chemical splashes;
  - Rainwear such as jackets, boots, waterproof trousers, for exposed locations and especially where operations cannot be suspended during heavy rain;
  - Gloves of an appropriate material and standard, for protection against penetration, abrasion, heat, cold, fire, chemicals, and other hazards; and
  - Safety footwear where heavy objects may cause injury to feet.

- Protective equipment such as:

  Safety glasses and goggles where wind-blown debris may cause eye injuries, such as grinding or in the vicinity of grit blasting, or where injury may be caused to operators or other personnel nearby by-welding flash;
  - Safety harnesses for those working at a height exceeding 2 metres;
  - Life-jackets for those in danger of falling into the water;
  - Respirators where the atmosphere may be contaminated and where air-line breathing apparatus is not appropriate; and
  - Breathing apparatus, either self-contained or preferably air-line for toxic or oxygen-deficient atmospheres, hearing protectors, torchlight with charged battery if required to enter confined spaces.

Appropriate standards above should apply in the selection of PPE. This is necessary for:

- Instruction to workers and supervisors; and
- Setting the terms of contracts to ensure the suitability of contractors' provision for their workers.

Selection of Personal Protective Equipment

In selecting and specifying the requirement for PPE, consideration must be given to:

- Type of hazards and risk involved

  PPE selected should be in accordance with the hazards and risks for exposure. Information on the characteristics (such as concentration, energy level, power, and so on) of the hazards must be available in order to select a PPE that provides the appropriate protection level.
- Standards specification

  Selection of type of PPE should be based on Singapore Standards or other reputable international standards. The following are mandatory Singapore Standards that are applicable to PPE:
  - SS548 : Code of Practice for Selection, use, and maintenance of respiratory protective devices
  - SS549 : Code of Practice for Selection, use, care, and maintenance of hearing protectors
  - SS 98 : Specification for Industrial Safety Helmets
  - SS 473 : Specifications for Personal eye-protectors:
    - Part 1 : General Requirements
    - Part 2 : Selection, use and maintenance
  - SS 513 : Specification for Personal Protective Equipment - Footwear
- Location of use

  Clear instruction should be given to a person likely to be exposed to the hazards at the location where the hazards may be present. Warning signs should be put up at conspicuous places where PPE is required.

Use of Personal Protective Equipment

Persons at the workplace much be made aware of the type(s) of PPE necessary to be worn prior to entry into the area where they are likely to be exposed to the hazards. For example, hearing protectors would be required at places where persons are likely to be exposed to excessive noise. Signs must be posted at conspicuous location(s) to warn people of such necessity. Where it is required, PPE must be worn by every person exposed, for the duration of the period of exposure.

Users should be given instructions on the correct way of putting on PPE and of verifying whether the PPE has been put on correctly prior to exposure to hazards. For example, when wearing respiratory protectors, the user should use the correct method of wearing the respirator and check using "fit test" to ensure that the respirator has been put on with a good seal to prevent inhalation of any toxic substances.

Having decided what PPE is/are to be worn, the organisation should set rules on PPE and ensure that they are being enforced and followed. A blanket rule in an area requires compliance by all personnel in the area including supervisors, management and visitors. In some instances, it may be necessary to monitor the effectiveness of PPE by personal health checks.

Maintenance of Personal Protective Equipment

Users of PPE must be trained on proper maintenance of their PPE to ensure the effectiveness of use and personal hygiene. Users must be aware of the useful life of PPE where applicable. PPE such as filter cartridges of respiratory protectors have expiry dates, or may break-through from continuous use. These may render the PPE ineffective, and fail to provide the intended protection.

5.4.6.19 Environmental Protection and Waste Management

Planning Control of New Facilities

For the development of a new shipyard and ship-repair facility, proper submission must be given to the Pollution Control Department (PCD) during planning stage. The impact of all developments on the environment is assessed and considered before each development is allowed to proceed. PCD checks these proposals, assesses the impact on the environment and ensures that new shipyards and ship repair developments are properly sited and are compatible with the surrounding land use. It also processes building plans and assesses the environmental impact to ensure that the prospective industries will not pose unmanageable health and safety hazards, and pollution problems.

Water Pollution Control

All wastewater (trade effluence) from shipbuilding and ship-repairing facilities must be discharged into the public sewerage system which is operated by the Public Utilities Board (PUB), or to a watercourse if a public sewer is not available. A permit must be applied for such discharge.

Trade effluence must be treated according to the specified standards before discharge into a sewer. These standards, together with other requirements are set out in the Sewerage and Drainage Act and Sewerage and Drainage (Trade Effluent) Regulations. (If public sewer is not available, trade effluence must be treated to standards specified in the Environmental Protection and Management (Trade Effluent) Regulations).

Premises generating large quantities of acidic effluent are required to install a pH monitoring and shutoff control system to prevent the discharge of acidic effluent into the public sewer.

Shipyards can apply to PUB for permission to discharge their trade effluent containing biodegradable pollutants, as determined by their biochemical oxygen demand (BOD) and total suspended solids (TSS) loading exceeding the allowable standards, directly into the public sewers on payment of a tariff. The tariff is levied to recover costs incurred in treating the additional pollution load at the sewage treatment works.

The provision, operation and maintenance of sewerage system are governed by the Sewerage and Drainage Act. The Act also governs the treatment and discharge of industrial wastewater into public sewers.

Air Pollution Control

Shipyards equipped with pollution control equipment (such as diesel boilers, furnaces, and so on) must comply with the air emission standards. The air emission standards are specified in the Environmental Protection and Management (Air Impurities) Regulations.

To minimise the emission of sulphur dioxide into the air, the sulphur content in fuels (such as diesel) used by industries is limited to not more than 1% by weight.

The use of open fires to dispose wastes is prohibited under the Environmental Pollution Control (Prohibition on the Use of Open Fires) Order.

Hazardous Substances Control

The control of hazardous substances is governed by the EPMA and the Environmental Protection and Management (Hazardous Substances) Regulations.

A licence is required for any person who wishes to import, sell, export, purchase, store, and/or use any hazardous substance controlled under the Act. A permit is required for any person who wishes to purchase, store and/or use any hazardous substance controlled under the Environmental Protection and Management (Hazardous Substances) Regulations.

Ozone Depleting Substances (ODS) are controlled as hazardous substances under the Environmental Pollution Control Act. Control of ODS covers import, export, production and consumption and is regulated under the Environmental Protection and Management (Ozone Depleting Substances) Regulations.

General Waste Disposal

Shipyards should implement good waste control and management practices. Options available for the handling and treatment of waste include:

- Reduce (most preferred);
- Reuse;
- Recycle; and
- Disposal (least preferred).

Organisations should systematically review their waste generation to identify opportunities for waste minimisation. Besides minimising the impact to environment, waste minimisation is usually accompanied by more efficient operation and cost saving. The most ideal approach is to minimise waste generation in the first place. Whenever possible, materials should be considered for reuse so as to minimise wastage. If reuse is not possible, the next best option would be to recycle the waste. This usually involves selling the waste as scrap to recyclers, who reprocess the scrap material into other forms or products. Where the above is not possible, waste should be properly disposed in accordance with the applicable legislations.

The disposal of waste is governed mainly by the following legislation:

- **Environmental Public Health Act**
  Makes provisions for environmental pollution issues likely to be caused by general public, including waste management and cleanliness in public places.
- **Environmental Public Health (General Waste Collection) Regulations**
  Sets requirements pertaining to the generation, storage, handling, transport and disposal of general waste, waste from grease interceptors, waste from sewerage systems, and waste from sanitary conveniences that are not part of a sewerage system.
- **Environmental Public Health (Toxic Industrial Waste) Regulations**
  As described in the following paragraph on Toxic Industrial Waste Control.
- **Radiation Protection Act**
  Regulates, among other aspects of radiation protection, the disposal of radioactive materials and irradiating apparatus.
- **Hazardous Waste (Control of Export, Import and Transit) Act and subsidiary legislations**
  Sets the requirements for controlling the movement or transboundary movement of hazardous waste in, through, and out of Singapore.
- **SS593 : Code of Practice for Pollution Control**
  Specifies the recommended pollution control requirements and good practices to safeguard clean air, clean land, clean water and a quality living environment. Includes siting requirements for various types of developments, management of hazardous substances and toxic industrial wastes, and land contamination and remediation.

Toxic Industrial Waste Control

The management of toxic wastes in Singapore is under the purview of the Pollution Control Department and is carried out through the Environmental Public Health (Toxic Industrial Waste) Regulations 1988. It makes provisions for the requirements for the generation, storage, handling, transportation and disposal of general waste; waste from grease interceptors sewerage systems and sanitary conveniences that are not part of a sewerage system.

The types of toxic waste which are controlled are listed in the Schedule of the Environmental Public Health (Toxic Industrial Waste) Regulations. Examples of toxic industrial waste generated in shipyards include: waste oil, spent solvents, spent etchants, waste acids or alkalis and waste sludges, and so on.

For toxic industrial waste (TIW) generators, the requirements on control measures under this regulation include:

- Maintaining a register, updated on a weekly basis, that contains:
  - Types and quantities generated;
  - Manner of disposal;
  - Date and quantity supplied or sold to a toxic industrial waste collector;
  - Name and address of the toxic industrial waste collector; and
  - Quantity held in stock.
- Storing TIW in containers with design, construction and maintenance in accordance with approved code of practice and in an area which is restricted to authorised personnel and labelled with appropriate hazard warning signs as prescribed in the approved code of labelling;
- Storing and dealing with TIW in a manner not to threaten the safety and health of any person or cause pollution to the environment;
- Prohibiting the mixing of different types of TIW (e.g., mixing of TIW with non-TIW are prohibited);
- Selling or supplying to licensed collector only;
- Supplying accurate information about TIW to TIW collectors;
- Preparing and keeping up-to-date an emergency action plan detailing how spillage, leakage or accidents involving TIW will be dealt with.

5.4.6.20 Management of Change

The shipyard should establish and maintain a procedure to ensure that all hazards arising out of any temporary or permanent changes to procedures, equipment, materials or personnel is evaluated, managed, controlled, documented and approved.

Establishment of Procedure

The shipyard should ensure that there is a system for evaluating, managing and controlling temporary and permanent changes.

The system should include, but not be limited to:

- Safe work procedures, practices or instructions;
- Facilities, layouts, statutory equipment;
- Statutory regulations and legislations;
- Load bearing parts or materials replacements on equipment; and
- Personnel appointments, trades and occupations.

The procedure should institute a systematic evaluation of the possible hazards or concerns arising from the change, and ensure that appropriate measures are put in place. A plan that clearly specifies the timeframe for the change and any control measures to be implemented should be developed.

The plan should be approved and authorised by the person responsible for the change. Any deviation, changes or extension required for the implementation of the plan should be subjected to review and authorisation by the appointed personnel responsible for the change.

5.4.6.21 Evaluation, Selection and Control of Contractors

The shipyard should establish a system to evaluate the safety performance of prospective contractors, select competent contractors who meet the safety requirements and expectations before contracting the works; and control the contractors' safety performance standards to ensure that all contractors working in the shipyard are aware of their safety obligations.

Evaluation of Contractors

The shipyard should establish procedures to evaluate the contractors' safety performance and competency. The result of these evaluations should be used as a criterion in the selection of contractors. The procedures should include, but not be limited to evaluating the contractor based on:

- Contractors' safety policy and management's commitment to safety;
- SHE risk management capability;
- Attainment or certification to SHE Management Standards such as SS 506, OHSAS 18001, ISO14001, ISO9000 and / or bizSAFE levels;
- Technology, engineering skill and competency available and deployed;
- Training, qualification and experience of managers, supervisors and workers;
- Robustness of control measures, including safe work procedures, to be used for the job;
- Safety plan, targets and objectives;
- Maintenance and state of all machinery and equipment;
- Effectiveness in communications; and
- Safety track records.

Selection of Contractors

The shipyard should establish procedures to select contractors based on their ability to meet safety requirements.

The procedures should include:

- Maintaining a list of approved contractors;
- Selecting bidders who are competent to carry out the work on a particular contract;
- Checking on the quality and safety aspects of their work before issuing an invitation to tender;
- Defining contract conditions, including safety-related aspects of the work and the relationship of contract personnel to the company's personnel, particularly identifying the company's supervision team responsible for their work. The written contract or agreement should stipulate the specific safety requirements for the contractors;
- Taking account of past safety performance, in addition to cost and delivery capabilities;
- Safety induction training of successful bidders and their personnel;
- Monitoring safety performance; and
- Applying consistent standards of discipline for contractors and employees.

Control of Contractors

The shipyard should establish procedures to effectively monitor and control the safety performance of contractors within its premises and ensure the safety requirements specified in the written agreement are implemented.

The procedures should include:

- Monitoring the overall safety performance and management's commitment of contractors;
- Conducting periodic inspections to ensure contractor's compliance with safety requirements;
- Verifying safety training records of contractors;
- Maintaining and monitoring incident statistics of contractors; and
- Maintaining a list of approved contractors who have regularly complied with the safety requirements.

5.4.6.22 Maintenance

General duties of persons at the workplace can be found in Part IV of the WSH Act, stipulating that employers and principals have the duty to, not only provide, but also maintain for those persons at work an environment which is safe, without risk to health, and adequate with regards to facilities and arrangements for their welfare at work. Occupiers, employers, self-employed, principals, and other responsible persons also need to fulfil their general duties of ensuring safety and health of persons at the workplace. As such, they have to maintain the machinery, equipment, plant, article or substance at the workplace so that they continue to be in good condition and safe to operate or for use.

Hazards

Injury or damage from in service plant and equipment not adequately maintained.

Plant and equipment which are not adequately maintained may fail in service, for example, vehicles, cranes and lifting equipment, compressed air and gas equipment, and so on. This is especially serious on safety-critical items, which could endanger personnel, plant, vessels or, production in case of failure. Safety critical items should be given particular attention in the maintenance programme.

Procedures

Maintenance Regime

The WSH (General Provision) Regulations specifies "maintenance regime" an element to be included in the safety management system. The shipyard should establish a maintenance programme to ensure safe and efficient operation of hand tools, machinery and equipment used in the shipyard. This maintenance programme should apply to hand tools, machinery and equipment owned by all suppliers and contractors.

This procedure must include provision for inspection and certification where necessary. Contractors must also demonstrate that equipment for which they are responsible for properly maintained and, where applicable, certified.

Establishment of Maintenance Regimes

- The shipyard should establish preventive maintenance procedures or programme to ensure safe and efficient operation of machinery and equipment owned and used in the shipyard.
- The maintenance programme should also ensure that suppliers and contractors have a preventive maintenance programme for the equipment provided and used by them.
- The maintenance programme should cover the repair, maintenance of machinery, equipment and hand tools specified under the WSH Act and its subsidiary legislation, relevant Code of Practices, Singapore Standards, and manufacturer's specifications.
- The development and documentation of the maintenance programme should include, but not be limited to:
  - A list of the machinery and equipment;
  - Schedule of inspection and maintenance;
  - Procedure for breakdown repair; and
  - Record of inspection and maintenance.
- The maintenance programme should take into consideration the safety and health exposure of personnel carrying out the maintenance work. It should incorporate safety precautionary measures such as lock-out/ tag-out procedures, permit-to-work system, job safety analysis, and so on.
- The maintenance programme should take into consideration that the materials used in the maintenance of equipment continue to meet design specifications, and any substitution of materials shall be appropriately reviewed before use.

Training and Competency for Maintenance Works

The shipyard should ensure that the maintenance personnel are trained and competent in relevant work practices and maintenance procedures. Where applicable, permit-to-work should be implemented on maintenance works similar to normal operations.

Maintenance Records

The shipyard should document and maintain records of all inspections, maintenance and repairs carried out by both in-house personnel and external parties.

Corrective Actions

After the maintenance operations, all faults and repairs that are required to be performed should be recorded with the appropriate follow-up actions and details of such actions to be taken to rectify the faults and repairs.

- The shipyard should establish a maintenance programme to ensure that hand tools, machinery and equipment, and working environment are kept in good condition and safe during operation.
- Equipment such as boilers, furnaces, waste treatment and disposal facilities, and so on, should be properly maintained to ensure efficient operation and avoid catastrophic failure for minimisation of pollution.
- Maintenance regime should also be applicable to suppliers and contractors. They should also have a preventive maintenance programme for the equipment provided and used by them.
- Risk assessment should be conducted and appropriate measures taken to control risks during maintenance work. Measures such as lock-out/ tag-out procedures, permit-to-work system, and so on. should be incorporated into the maintenance programmes.
- During maintenance, SS573 9: Code of Practice for Energy Lockout and Tagout is applicable to prevent inadvertent turning on of energy sources.
- The materials used in the maintenance of equipment should continue to meet design specifications. Any substitution of materials should be appropriately reviewed and approved before use.
- The maintenance programme should include, but not be limited to:
  - A list of machinery and equipment;
  - Schedule of inspection and maintenance;
  - Procedure for breakdown repair; and
  - Record of inspection and maintenance.

5.4.6.23 Control of Hazardous Materials

The main risks associated with materials encountered in shipyards are flammability (risk of injury or damage); and toxicity (health risk). Some hazardous materials encountered are brought in for use by shipyard or ship's crew, while others are residues remaining from cargoes or ship's systems (hydraulic oil, cargo oil, fuel oil, etc.).

Hazardous Residues and Structural Materials

The main substances in this category are:

- Hydrocarbon—cargo, fuel, lubricating or hydraulic oil in tanks, pipe-work, valves, pumps, beneath rusty scales on bulkheads, pipes and insulation areas;
- Oily water in bilges;
- Contaminants such as mercury or hydrogen sulphide; and
- Asbestos insulation or friction materials;
- Petroleum cargo and oil tanks are potentially hazardous when the residual oil trapped in the sludge or lying behind scale evaporates due to a rise in temperature or when the surface has been disturbed. The pump rooms may have petroleum vapour due to leakage from pumps, pipelines or valves. The hazardous effect will depend mainly on the concentration and nature of the substance present.

See table below for a rough guide on the effects of various exposure duration to different concentrations of petroleum vapour.

Hydrocarbon	% v/v in air	Time	Effect
Crude oil, motor gasoline, jet fuel, kerosene, naphtha, white spirit, gas or diesel oil, heavy fuel oil	0.05 (500 ppm)	8 hours	None
	0.20 (2000 ppm)	30 minutes	Giddiness and irritation
	1.0 (10 000 ppm)	10 minutes	Loss of consciousness
	2.0 (20 000 ppm)	-	Death

Hazards

Fire and Explosion

The hazard of hydrocarbons is greatest with the more volatile petroleum products. An accumulation of petroleum vapour in cargo tanks, pump rooms or any confined spaces in the presence of a source of ignition may result in an explosion or fire. The flash points of some hydrocarbons are given below:

Hydrocarbon	Flash Point
Crude oil	- 40 to 200°F
Motor gasoline	- 50°F
Jet fuel	95° to 145°F
Kerosene	100°F (min)
Naphtha	< 0°F
Diesel oil	100°F (min)
Lubricating oil	300°F

*Extracted from *Fire Protection Handbook*, 2003 Edition, by National Fire Protection Association.

Sources of Ignition

Hot work due to direct or indirect heat penetration, sparks from welding, cutting and grinding, and lighted cigarettes and cigarette butts.

Skin Disease

Contact with some hydrocarbons can result in skin disease.

Toxic Effects

Some substances which may be present in residues are toxic. The hazard of hydrogen sulphide is particularly serious, exposure to a concentration of 700 ppm will result in paralysis of the nervous system and death is likely within a few minutes.

Procedures

The permit-to-work system is designed to ensure that the workplace is free of such hazards and must be adhered to rigorously. It should be supported by operational procedures, practices and safety rules.

Mitigation

There must also be provision to deal with incidents:

- Emergency procedures to deal with fire, explosion, and so on.;
- Stand by man to monitor well-being of a person in a potentially hazardous location, particularly confined spaces;
- Trained first aiders and access to medical services; and
- Provision of suitable breathing apparatus, reviving apparatus and rescue equipment.

Hazardous Substances Used in Shipyards

Hazards

Chemical

These include toxins, asphyxiants, caustic, dust and fibres that may be allergenic or carcinogenic, and other health-damaging chemicals.

Physical

Physical hazards to health include noise, vibration and radiation. They also include high and very low temperature, and excessive or inadequate lighting.

Biological

Biological, hazards arise from sources such as water storage, unhygienic food handling and damage to the skin from chemicals.

Procedures

Where these hazards are present, the company must have a means to:

- Identify the hazards which exist;
- Assess the degree of risk associated with each hazard;
- Evaluate the acceptability of the risk; and
- Take the appropriate action to eliminate the hazard, mitigate its effects, or protect personnel and the workplace against the hazard.

The procedures should cover:

- Approval of materials for receipt into the yard, including materials required by ship's crew and to be used on board;
- Contract details, including provision of a SDS;
- Receipt into the shipyard of hazardous materials;
- Transport;
- Storage;
- Handling;
- Use; and
- Disposal.

A list of common hazardous materials is shown in Annex E-10.

Establishment of Hazardous Material Control Programme

The shipyard should establish a hazardous material control programme which should include but not be limited to:

- Procedures for approving the acquisition, receipt, transporting, storage and use of hazardous materials by all in the shipyard;
- Any person who brings any hazardous substance into a shipyard or on board a ship in a harbour should obtain approval to do so from:
  - In the case of a shipyard, the Occupier of the shipyard; and
  - In the case of a ship in a harbour, the Master, Owner or Agent of the ship ("hazardous substance" means any hazardous substance specified in Part II of the Fifth Schedule to the Act).
- Appointment of competent person to receive such materials and ensure its safe storage, movement and use;
- Maintenance of a register of hazardous materials held or used on site, supported by SDS, which should contain accurate and adequate information on the composition, physical and chemical properties of the material, and instruction for safe handling, storage, use and disposal. The register should show:
  - Identification (including generic or trade name);
  - Safeguards to be applied in the transportation, storage, handling and use of the hazardous materials;
  - Maximum quantity stored, and
  - Emergency measures to be taken including medical first aid in the event of an incident occurring in the handling or use of the hazard materials.
- Establishment of procedures for labelling, storage, issue, distribution, movement and use;
- Communication of the hazards associated with the hazardous materials by the competent person to the users. This should include provision of instructions to users, PPE and correct method of transportation;
- Designation of storage areas which should be suitable for the materials and secured against unauthorised access. The hazardous materials should be returned to the designated storage areas when not in use; and
- Establishment and implementation of procedures for disposal of hazardous materials which should be carried out in accordance with statutory requirements or manufacturer's recommendations.

The typical procedures for the acquisition and control of hazardous materials are shown below:

Personnel	Action
Supervisor, Engineer, Project Manager, Ship's Master	Request chemical with justification.
Safety Department	Assess need for this substance.
If risk is low or there is no satisfactory alternative,	
Safety Department	Issue approval along with conditions, if necessary.
Purchasing Department	Issue order along with conditions, especially SDS.
Safety Department	Notify user, security and stores of substance, hazards, and so on.
Gatehouse Security	Check goods agree with notification.
Gatehouse Security	Notify Safety Department and user.
Safety Department	Check goods and approve if okay. Ensure that all personnel affected know procedures, precautions and the means of storage, movement, use and disposal.
Safety Department	Include inspections to ensure that hazards are properly controlled.

Safety Data Sheet

A material SDS is provided by the manufacturer or supplier of a chemical to give information including:

- Chemical name, synonyms and trade names;
- Hazardous ingredients (its percentage in volume or weight);
- Manufacturer's and supplier's name and address;
- Physical and chemical properties such as appearance, odour, melting point, boiling point, vapour pressure, density, and solubility;
- Fire and explosion data such as flash point, lower explosive limit, upper explosive limit, autoignition temperature, and fire-fighting measures;
- Health hazard information such as route of entry into body, acute effects, chronic effects, and recommended permissible exposure levels;
- First aid measures for eye or skin contact, inhalation and ingestion;
- Stability and reactivity data such as stable or unstable, decomposition products polymerisation, and incompatibility or conditions to avoid;
- Spill or leak procedures such as steps to be taken and waste disposal method;
- Exposure controls and personal protection such as hazard control measures, ventilation requirements, respiratory protection, skin and hand protection, and other protective appliances;
- Special precautions such as handling precautions, storage-precautions, and others;
- Other information, for example, name and designation of person who prepared the SDS, sources of key data, and date of issue of the SDS.

Asbestos

Hazards

Lung Disease

Inhaling asbestos fibres can lead to serious and frequently terminal illness. It was widely used as an insulating material and also for friction surfaces like brake shoes and pads.

Procedures

When handling asbestos, the following should be adhered to:

- The WSH (Asbestos) Regulations; and
- WSH Council's *WSH Guidelines on Management and Removal of Asbestos*.

Mercury

Tanks which have contained crude oil or condensate in floating storage units or offtake tankers may be contaminated with mercury.

Mercury Poisoning

Hazards

The results of inhaling mercury compounds include:

- Fever, chills, tiredness, breathlessness and chest pain;
- Burning pain in mouth and stomach;
- Inflammation of the lungs;
- Diarrhoea;

- Vomiting, and ultimately collapse; and
- Kidney damage, leading to death.

Procedures

The following measures should be included in the procedures for companies where workers are exposed to this risk:

- Test the surfaces and atmosphere before and during work, particularly for hot work. If necessary, grit blast the surfaces to clear any mercury deposit;
- Train all workers who are close to blasting, hydro-washing, cleaning and hot work in contaminated tanks in the proper use of respirators;
- Use respiratory protection when working in these areas;
- Aid-fed mask for those conducting blasting operations;
- Particulate masks and disposable suits for those involved in cleaning grit and blasting debris;
- During blasting operations, take samples of dust to monitor the cumulative exposure;
- Hydro-wash cargo oil tanks after blasting and cleaning before hot work;
- Carry out tests to ensure that NEA standards are complied with:
- Leachate test of spent grit prior to disposal;
- Conduct water analysis after hydro-washing to verify that contaminant levels meet disposal requirements.
- Test the vapours produced during hot work with a mercury analyser to ensure that mercury levels are below the threshold limit value of 0.025 ppm;
- Use air blowers with trunking and air extractors in each tank where hot work is being carried out to prevent an accumulation of vapour;
- Screen the workers involved in or close to the operations to detect mercury poisoning and to ensure that protection measures are adequate;
- If a worker is exposed to mercury fumes or vapour, he or she should be given a thorough medical check.

Lead in Paint

Similar precautions to those for mercury should be taken when carrying out hot work on materials which have been treated with paint containing lead.

5.4.6.24 Control of Occupational Health Hazards

Occupational health issues should be controlled and managed similar to that of safety issues. The approach is similar to that for safety—identification of health hazards, evaluating the associated risks, implementing control measures to minimise risks, monitoring the control measures, work place environment as well as health surveillance of persons exposed to agents which may be injurious to health.

Types of Hazards and Control

Chemical

- Fumes, gases, vapours, mists and liquids.

Physical

- Dust and powder, fibres, noise, vibration, lighting, temperature, pressure and radiation.

Biological

- Bacteria, viruses, moulds and fungi.

Ergonomic

- Psychological—especially stress, and physiological-working position, conditions.

The Hierarchy of Control: Elimination, Substitution, Engineering Control, Administrative Control followed by PPE is also applicable here, as for safety. The management of occupational health typically covers areas of worker's health, including but not limited to the following subjects or areas:

Chemical Hazard Control

Where hazardous chemicals are used or produced, the Occupier should appoint a designated person to co-ordinate a programme to control chemical hazards. The programme should cover, the health and safety aspects of transport, storage, handling and use of all hazardous chemicals within the company. The Occupier should keep a register or a list of all hazardous chemicals used or produced in the company. This register should at least contain the inventory and location of use of the chemicals.

The Occupier should obtain or prepare SDS for all the chemicals listed in the register. He should assess all relevant information in the SDS and take the necessary precautions to ensure the protection of workers. He should also ensure that the SDS are readily accessible to all workers who are exposed or have the potential of exposure to the chemicals. Such workers must be fully informed of the hazards and the precautionary measures.

The chemical hazard control programme should also cover:

- Selection and procurement procedures;
- Proper storage of chemicals;
- Proper labelling of containers;
- Safe handling procedures;
- Engineering control measures;
- Environmental monitoring;
- Medical surveillance;
- PPE and appliances; and
- Emergency and first aid procedures.

The procedures for the above should be in writing, and proper documentation maintained. The responsibility for control of hazardous chemicals lies with the employer or the occupier of a factory. Essentially, the Occupier or employer should identify exposed employees and access the risk of exposure. If the risk is significant, appropriate control measures should be implemented to reduce risk of exposure to as low a level as is practical. The control measures include elimination of the use of hazardous chemicals, substitution with less hazardous chemicals, process automation, isolation or enclosure, installation of local exhaust ventilation or applying dilution ventilation or other engineering controls.

Hearing Conversation

A Hearing Conversation Programme (HCP) should be established and implemented for workers who are exposed to excessive noise (above 85 dBA over an 8-hour period). The objective of a HCP is to minimise the risk of hearing loss as a result of exposure to excessive noise. The programme should have the following key elements:

- Regular monitoring of noise levels for identification of noise sources and exposed workers;
- Reduction of noise exposure levels through engineering and administrative control measures where feasible;
- Selection and provision of hearing protectors and supervision of their usage; and
- Periodic audiometric examinations of exposed workers for early detection of hearing loss.
- Training and health education of workers on the hazards of noise and its prevention.

A responsible staff member should be in-charge of the programme. Each component activity could be delegated to a particular person. Written procedures should be drawn up and relevant records should be kept. The programme should be evaluated from time to time and targets set.

Industrial Ventilation

Local exhaust ventilation (LEV) systems are widely used to remove airborne contaminants such as toxic gases, vapours, dusts, fumes and mists from industrial operations and processes. A LEV system usually consists of exhaust hoods and ducts, an air-cleaning device, fan and motor. A proper design of a LEV system is essential for the effective removal of airborne contaminants that would otherwise pollute the work environment resulting in occupational health hazards. The engineering drawings of a LEV system and the design specifications, for example, capture velocity, duct velocity, exhaust rates, fan capacity and fan static pressure should be kept for reference.

A new LEV system should be tested to check whether the design specifications are met.

Existing LEV systems should be maintained and tested regularly to ensure acceptable performance. Tests can be performed by using smoke tubes, anemometers, manometers and pilot tubes. Records of checking and testing performed should be kept.

Persons involved in the design or vetting of design, testing and maintenance of LEV systems should receive appropriate training.

Quality of Breathing Air

The quality of breathing air requires:

- The use of a separate compressor from that used for other purposes such as abrasive blasting unless the breathing air is suitably treated;
- A suitable type of compressor, preferably not oil lubricated;
- If an oil-lubricated compressor must be used, suitable filters on the compressor outlet to remove contaminants like oil mist and particulates;
- A maintenance programme to ensure that the filters continue to function efficiently;
- A carbon monoxide monitor and alarm system to warn if carbon dioxide is present above a threshold concentration; and
- Separation between the exhaust of any internal combustion engine and the compressor intake to avoid carbon monoxide in the air stream.

The acceptable limits for indoor air contaminants and physical factors are:

Carbon monoxide	10 ppm
Carbon dioxide	1000 ppm
Ozone	0.05 ppm
Formaldehyde	0.1 ppm
Volatile organic compounds	3 ppm
Bacterial count	500 cfu/m3*
Fungi count	500 cfu/m3*
Suspended particulate matter	0.15 mg/m3
Temperature	22.5 – 25.5 ºC
Relative humidity	<= 70%
Air movement	<=0.25 m/s

*cfu = colony forming unit

Industrial Hygiene Monitoring

Occupiers have the responsibility to ensure that no persons at the workplace are exposed to toxic substances in excess of level as specified in the First Schedule of the WSH (General Provisions) Regulations. This is also discussed in Section 5.5.1.2.

An industrial hygiene monitoring programme (IHMP) should be established to achieve the above objective. The scope of the IHMP should be defined in writing. The programme document should include:

- Objective;
- Sampling methodology;
- Sample preparation;
- Instrument calibration;
- Sampling procedures;
- Sample collection;
- Sample analysis;
- Sampling strategies;
- Location of monitoring;
- Duration of monitoring;
- Size of sampling; and
- Frequency of monitoring.

An important aspect of the IHMP is the valid interpretation of the data collected on a continuing basis. The individual responsible for the IHMP should be qualified by training and is experienced in the practice of industrial hygiene monitoring.

A record of the result of every monitoring should be kept available for at least 5 years.

Medical Surveillance

Under the WSH (Medical Examinations) Regulations, workers may be required to undergo pre-placement and periodic medical examinations by a designated workplace doctor if they are employed in any hazardous occupations involving the exposure to excessive noise or list of substance stipulated therein (such as arsenic, asbestos, benzene, cadmium, raw cotton, lead, manganese, organophosphates, silica, etc.)

The objective of medical monitoring and supervision is to detect early signs of over-exposure to toxic chemicals or noise and thus help to prevent occupational diseases.

A medical surveillance programme should be established to achieve the above objective. The programme should include:

- Identification of exposed workers;
- Arrangement for medical examinations;
- Evaluation of results of medical examinations; and
- Maintenance of medical records.

Respiratory Protection

Workers who are exposed to a significant level of airborne contaminants, for example, toxic dusts, fumes, mists, gases and vapours should be protected by wearing respirators. This is complementary to environmental control measures taken.

There are basically two categories of respirators: air-filtering type (e.g., dust mask and chemical cartridge respirator) and air supplied type (e.g., air-line respirator and self-contained breathing apparatus). Each respirator has its applications and limitations. To ensure that workers are adequately and effectively protected, a Respiratory Protection Programme (RPP) should be established.

The key elements in the RPP are:

- Regular monitoring of exposure levels to airborne contaminants to identify the need of respiratory protection;
- Selection of suitable types of respirators;
- Training and educating of workers on the proper use of respirators;
- Fit testing of respirators to ensure proper fit during issuance of respirators;
- Supervision of and checking the usage of respirators; and
- Maintenance of respirators.

In addition, appropriate signs should be displayed in areas where respiratory protection is required.

Confined Space Work

A confined space is a space with limited access, poor natural ventilation and lighting. It is not meant for continuous work.

The potential hazards in confined space work fall into three main categories:

- Lack of oxygen which can cause suffocation;
- Presence of flammable gases or vapours which can cause fire and explosion; and
- Presence of toxic gases or vapours which can cause health effects and poisoning.

Other dangers such as electrical and mechanical hazards, poor illumination level and adverse thermal environment may be encountered in confined space work.

To minimise or eliminate these hazards, written procedures for confined space entry should be established, taking the following into consideration:

- Isolating of the confined space from other systems;
- Purging of space and providing mechanical ventilation;
- Testing for oxygen level, flammable and/ or toxic gases and vapours;
- Administering a permit-to-enter system;
- Documenting the work practices and procedures;
- Providing safety equipment and appliances;
- Planning an emergency rescue procedure; and
- Training of workers on the health and safety aspects of confined space work.

Manual Handling

Manual handling is responsible for injuries, particularly back pain and trapped hands and feet. Companies should ensure that those involved in manual handling of heavy loads:

- Know how to lift without causing injury;
- Use mechanical assistance when size or weight of the load requires it;
- Use kinetic techniques to facilitate the operation; and
- Use tag lines instead of hands and feet to guide loads being lifted by crane, pulley block or hoist.

Contract Work

Most companies engage contract workers to do maintenance work during shutdown or turnaround periods. Some companies engage contract workers to carry out routine unskilled work or other specialised projects.

Most contract work and projects are potentially hazardous. Due to the mobility of contract workers and the tight schedule of contracts, the safety and health aspects of the work are often overlooked. Hence accidents involving contract workers are not uncommon. Management should set up a system to ensure that contract work is carried out safely within the company.

First Aid Facilities

First aid is provided to mitigate the severity of injury and preserve human life. More detailed discussions are included in Section 5.4.7.6 on first aid.

Expert Advice

The Company should have access when necessary to occupational health matters including the following:

- Review the conditions in the shipyard;
- Carry out industrial hygiene monitoring such as measurements of exposure to air-borne contaminants, exposure level and received doses for physical agents such as noise, radiation, and so on;
- Assess concentration, noise level, and so on, against tolerable limits; and
- Recommend action if required.

5.4.7 Shipyard and On-board Emergency Preparedness and Response

5.4.7.1 Principles of Emergency Planning and Response

The main principles of emergency response are:

- Procedures cannot be prescribed for all possible situations. The procedures are aimed at getting information quickly to the person responsible for managing the response and mobilising assistance;
  - Emergency response consists of decision-making based on the situation at the time;
    - Notification of external authorities including Singapore Civil Defence Force (SCDF) or Police to mobilise assistance, particularly fire-fighting, ambulance, crowd control, press, and so, and
    - Mobilisation of internal resources such as fire-fighting appliances, ambulance, first-aiders, stretcher parties, divers as appropriate, and so on.
- An emergency is likely to consist of several different events at the same time. For example, an explosion may result in multiple injuries, people in the water, danger of sinking or capsizing, and danger to adjacent facilities or ships.
- Emergency response is a combination of physical action such as fire-fighting, rescue, recovery of property;
  - Local direction to mobilise assistance; and
  - Management support to deal with major decisions, and with outside authorities and interested parties.
- The company's priorities are to:
  - Prevent incidents, by defining and implementing its safety management system, carrying out risk assessment and control, ensuring that people are trained and motivated, maintaining equipment and its protective systems, and so on;
  - Detect a condition which could develop into an incident, for example, by gas detection, fire detection, reporting hazards;
  - Mitigate the effects of an incident if it should occur, for example, by providing fire-fighting equipment and personnel trained in its use at the site of hot work; ensuring that personnel are aware of the action they should take on detecting an incident, such as man overboard;
  - Restore operations as quickly as possible to minimise disruption to ship owners, company and workers.

5.4.7.2 Identification of Types of Emergency

The company must identify the potential types of emergency situations that may arise from its operations and establish response to such situations. Such emergency situations may include:

- Fire and explosion;
- Gas release;
- Oil or chemical spill;
- Structure collapse or loss of stability;
- Collision, capsize or sinking;
- Transport emergency;
- Accident flooding of dry dock or floating dock;
- Man overboard;
- Criminal acts;
- Medical emergency; and
- Epidemic sickness.

5.4.7.3 Emergency Response Procedures

The SCDF provides guides on drawing fire emergency plans on its websites. A sample is attached in Annex F for a typical format on fire emergency plan for an industrial site.

Emergency response procedures may comprise:

a. Alarms and Mobilisation

The means of raising an alarm should be explained. This leads to the mobilisation of resources to deal with the emergency.
The means of raising an alarm may include:

- Activating fire alarm at call point;
- Raising siren;
- Calling security or emergency response organisations; and
- Shouting for help.

b. Actions on Specific Type of Incident

i. Fire or Explosion

The procedures for fire or explosion will depend on the capabilities to shipyards have available for fire-fighting on site. It should include:

- Liaison with and assistance to the emergency services, for example, by providing escorts to the location of the incident;
- Treatment of any injured personnel; and
- Shut-down of operations affected.

ii. Gas Release

The procedures for gas release should include:

- Identification of the nature of the gas and its source;
- Isolation of the source;
- Shut-down of all hot work in the vicinity;
- Ventilation of confined spaces potentially affected, using flameproof equipment;
- Gas testing to verify that the area is clear for work to re-commence.

iii. Oil or Chemical Spill

The procedures should include:

- Identification of the nature of the spill and its source;
- Assessment of hazards associated with the substance spilled;
- Isolation of the source, taking care to protect personnel exposed to the hazard;
- Notification to the Maritime Port Authority;
- Mobilisation of limitation measures, including floating boom, dispersant or other means in consultation with the MPA; and
- Notification of the environment authority if the spill is on land and particularly if it is likely to affect drains or water courses.

iv. Structural Collapse or Loss of Stability

On notification of potential or actual structural collapse or loss of stability, affecting a building, crane, vessel or other structure, the procedures should include:

- Making the area safe for personnel and placing barriers to prevent access to all but essential personnel;
- Treatment of injured personnel;
- Assessing the situation and deciding the appropriate action; and
- Informing the appropriate authorities and other bodies, particularly ship owner or agent.

v. Collision, Capsize or Sinking

An emergency afloat is a matter for the MPA who will take responsibility for the emergency response.

vi. Transport Emergency

The procedures for a collision on land, affecting vehicles, crane, fixed structure or other asset should include:

- Rescue and treatment of injured personnel;
- Assessment of damage; and
- Notification of other parties involved, such as the owner of a vehicle.

vii. Accidental Flooding of Dry Dock or Floating Dock

The company's safe operating procedures should include precautions to be taken when docking or floating a vessel, including warning signals, visual checks, vessel preparation and moorings. In the event that a structural failure or premature flooding takes place, the emergency procedures should include:

- A warning signal to both ship and yard personnel;
- An assessment of the reason for the flooding—failure of the structure or the valve systems or improper operation of the systems;
- An assessment of danger to the vessel, particularly if the hull integrity is breached, for example, at the propeller shaft stern tube or where plates have been removed;

- Rescue of personnel, whether on board, on scaffolding or on the dock floor;
- Action to arrest the flooding; and
- Action to make the vessel safe.

viii. Criminal Acts

Criminal acts include events such as:

- Personal attack;
- Unidentified object;
- Bomb threat; and
- Attack from outside the yard.

The procedures should be compiled in consultation with the Police.

x. Man Overboard

Procedures should include:

- A continuous watch to keep the person in view;
- A separate search and rescue, probably from a small craft;
- Mobilisation of resuscitation and medical assistance; and
- Notification to the MPA.

ix. Medical Emergency

Procedures should specify the action to be taken in the event of a medical emergency, arising from an accident (e.g., fall, amputation, overcome by gases etc.) or illness (e.g., exhaustion, heat stroke, heart attack, etc). This will include:

- First aid and medical assistance; and
- Briefing all relevant personnel on what to do in such a case, particularly that the injured person not be moved except by trained paramedics or medical experts.

xi. Epidemic Sickness or Flu Pandemic

There should be procedures for early detection of such an epidemic, and response plan during an outbreak such as contact tracing, analysis to identify the source and action to isolate that source, quarantine actions, notification to the Ministry of Health, and so on.

Companies should follow the recommendations and instruction to be taken during a flu pandemic from the Ministry of Health. The guide, *A Flu Pandemic Business Continuity Guide for SME* has been developed and is available for download at the Ministry of Information, Communication and the Arts. It was developed using principles in the Business Continuity Management Technical Reference TR 19:2005, which was initiated by the Singapore Business Federation and supported by SPRING Singapore and the Economic Development Board.

The Ministry of Health has come up with a Disease Outbreak Response System. The response plan allows a risk management approach appropriate to the transmissibility and virulence of the virus. A colour coding system is used to rate the stage of alert of the outbreak: green being the lowest level of alert, followed by yellow, orange, red and black. Specific actions are recommended for each alert level. Depending on the mutation pattern of the virus, the intermediate colour codes may be skipped.

5.4.7.4 Emergency Organisation

The organisation that would be mobilised in an emergency must be defined. Action should be taken to ensure that all personnel involved are properly trained in their respective emergency response functions. This involves:

- Managing on-scene action;
- Carrying out emergency response including notification of an incident, fire-fighting, first aid and rescue;
- Management support including reporting to authorities, partners, clients, owners, and other interested parties as well as handling inquiries from the news media and relatives of persons possibly involved; and
- Security who should control the access to the shipyard limiting this to the emergency services.

5.4.7.5 Emergency Response Resources

The extent to which a company invests in and maintains its own facilities for the combat of an emergency is largely a matter of policy, subject to legislation as outlined below:

First Aid and First Aiders

Section 5.4.7.6 on first aid contains guidance on provisions for first aiders, first aid boxes and first aid rooms which are statutory requirements.

Lifting Cages

The use of lifting cages is subject to Regulation 120 of the Factories (Shipbuilding and Ship-repairing) Regulations. The use of a lifting cage has particular hazards such as injuries to hands if an occupant holds the outer rail or injuries resulting from swinging. The company should ensure that this type of operation is properly supervised and regulated.

Rescue Operations

The resources available for rescue include:

- Rescue from sea—flotation devices, small craft, radio, facilities available from the MPA;
- Rescue from a vessel or workshop—stretchers and trained stretcher parties, first aiders, medical and other assistance from external emergency services.

Fire-fighting

As stated in Section 38 of the WSH (General Provisions) Regulations, the company must make provisions for means of escape and effective warning devices in case of fire.

- The provision for fire protection and means of escape for fire should follow that as stipulated by the SCDF Fire Code and the Singapore Standards and Code of Practices mentioned therein. Some of the fire emergency-related Singapore Standards and Code of Practice include:
  - CP 10 : Code of practice for the installation and servicing of electrical fire alarm systems;
  - CP 45 : Code of practice for Halon 1301 fire protection systems;
  - CP 52 : Code of practice for automatic fire sprinkler system;
  - SS 299 - 1 : Fire resistant cables - Performance requirements for cables required to maintain circuit integrity under fire conditions;
  - SS 332 : Specification for fire doors;
  - SS 489 : Fire shutters; and
  - SS 578 : Code of practice for use and maintenance of portable fire extinguishers.

Some shipyards provide mobile fire appliances as a first line of defence but in all cases, the reliance is on the SCDF.

Portable fire extinguishers and hose-reels are basic resources for general fire-fighting response in the first instance.

Search Operations

Search parties may be assembled from groups of personnel acquainted with the area to be searched.

This could include:

- Work parties familiar with specific ship projects;
- Divers for underwater searches; and
- Workshop personnel for searches in their workplaces.

In the event of a bomb threat, the search may be a company's responsibility and should be carried out by personnel familiar with each area within the scope of the search, subject to guidance from the SCDF and Police.

5.4.7.6 First Aid

The WSH (First Aid) Regulations require provision of first aid boxes, first aiders, first aid rooms and facilities for treatment.

The requirements for trained first aiders, first aid boxes and a first aid room are as follows:

First Aiders

For a shipyard with 26 to 100 workers, there must be at least one first aider.

For every additional 100 workers or part thereof, another first aider should be appointed. The ratio of 1 first aider to every 100 workers shall be maintained. The ratio of first aiders listed above is also applicable to first aiders available in each work shift.

First aiders must:

- Have successfully completed a training course acceptable to the WSH Comissioner;
- Undergo subsequent re-training in first aid treatment as the WSH Comissioner may require; and
- Record and maintain all records of all treatment that they rendered.

First Aid Boxes

The number of first aid boxes to be provided depends on the physical layout of the shipyard and the number of workers employed.

First aid boxes must be:

- Adequately equipped;
- Properly maintained;
- Checked frequently to ensure that it is fully equipped;
- Filled with content whereby all the items in it are usable;
- Clearly identified as a first aid box;
- Placed in a location that is well-lit and accessible;
- Under the charge of a person appointed by the Occupier of the workplace;
- Kept with nothing else but the appliances or requisites for first aid listed in above;
- Made of sturdy material and must be portable so that they can be taken to the site of an accident; and
- Persons at work should be informed of the location of all the first aid boxes.

First Aid Room

Where more than 500 workers are employed, a first aid room shall be provided and maintained.

The first aid room may be equipped with the following (non-exhaustive):

- Sink with running potable water;
- A few chairs outside the first aid room for workers waiting for treatment;
- Paper towels;
- Smooth-topped working surfaces;
- Adequate supply of sterile dressings and other materials for wound treatment;
- Stretchers;
- Splints;
- Clinical thermometer;
- A couch with pillow and blanket;
- A suitable store for first aid equipment, for example, stretchers, wheel chairs;
- Soap and nail brush;
- Clean garments for use by first aiders; and
- Suitable refuse container.

First Aid for Exposure to Toxic or Corrosive Substances

In shipyards where there may be risks of exposure to toxic or corrosive substances, provisions must be made for emergency treatment of the person if so required by the WSH Commissioner. Where the eyes or body of any person in a workplace may come into contact with toxic or corrosive substances, suitable facilities such as emergency shower and eye-wash must be provided within the work area for quick drenching or flushing of the eyes and body.

5.4.7.7 Notification of an Emergency

The emergency plan should include procedures for the notification to internal and external parties about the occurrence of incidents and emergency situations.

Internal notification may include:

- Senior management;
- Crisis management team; and
- Corporate management.

External notification may include:

Emergency Incident	Government Agency to Notify
Dangerous occurrence as listed in the Second Schedule, WSH Act. (The list of dangerous occurrence can be found in Section 5.5.2.1)	MOM
Incidents that involve spill or release of hazardous substances having off-site impact.	NEA
Fire	SCDF
Criminal act, bomb threats	Police
Building structural-related	BCA

Requirements on incident reporting are also discussed in Section 5.5.2.1 on Incident Report of this manual.

5.5 Checking and Corrective Actions

5.5.1 Performance Measurement and Monitoring

Companies should identify and set key performance parameter to measure SHE performance.

These parameters may include:

- Both qualitative or quantitative measurements;
- Proactive in measuring compliance, operation criteria and management programmes performances;
- Reactive in measuring incident, accident and illness rates or other deficiencies in SHE performances;
- Monitoring the extent to which the SHE objectives are met; and
- Monitoring and measurements that facilitate preventive and corrective actions.

Where equipment and instruments are used for monitoring, they should be properly maintained and calibrated.

Equipment and instruments brought by Contractors to the shipyard must also be subjected to the same requirements.

5.5.1.1 Proactive and Reactive Monitoring

Examples of proactive monitoring include:

- Number of workers trained in SHE;
- Effectiveness of SHE training;
- Number of promotional campaigns done;
- Employees participation in promotional campaigns and SHE programmes;
- Number of risk assessments conducted;
- Extent to which risk control measures are complied with;
- Frequency of safety inspection and audits done;
- Frequency and effectiveness of SHE committees and group meetings;
- Frequency and effectiveness of SHE communications;
- Number of SHE suggestions completed;
- Time to implement suggestions; and
- Compliance in use of PPE.

Examples of reactive monitoring include:

- Accident Frequency Rate

  Refers to the number of workplace accidents per million man-hours worked

  $$= \frac{\text{Number of workplace accidents} \times 10^6}{\text{Man-hours worked}}$$

- Accident Severity Rate

  Refers to the number of man-days lost to workplace accidents per million man-hours worked

  $$= \frac{\text{Number of man-days lost to workplace accidents} \times 10^6}{\text{Man-hours worked}}$$

- Fatality Rate

  Refers to the number of workplace fatalities per 100,000 persons employed. Figures used are victim based

  $$= \frac{\text{Number of workplace fatalities} \times 10^5}{\text{Number of persons employed}}$$

- Injury Rate

  Refers to the number of fatal and non-fatal workplace injuries per 100,000 persons employed

  $$= \frac{\text{Number of fatal and non-fatal workplace injury} \times 10^5}{\text{Number of persons employed}}$$

- Disease Incidence

  Refers to the number of occupational diseases (chronic confirmed cases) per 100,000 persons employed.

  $$= \frac{\text{Number of chronic confirmed occupational diseases cases} \times 10^5}{\text{Number of persons employed}}$$

  A confirmed case of occupational disease is one where there is definite evidence that the worker suffers from a disease which is related to his occupation.

- Number of Reportable Dangerous Occurrences
  Number of dangerous occurrence as defined in the Second Schedule, WSH Act being reported.

- Regulatory Enforcement Actions
  Number of regulatory enforcement action taken against the company in the period.

5.5.1.2 Industrial Hygiene Monitoring

Industrial hygiene monitoring should be carried out for:

Noise

In accordance to the WSH (Noise) Regulations:

- Where there are 50 or more relevant persons employed or working in the shipyard, the shipyard should appoint a competent person to put in place proper noise control measures.
- Where there are 10 or more relevant persons employed or working in the shipyard, the shipyard should appoint a competent person to carry out noise monitoring at least once every 3 years, or earlier if any change in machinery, equipment, process, operation, work, control or other condition is likely to cause any such person to be exposed to excessive noise.
- The permissible exposure limit for noise specified in the schedule of the regulations shall be strictly adhered to.

For more information on noise monitoring, refer to WSH Council's *WSH Guidelines on Hearing Conversation Programme*.

Air Contaminants

Regulation 40 of the WSH (General Provisions) Regulations, requires that Occupiers should take all reasonably practicable measures to ensure that no person at work in the factory is exposed to the toxic substances specified in the First Schedule in excess of the permissible exposure levels specified in that Schedule.

In Regulation 39(6) of the WSH (General Provisions) Regulations, the atmosphere of any place of work in which toxic substances are manufactured, handled, used or given off should be tested by a competent person at sufficient intervals to ensure that toxic dust, fumes, gases, fibres, mists or vapours are not present in quantities liable to injure the health of persons at work.

The shipyard should therefore ensure that regular monitoring of workers, exposure to air contamination should be carried out.

5.5.1.3 Medical Surveillance

The WSH (Medical Examination) Regulations requires workers involved in hazardous occupations listed below (non-exhaustive):

- Use or handling of or exposure to the fumes, dusts or vapour of:
  - Arsenic, cadmium, lead, manganese or mercury or any of their compounds;
  - Benzene, perchloroethylene, trichloroethylene;
  - Asbestos, silica, or raw cotton;
  - Tar, pitch bitumen or creosote;
  - Exposure to excessive noise;
  - Work in compressed air environment;
- Undergo medical examination carried out by a designated factory doctor to:
  - Certify fit to work before employment; and
  - Periodically at interval undergo examination and investigation in accordance with Part II of the First Schedule of the Regulations.

The employer should keep a register of persons involved in these hazardous occupations.

The designated factory doctors should report his findings to the employer of the persons affected, and when appropriate, advise the person involved in the hazardous occupations accordingly, including suspension or cessation of employment in such occupations.

5.5.1.4 Inspection and Compliance Verification

Equipment

Inspect equipment regularly to ensure that it is in proper working order. Mobile equipment such as cranes and forklift trucks should be inspected by the operators at the start of each shift, with the aid of a checklist to ensure that essential items (such as brakes and tyres) are in good working order.

The company should keep an inventory of equipment subjected to statutory or technical inspection.

The general requirements for maintenance are detailed in the appropriate sections of the WSH (General Provisions) Regulations. The specific requirements for inspection or examination and test are:

Equipment	Examination/ Certification Requirements	Sections in WSH (General Provisions) Regulations
Hoists and lifts	6 months	19(3)
Lifting gears	12 months	20(3)
Other lifting gears if not regularly used	12 months As and when	20(4)(b)
Lifting appliances, lifting machine	12 months	21(3)
Steam receivers	24 months	29(6)
Steam boilers	12 months	28(12)(a)
Air receivers	24 months	31(5)

The WSH (Shipbuilding and Ship-repairing) Regulation also specifies the inspection to be done by competent person for various equipments listed below:

Equipment	Examination/ Certification Requirements	Sections in WSH (Shipbuilding and Ship-repairing) Regulations
Electrode holders, welding cables, cable connectors and other arc welding equipment	Once every 30 days	61(2)
Equipment and fittings use for carrying out hot work such as gas hoses, torches, blowpipes, pressure regulators, nozzles connectors, and so on.	14 days	61(3)
Safety devices such as non-return valve or similar devices, flash-back arrestor and anti-leakage devices	12 months	61(4)
Crane, employee's lift or material handling machinery (employee's lift shall be examined and inspected by authorised examiner)	Before it is put into service for the first time in the shipyard or on board the ship in the harbour.	68

The WSH (Scaffolds) Regulations also specifies the inspection to be done by a scaffold supervisor:

Equipment	Examination/ Certification Requirements	Sections in WSH (Scaffolds) Regulations
Scaffolds	every 7 days	26(b)

Clause 19.1 of CP 14:1996 Code of Practice for Scaffolds also stipulated that inspections on the scaffolds and additional equipment attached to the scaffolds to be conducted on a weekly basis.

Work Conditions

Criteria specifying the acceptable conditions at the shipyard should be established and documented.

Regular inspection should be conducted by line supervisors and managers, and safety committee members. An example of the safety inspection programme is as follows:

- Daily inspection – by supervisors;
- Weekly inspection – by departmental manager;
- Monthly inspection – by safety committee; and
- Middle and senior management should involve themselves in these inspections by taking part in the scheduled inspections or conducting inspections on their own.

Housekeeping patrols should be conducted on a regular basis to maintain housekeeping standards. One of the ways is to form a team tasked to carry out the patrol once a week.

Occupational Health Inspection Audit

Besides inspection of equipment and work condition for safety, occupational health aspects should also be taken into consideration for monitoring.

An inspection audit checklist used by shipyards in this area is provided in Annex I for reference.

5.5.2 Incident, Accident. Non-conformance, Corrective and Preventive Actions

5.5.2.1 Incident Reporting Requirements

Incidents (including those resulting in reportable injuries and those which are classified as dangerous occurrences) must be reported as detailed in this section.

The WSH (Incident Reporting) Regulations requires reporting to MOM on the following:

a. Dangerous Occurrences
Where any dangerous occurrence (refer to list below) occurs at a workplace, the Occupier of the shipyard should, as soon as is reasonably practicable, notify the Commissioner of the occurrence, and thereafter, not later than 10 days after the occurrence, submit a report to the Commissioner.

The list of dangerous occurrences is defined in the First Schedule of the WSH Act.

i. Bursting of a revolving vessel, wheel, and grindstone or grinding wheel moved by mechanical power.

ii. Collapse or failure of a crane, derrick, winch, hoist, piling frame or other appliance used in raising or lowering persons or goods, or any load bearing part thereof (except breakage of chain or rope slings), or the overturning of a crane.

iii. Explosion or fire damage to the structure of any room or place in which persons are at work, or to any machine or plant contained therein, and resulting in the complete suspension of ordinary work in the room or place or stoppage of machinery or plant for not less than 5 hours, where the explosion or fire is due to the ignition of dust, gas or vapour, or the ignition of celluloid or substance composed wholly or in part of celluloid.

iv. Electrical short circuit or failure of electrical machinery, plant or apparatus, attended by explosion or fire or causing structural damage thereto, and involving its stoppage or disuse for not less than 5 hours.

v. Explosion or fire affecting any room in which persons are at work and causing complete suspension of ordinary work therein for not less than 24 hours.

vi. Explosion or failure of structure of a steam boiler or of a receiver or container used for the storage at a pressure greater than atmospheric pressure of any gas or gases (including air) or any liquid or solid resulting from the compression of gas.

vii. Failure or collapse of formwork or its supports.

viii. Collapse, in part or in whole, of a scaffold exceeding 15 metres in height or of a suspended scaffold or a hanging scaffold from which any person may fall more than 2 metres.

ix. Accidental seepage or entry of seawater into a dry dock or floating dock causing flooding of the dry dock or floating dock.

b. Accident Leading to Injury
Where an employee meets with an accident at a workplace and is:

i. Granted more than 3 days of sick leave (whether consecutive or not) by a registered medical practitioner for that injury; or
ii. Admitted in a hospital for at least 24 hours for observation or treatment; the employer of that employee should, not later than 10 days after the accident, submit a report to the Commissioner. If the employee subsequently dies as a result of the injury, the employer of that employee should, as soon as is reasonably practicable, notify the Commissioner of the death.

Where any person who is not at work or any self-employed person meets with an accident at a workplace which requires him to be taken to a hospital for treatment in respect of that injury, the Occupier of the workplace should, as soon as is reasonably practicable, notify the Commissioner of the accident.

c. Occupational Diseases
The employer of that employee who suffers form occupational disease should, upon receiving a written statement prepared by a registered medical practitioner diagnosing the occupational disease, submit a report to the Commissioner not later than 10 days after receipt of the written diagnosis.

d. Notification to MOM
Immediate Notification

For incidents such as dangerous occurrences and death cases, the Commissioner of Workplace Safety and Health should be immediately notified via:

Phone: (65) 6317 1111; or Fax: (65) 6535 2550.

The following information (non-exhaustive) should be provided:

i. Name and identification number of the injured/ deceased, if any;
ii. Date and time of the incident;
iii. Place of the incident;
iv. Name of the employer and occupier;
v. Brief description of the incident; and
vi. Name and contact details of the person making the notification.

For All Cases

The incident report should be submitted to the Commissioner of Workplace Safety and Health within 10 days via iReport (a web-based submission via http://www.mom.gov.sg/iReport).

e. Record Keeping
Such records should be kept at the employers'/ Occupiers' place of business for a period of three years from the time the report is made.

Employers/ occupiers are required to keep a record of any incident reports made.

f. Work Injury Compensation
There is no need to submit a separate report for workmen's compensation; the incident report includes a section for that purpose.

5.5.2.2 Incident Investigation and Analysis

The statutory requirements for reporting accidents and dangerous occurrences are concerned mainly with outcomes—details of the person injured, data on his period of work; the nature and location of the injury. The company should investigate the history of events preceding any incident, to a depth of detail consistent with the potential of the incident to cause serious injury, damage or loss. The investigation should be designed to arrive at the following:

- The history of events before the incident in which errors had occurred;
- Basic and root causes, as distinct from the resulting injury or damage;
- Improved safety performance; and
- The actions recommended to correct the failure at source.

This involves:

- Thorough recording of the circumstances of causes (in addition to outcomes);
- Regular reviews of recurrent causes;
- Actions aimed specifically at these recurrent causes; and
- Monitoring the effectiveness of those actions.

There are skills in incident investigation which should form part of the training of safety specialists and line supervisors.

The shipyard should establish, as an element in its SHE management system, written procedures to identify, record, investigate and analyse all incidents, to maintain these procedures and implement specific corrective actions to prevent recurrence. The procedures should include the following:

a. Identification and Record of Incidents
i. The shipyard should set up a system to identify and record all incidents (accidents and near misses) at work.
ii. The incidents should be reported and recorded promptly, and should include incidents by all personnel including Contractors.

b. Investigation of Incidents
i. The shipyard should establish procedures for the investigation of incidents.
ii. The investigation of incidents should not be limited to the identification of unsafe conditions and unsafe acts but should probe into the underlying systemic cause and deficiencies of the safety management system.
iii. Incident investigation procedures should include, but not be limited to:
– Identification of types of incidents to be investigated;
– Prompt reporting of incidents to designated persons, including incidents involving contract workers;
– Assignment of competent persons responsible for the investigation;
– Establishment investigation procedures;
– Identification of root causes, and recommendation; and
– Implementation of recommendations and corrective measures.
iv. The Control Flow Chart for Accident/ Incident Reporting and Investigation is shown in Annex G-2.
v. Line managers, supervisors, safety personnel and safety committee members should be included in the incident investigation team.

c. Implementation and Review of Corrective Actions
i. The shipyard should establish a system to ensure that recommendations arising from investigations and corrective actions are followed through and effectively implemented.

ii. The shipyard should prescribe short-term preventive actions by implementing corrective measures immediately to prevent recurrence of incident.
iii. The shipyard should also seek to improve overall safety management system with longterm corrective actions.
iv. The shipyard should review all corrective actions implemented and their effectiveness in enhancing safety at the worksite.
v. Procedures should be established to ensure lessons learned from the incidents are communicated to all personnel working in the shipyard for information and awareness.

d Analysis of Incident Statistics
i. The shipyard should establish procedures to monitor and analyse incident trends, and prescribe holistic preventive solutions.
ii. Incident statistical analysis should include, but not be limited to:
- Types of incidents;
- Agency of incidents;
- Causes of incidents;
- Human factors and behavioural considerations;
- Incident frequency rate; and
- Incident severity rate.

iii. The analysis report should be made available to all key relevant personnel in the shipyard and maintained for future reference.
iv. The shipyard should carry out analysis of all incident statistics periodically. This information should be used to draw up safety and health workplans, promotional programmes and training courses.

5.5.2.3 Corrective and Preventive Actions

Where non-conformances are found during walk through, inspection, audit or arising from incident/ accident investigation and performance analysis, corrective and preventive actions should be taken.

Corrective actions are actions taken to eliminate the root cause(s) of identified non-conformances, accidents or incident in order to prevent recurrence. This may include (but not limited to):

- Short-term and long-term actions;
- Evaluation of hazard identification and risk assessment results;
- Making changes to safe work procedures; and
- Implementing new or modifying existing control measures.

Preventive actions are actions to prevent occurrence of non-conformances, accidents, incident or ill health. Examples may include:

- Use of appropriate information such as workplace observation trends, audit report, employees' feedback, expert advice, lesson learnt from other workplaces, and so on;
- Identifying problems requiring preventive action through walk through, inspection, use of hazard identification and risk assessment tool such as checklists, job hazard analysis, and so on.;
- Initiating actions to ensure controls measures are effective.

The shipyard should ensure that correctives and preventive measures are assigned with owners for responsibility and accountability for completion date, be monitored and followed up for closure and effectiveness evaluated. Sufficient resource should be provided for the implementation of such actions.

5.5.3 Records and Records Management

Companies should ensure that SHE records are properly identified, maintained reviewed, stored and disposed appropriately SHE records should be legible, identifiable and traceable to the activities involved. They should be kept in such a systematic manner that enable easy retrieval and protected against damage, deterioration or loss.

Examples of records that should be kept for the retention periods:

Records	Valid Period
Risk Assessment Records	3 years
Incident Reports	3 years
Medical Examination Reports of Persons Involved in Hazardous Occupations	5 years
Noise Monitoring Reports	10 years

The WSH (Shipbuilding and Ship-repairing) Regulations requires:

Records	Regulation
Secretary of VSCC • Make and keep record of all matters discussed and decisions made at VSCC; • Keep a copy of all relevant permit-to-work issued; and • Update the permit-to-work coordination notice board.	15
WSH Officer maintains a diary in which record shall be made of: • The movement on board the ship and within the shipyard by the WSHO; and • The observation on the types of hazardous works being carried out on board the ship and within the shipyard.	71
Register of scaffolds	80(4)
• Design and drawings by professional engineer of tube and coupler scaffold exceeding 15 m in height; • Hanging scaffold from which person may fall > 3 m.	82

5.5.4 Audit

5.5.4.1 Mandatory WSH Audit

In accordance with the WSH (Safety and Health Management System and Auditing) Regulations, a Shipyard shall implement and maintain at all times a safety and health management system to ensure the safety and protect the health of every person at work or employee of the Occupier.

For shipyards with more than 200 workers, the Occupier should appoint an approved WSH auditor to audit the safety management system at least once every 12 months.

In shipyards where less than 200 workers are employed, the Occupier must conduct an internal review of the safety management system at least once every 12 months. Where necessary, MOM may require an external audit to be conducted instead of a review of the safety management system.

The Occupier shall, as far a practicable, implement the recommendations of the audit or the review without undue delay.

The content of this manual may serve as a guide for the establishment and maintenance of the safety management system. Annex A of this manual presents a table showing the corresponding requirements in the MOM safety and health management system, the Singapore Standard SS506 OSH Management System, and the corresponding sections.

5.5.4.2 SHE Management System Audit

Shipyards are encouraged to establish, implement and have the SHE management system audited or certified by an external independent auditor. Such systems may include:

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

The SHE system audit provides opportunities for the company to continually evaluate the effectiveness of its system.

The frequency and coverage of the SHE system audit should be related to the risk associated with the failure of the SHE management system elements, availability of performance data and extent of changes.

The results of the audit should be updated to relevant parties involved for corrective actions and provide inputs for improvement of the system and SHE performances.

5.6 Management Review

The top management of a shipyard should, at regular interval, review the SHE management systems to ensure its suitability, adequacy and effectiveness. The review should include consideration of whether the SHE 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. The WSH (Risk Management) Regulations requires that the Employer, Self-employed and Principal review the risk assessment:

- At least once every 3 years; or
- Occurrence of any body injuries to any person as a result of exposure to a hazard in the workplace; or
- Where there is a significant change in work practices or procedures.

The Occupier of a shipyard with less than 200 persons employed conduct internal reviews of its safety management system annually.

A checklist, attached at Annex H-2 of this manual may serve as a checklist for the review of the Shipyard Safety Management System for the MOM Safety and Health Management System.

6. Annexes

Annex A-1: Suggested Elements of Safety and Health Management System

Elements of Safety and Health Management System

- Safety policy, including the allocation and delegation of responsibility for safety
- Safe work practices
- Safety training
- Group meetings
- Incident investigation and analysis
- In-house safety rules and regulations
- Safety promotion
- System for the evaluation, selection and control of contractors
- Safety inspections
- Maintenance regime
- Risk assessment
- Control of movement and use of hazardous chemicals
- Occupational health programmes
- Emergency preparedness

Annex A-2: Guidelines on Safety and Health Management System for the Shipbuilding and Ship-repairing Industry

Correspondence between various safety management systems

This table matches the corresponding clauses, elements or sections in the following:

- Singapore Standards SS 506 Part 1:2004, OSH Management Elements of Safety and Health Management System;
- Singapore Standards SS 506 Part 3:2006, OSH Management Elements of Safety and Health Management System, Part 3 Requirements for the Chemical Industry; and
- Guidelines on Safety an Health Management System for the Shipbuilding and Ship-repairing Industry (this document).

Clause	S 506-1: 2006	Clause	SS 506-3: 2006	Elements	Second Schedule	Section	Guideline on SMS	Section	Guidelines – S&H Mgt
0.1	General	0.1	General	-					
0.2	Process approach	0.2	Process approach	-					
0.3	Relationship with ISO 9004	0.3	Relationship with ISO 9004	-					
0.4	Compatibility with other management systems	0.4	Compatibility with other management systems	-					
1	Scope	1	Scope	-			Scope and definition	1	Introduction
1.1	General	1.1	General	-					
1.2	Application	1.2	Application	-					
2	Normative references	2	Normative references	-				2	Reference standards
3	Terms and definitions	3	Terms and definitions	-			Scope and definition	3	Terms and definitions
5	OSH management system elements	5	OSH management system elements	-			Introduction	5	Safety health and environmental management element
5.1	General requirements	5.1	General requirements	-			Introduction	5.1	General requirements
5.2	OSH policy	5.2	OSH policy	1	Safety policy	1	Safety policy	5.2	SHE Policy
5.3	Planning	5.3	Planning	-	-			5.3	Planning
5.3.1	Planning for hazard identification, risk assessment and risk control	5.3.1	Planning for hazard identification, risk assessment and risk control	11	Risk assessment	11	Hazard analysis	5.3.1	Hazard identification, risk assessment and risk control
-	-	5.3.1.1	Process safety information						WSH hazard identification, risk assessment and risk control
-	-	5.3.1.2	Hazard identification, risk assessment and risk control						Environmental aspects
				-				5.3.1.3	Risk register
				-				5.3.1.4	Identification of significant environmental aspects and impacts

5.3.2	Legal and other requirements	5.3.2	Legal and other requirements	-				5.3.2	Legal and other requirements
				-				5.3.2.1	Primary legislations
				-				5.3.2.2	Subsidiary legislations
				-				5.3.2.3	Codes of practice
5.3.3	Objectives	5.3.3	Objectives and targets	-	-			5.3.3	Objectives and targets
5.3.4	OSH management programme(s)	5.3.4	OSH management programme(s)	-	-			5.3.4	OSH management programme(s)
5.4	Implementation and operation	5.4	Implementation and operation	-	-			5.4	Implementation and operation
5.4.1	Structure and responsibility	5.4.1	Structure, responsibility authority and inhouse OSH rules and regulations	1	Safety policy, including allocation and delegation of responsibility for safety In-house safety rules and regulations	1	Safety policy, including allocation and delegation of responsibility for safety In-house safety rules and regulations	5.4.1	Resources, roles, responsibility, accountability and authority
				6	In-house safety rules and regulations	6	In-house safety rules and regulations		
-		5.4.1.1	Structure, responsibility and authority	1	Safety policy, including the allocation and delegation of responsibility for safety			5.4.1.1	General duties of persons at workplaces as defined in WSH Act
-		5.4.1.2	In-house OSH rules and regulations	6	In-house safety rules and regulations	6	In-house safety rules and regulations	5.4.1.2	In-house safety rules and regulations
5.4.2	Training, awareness and competence	5.4.2	Training, awareness and competence	3	Safety training	3	Safety training	5.4.2	Training, awareness and competence
				-				5.4.2.1	Types of SHE Training
				-				5.4.2.2	Safety and health training programme
				-				5.4.2.3	Provisional identification labels for new and inexperienced worker
				7	Safety promotion	7	Safety promotion	5.4.2.4	Safety promotion
				7	Safety promotion	7	Safety promotion	5.4.2.4	Safety promotion
5.4.3	Consultation and communication	5.4.3	Consultation and communication	4	Group meetings	4	Group meetings	5.4.3	Consultation and communication
								5.4.3.1	Small group meetings
								5.4.3.2	Safety information
								5.4.3.3	Other forms of consultation and communication
5.4.4	Documentation	5.4.4	Documentation	-	-			5.4.4	Documentation
5.4.5	Document and data control	5.4.5	Control of documents	-	-			5.4.5	Document and data control
5.4.6	Operational control	5.4.6	Operational control	2	Safe work practices	2	Safe work practices	5.4.6	Operational control
				10	Maintenance regime	10	Maintenance regime		
				13	Occupational health programmes	14	Occupational health programmes		
-	-	5.4.6.1	General					5.4.6.1	General
-	-	5.4.6.2	Operating procedures and safe work procedures	2	Safe work practices	2	Safe work practices	5.4.6.2	Safe work practices
								5.4.6.3	Permit-to-work systems
								5.4.6.4	Design and engineering
								5.4.6.5	Safe access
-	-							5.4.6.6	Hot work
								5.4.6.7	Confined space entry
								5.4.6.8	Surface treatment
								5.4.6.9	Testing
								5.4.6.10	Radiography
								5.4.6.11	Diving
								5.4.6.12	Ship movements

								5.4.6.13	Transfers of fluids between tanks and to shore
								5.4.6.14	Use of tools and equipment
								5.4.6.15	Compressed air and gases
								5.4.6.16	Transport and materials handling
								5.4.6.17	Electrical safety
								5.4.6.18	Personal protective equipment
								5.4.6.19	Environmental protection and waste management
		5.4.6.3	Management of change			15	Management of change	5.4.6.20	Management of change
-	-	5.4.6.4	Pre-start-up safety						
-	-	5.4.6.5	Contractors	8	System for evaluation, selection and control of contractors	8	Contractors' evaluation, selection and control	5.4.6.21	Evaluation, selection and control of contractors
						16	Materials and services management		
		5.4.6.6	Mechanical integrity and reliability	10	Maintenance regime	10	Maintenance regime	5.4.6.22	Maintenance
		5.4.6.7	Control of hazardous substances	12	Control of movement and use of hazardous materials	12	Control of movement and use of hazardous materials	5.4.6.23	Control of hazardous substances
						16	Materials and services management		
		5.4.7	Occupational health	13	Occupational health programmes	14	Occupational health programmes	5.4.6.24	Control of occupational health hazards
		5.4.7.1	Medical surveillance						
		5.4.7.2	Hearing conservation						

		5.4.7.3	Respiratory protection						
5.4.7	Emergency preparedness and response	5.4.8	Emergency preparedness and response	14	Emergency preparedness	13	Emergency preparedness	5.4.7	Shipyard and on-board emergency preparedness and response
								5.4.7.1	Principles of emergency planning and response
								5.4.7.2	Identification of types of emergency
								5.4.7.3	Emergency response procedures
								5.4.7.4	Emergency organisation
								5.4.7.5	Emergency response resources
								5.4.7.6	First aids
								5.4.7.7	Notification of emergency
	Checking and corrective action		Checking and corrective action					5.5	Checking and corrective action
5.5.1	Performance measurement and monitoring	5.5.1	Performance measurement and monitoring					5.5.1	Performance measurement and monitoring
-	-	5.5.2	Evaluation of compliance					5.5.1.1	Proactive and reactive monitoring
-	-	5.5.2.1	Evaluating compliance with legal requirements					5.5.1.2	Industrial hygiene monitoring
-	-	5.5.2.2	Evaluating compliance with other requirements					5.5.1.3	Medical surveillance
		5.5.2.3	OSH inspection	9	Safety inspections	9	Safety inspections	5.5.1.4	Inspection and compliance verification
5.5.2	Incidents accidents, non-conformance corrective and preventive measures	5.5.3	Incidents accidents, non-conformance corrective and preventive measures	5	Incident investigation and analysis	5	Incident investigation and analysis	5.5.2	Incidents, accidents, non-conformance, corrective and preventive measures
								5.5.2.1	Incident reporting
								5.5.2.2	Incident investigation
								5.5.2.3	Corrective and preventive actions

5.5.3	Records and records management	5.5.4	Audit	5.6	Management review
5.5.4	Audit	5.5.5	Mandatory WSH audit		
			SHE management system audit		
			Management review		

Annex B: A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations

The following paragraphs serve only as guides for the general understanding of the requirements of the WSH (Shipbuilding and Shiprepairing) Regulations. The readers are to refer to the actual regulation document available at Singapore Statutes Online.

1. Introduction

1.1 Overview of Content

The Regulation comprises 10 Parts (Part I to Part X) as listed below:

	Regulations
Part I Preliminary	1. Citation and commencement 2. Definitions 3. Application
Part II Safety and Health Management Arrangement	4. Safety and health training 5. Duties of ship repair manager 6. Ship repair manager to approve work 7. Notification of work carried out on board ship in harbour
Part III Vessel Safety Co-ordination Committee	8. Vessel safety co-ordination committee 9. Role of vessel safety co-ordination committee 10. Composition of vessel safety co-ordination committee 11. Frequency of meetings 12. Duties of chairman 13. Duties of secretary 14. Handing-over procedure for shifts
Part IV Permit-to-Work System	15. Application of this Part 16. Implementation of permit-to-work 17. No high-risk work without permit-to-work 18. Application for permit-to-work 19. Evaluation of permit-to-work 20. Issue of permit-to-work 21. Posting of permit-to-work 22. Monitoring of high-risk work 23. Duty to report incompatible work 24. Revocation of permit-to-work
Part V Hot Work Permit System	25. Implementation of hot work permit 26. No hot work without hot work permit 27. Application for hot work permit 28. Evaluation of hot work permit 29. Issue of hot work permit 30. Person carrying out hot work to be competent in hot work 31. Measures for hot work 32. Marking of hot work area 33. Fire watchman 34. Duty to report incompatible work 35. Daily review and revocation of hot work permit
Part VI General Provisions	36. Safety of equipment 37. Approval of hazardous substances 38. Drowning hazards 39. Slipping hazards 40. Hazards arising from protruding objects 41. Prevention of accidental closure of hatch 42. Spray painting 43. Vehicular hazards 44. Lighting 45. Disposal of debris 46. Prohibition on smoking 47. Safety signs 48. Emergency exits 49. Personal protective equipment

Part VII Electrical Safety	50. Electrical installations, equipment and connections 51. Electrical welding equipment
Part VIII Welding and Cutting Operations	52. Gas cylinders 53. Gas manifolds 54. Pipe lines and gas hoses 55. Gas equipment to be of good construction, and so on 56. Safety devices 57. Safety measures during break in gas welding and cutting 58. Inspection of hot work equipment 59. No welding in wet conditions 60. Adequate ventilation 61. Metallic fumes 62. Welding and cutting on containers that held flammable substances
Part X Miscellaneous	63. Offence 64. Revocation

1.2 Application

The WSH (Shipbuilding and Ship-repairing) Regulations 2008 is applicable to any work carried out in a shipyard or on board a ship in a harbour in connection with:

- The construction, re-construction, repair, refitting, fitting painting, finishing, furnishing or breaking up of a ship;
- The scaling, scurfing or cleaning of boilers (including combustion chambers and smoke boxes) in a ship;
- The cleaning of any tank, bilges or holds in a ship; and
- The survey or inspection of a ship or its contents (where such survey or inspection is not carried out by the crew of the ship).

1.3 Definition

1.3.1 In the Regulations, unless the context otherwise requires the meaning of terms used are as below:

Terms	Definition
Competent Person	Person who has sufficient experience and training to perform the work required to be carried out.
Designated Person	A competent person appointed in writing by: • An Occupier of a shipyard; • An Employer of persons carrying out work in a shipyard or on board a ship in a harbour; or • A Principal who gives direction to persons on the work carried out by those persons in a shipyard or on board; • A ship in a harbour, to perform any task or duty prescribed under these Regulations.
Employee's Lift	A powered car operating in guides and used primarily to carry persons in a substantially vertical direction.
Fire Watchman	Means a fire watchman appointed under Regulation 35(1).
Hazardous Work	Means any work that is likely to endanger the life of any person in a shipyard or on board a ship in a harbour and includes any type of work which is specified by the Commissioner in writing as hazardous work.
Hot Work	Riveting, welding, flame cutting or burning and includes any other work involving the use or generation of heat or the production of sparks.
Responsible Person	In relation to any work carried out in a shipyard or on board a ship in a harbour, means: • In the case of a shipyard, the Occupier of the shipyard; and • In the case of a ship in a harbour: – The Employer of any person who carries out the work; or – The Principal under whose direction any person carries out the work.
Safety Assessor	A safety assessor appointed under Regulation 18(1)(ii) or 27(1)(ii).
Shipyard	Includes any dry or wet dock, wharf, jetty and quay, and the precincts thereof.
Ship Repair Manager	Means a ship repair manager appointed under Regulation 7.

2. Safety and Health Management Arrangement

2.1 Safety and Health Training

2.1.1 The Employer of any person, or the Principal who direct any person to:

- Carries out hot work, spray painting and hazardous work;
- Oversees or supervises any work (including any process); should ensure that the person has undergone a safety and health training course approved by the Commissioner.

2.1.2 Every person who

- Carries out hot work, spray painting and hazardous work;
- Oversee or supervises any work (including any process); should not carry out the abovementioned tasks unless he has undergone a safety and health training course approved by the Commissioner.

2.1.3 The Employer of any person, or the Principal, should ensure that no person is appointed as a ship repair manager unless the person has received adequate safety and health training. This is to ensure that he is able to co-ordinate safely all activities relating to the construction or repair of the ship.

2.2 Duties of Ship Repair Manager

The Occupier of a shipyard, or in the case of a ship in a harbour, the master, owner, or agent of the ship should appoint a ship repair manager to take charge of and coordinate all activities relating to the construction or repair of the ship.

The master, owner, agent or crew of a ship in a shipyard or harbour should not carry out any work on the ship without approval of the ship repair manager.

2.3 Notification of Work Carried Out On Board Ship in Harbour

The master, owner or agent of the ship should notify the Commissioner, 3 days in advance, prior to the commencement of any work as listed in Section 1.2.

3. Vessel Safety Co-ordination Committee

3.1 Establishment of a Vessel Safety Co-ordination Committee (VSCC)

Where any hazardous work is to be carried out on board any ship or the structural part of any ship under construction, the Occupier of the shipyard, or in the case of a ship in a harbour, the master, owner or agent of the ship, should establish a vessel safety coordination committee for that ship.

3.2 Composition of VSCC

The vessel safety co-ordination committee should comprise:

- A chairman;
- A secretary; and
- As many members as may be necessary for the functions of the committee to be effectively carried out.

The ship repair manager should be the chairman of the VSCC. The WSH officer, or such other person as may be appointed by the ship repair manager, should be the secretary of the VSCC. The master, owner or agent of the ship or his representative and supervisors (including Contractor's supervisors) from each trade involved in any work on board the ship should be members of the VSCC.

3.3 Roles of VSCC

The VSCC should:

- Review and discuss regularly all matters relating to the safety and health of persons involved in the work;
- Draw up a plan for co-ordination of work to ensure that where different types of work are being carried out at the same time, the types of work are compatible;
- Ensure that all relevant first-line supervisors and the master, owner and agent of the ship or their representatives are informed of the plan;
- Review on a daily basis all work in progress on the ship;
- Plan and co-ordinate the movement and storage of hazardous materials;
- Review on a daily basis the validity of all permits issued under these Regulations;
- Specially monitor all hot works carried out on the ship and ensure that all safety measures are maintained throughout the period of such work;
- Ensure that every confined space is checked for concentrations of oxygen, dangerous gases and flammable vapours:
  - Before any person enter; and
  - Regularly while work is being carried out, and review the results of such checks;

- Ensure that every person is provided with and use appropriate PPE for his work; and
- Make arrangements and determine locations for display of safety signs and permits on board the ship.

3.4 Duty of Chairman

The chairman of the VSCC should have the following duties:

- Preside every meeting;
- Decide which members required to attend each meeting;
- Ensure that every member are attending the meeting is informed in good time of the date, time and venue of the meeting;
- Ensure that the VSCC exercises its functions in accordance with this Part; and
- Ensure that every decision made at the meeting is implemented by the relevant member.

A chairman who contravenes above Regulations shall be guilty of an offence and shall be liable on conviction to a fine not exceeding $5,000 and, in the case of a second or subsequent conviction, to a fine not exceeding $10,000.

3.5 Duty of Secretary

The secretary of the VSCC should have the following duties:

- Make and keep a record of all matters discussed and decisions made at each VSCC meeting and extend a copy of such record to every member of the committee;
- Keep a copy of every permit issued under these Regulations; and
- Update the permit co-ordination notice-board.

A secretary who contravenes the above Regulations shall be guilty of an offence and shall be liable on conviction to a fine not exceeding $2,000 and, in the case of a second or subsequent conviction, to a fine not exceeding $5,000.

3.6 Frequency of Meetings

The VSCC meets daily (including Sundays and public holidays) when any hazardous work is being carried out on the ship and at such other times whenever the chairman of the VSCC decide. Unless the chairman of the VSCC otherwise decide, it should be the duty of every member to attend such meetings.

3.7 Handing-over Procedure for Shifts

3.7.1 Where any work is carried out in a shipyard or on board a ship in a harbour in shifts, it should be the duty of the responsible person to:

- Provide a written handing-over procedure to be followed by the supervisor or foreman of each out-going and in-coming shift, so that the supervisor or foreman of the in-coming shift:
  - Will have a comprehensive and accurate knowledge of what occurred during the previous shift; and
  - Is apprised of his and his workers' duties and responsibilities; and
- Ensure that the written handing-over procedure referred to in Section 3.7.1 is followed.

3.7.2 The written handing-over procedure referred to in Section 3.7.1 should include handing over to the supervisor or foreman of the in-coming shift:

- The activities chart; and
- A copy of the records of the latest VSCC meeting.

4. Permit-to-Work System

4.1 Types of Work that Require Permit-to-Work

Permit-to-work systems should be implemented to ensure that:

- High-risk work is carried out with due regard to the safety and health of persons carrying out the work;
- The persons carrying out the work are informed of hazards associated with high-risk work and the precautions they have to take; and
- Necessary safety precautions are taken and enforced when high-risk work is being carried out.

The permit-to-work system applies to the following high-risk works:

- Work which involves use of any hazardous, volatile, corrosive or flammable chemical, material or solvent in significant quantities;
- Spray painting work;
- Grit-blasting work carried out in a confined space;
- Testing or dismantling of any pipe or equipment that:
  - Contains, or had contained, oil or substances that are flammable, toxic or corrosive; or
  - Contains steam;
- Ballasting and de-ballasting of a ship;
- Repair or maintenance work carried out on the hydraulic system of a ship;
- Bunkering and transferring of fuel oil;
- Radiography work; and
- Such other work the Commissioner may specify in writing to the Occupier of the shipyard or the master, owner or agent of the ship or the Employer or Principal of the person carrying out the work.

4.2 Implementation of Permit-to-Work

The Occupier of a shipyard, or in the case of a ship in a harbour, the master, owner, or agent of the ship has duties to:

- Implement a permit-to-work system;
- Appoint a safety assessor (a WSHO or competent person) competent to perform the function and duty of safety assessor.

4.3 No High-risk Work without Permit-to-work

4.3.1 Following persons have the duty to ensure that no such high-risk work is carried out without a permit to-work:

Shipyard	Ship in a Harbour
• Occupier; • Employer of any person who carries out high-risk work; or • Principal under whose direction any person carries out high-risk work.	• Employer of any person who carries out high-risk work; or • Principal under whose direction any person carries out high-risk work.

The only exception to such permit-to-work system is during special situations when the system may operate to interfere with or render unlawful any rescue work or other work necessary for general safety of life or property.

4.4 Application for Permit-to-Work

An application for a permit-to-work should:

- Be made by the supervisor or foreman of a person who is to carry out any high-risk work;
- Be made in such form and manner as may be required by the ship repair manager of the ship to which the high-risk work relates;
- State the measures which will be taken to ensure the safety and health of persons who carry out the high-risk work; and
- Be addressed to the ship repair manager and submitted to the safety assessor of the shipyard or the ship in the harbour where the high-risk work is to be carried out.

4.5 Evaluation of Permit-to-Work

4.5.1 On receipt of an application for a permit-to-work, the safety assessor should:

- Assess whether all reasonably practicable measures have been taken to ensure the safety and health of persons who will be carrying out high-risk work; and
- Inspect the site (including its surroundings) where high-risk work is to be carried out together with the supervisor or foreman of person who is to carry out the work to ensure that high-risk work can be carried out safely.

4.5.2 The safety assessor should endorse the application for the permit-to-work and forward the endorsed application to the ship repair manager if he is satisfied that the high-risk work can be carried out safely.

4.5.3 It should be the duty of the safety assessor to exercise all due diligence when performing his functions in relation to the evaluation and endorsement of an application for a permit-to-work.

4.6 Issue of Permit-to-Work

4.6.1 The ship repair manager may issue a permit-to-work in relation to any high-risk work if he is satisfied that:

- There has been a proper evaluation of risks and hazards involved in carrying out of high-risk work based on the information available;
- No incompatible work that may pose a risk to the safety and health of person who is to carry out high-risk work and other persons at work in the shipyard or on board the ship in the harbour should be carried out at the same time and in the same vicinity as the high-risk work;
- All reasonably practicable measures will or have been taken to ensure the safety and health of persons who carry out or are to carry out high-risk work; and
- All persons who are to carry out high-risk work are informed of hazards associated with it.

4.6.2 The ship repair manager who issues a permit-to-work for any high-risk work shall retain a copy of the permit-to-work.

4.6.3 It should be the duty of the ship repair manager to exercise all due diligence when performing his function in relation to the issue of a permit-to-work.

4.6.4 A permit-to-work should be valid for the period stated therein, and if the high-risk work for which the permit-to-work is issued is not completed within the validity period, a fresh application should be made accordingly.

4.7 Posting of Permit-to-Work

The supervisor or foreman of any person who carries out any high-risk work should:

- Clearly post a copy of the permit-to-work issued for the pupose of that high-risk work, including where reasonably practicable, a sketch of any area where the high-risk work is permitted, at the work area where the work is carried out; and
- Ensure that the copy is not removed until the date of expiry or date of revocation of the permit-to-work or on completion of the high-risk work, whichever is earlier.

4.8 Monitoring of High-risk Work

4.8.1 The ship repair manager should continually review the progress of all high-risk work carried out for which permit-to-work has been issued to ensure that the high risk work is carried out safely.

4.8.2 The supervisor or foreman of any person who carries out any high-risk work should:

- Ensure that the measures necessary to ensure the safety and health of the person at work are taken and are in place at all times during the validity period of the permit-to-work; and
- To inform the ship repair manager upon completion of the high-risk work.

4.9 Duty to Report Incompatible Work

4.9.1 Any person who is aware of any work being carried out in a shipyard or on board a ship in a harbour which is incompatible with any high-risk work being carried out in the same area is to immediately report the incompatible work to his supervisor, the WSH officer, the WSH co-ordinator or the ship repair manager who issued the permit-to-work for the purpose of that high-risk work.

4.9.2 In the above paragraph, any work which is carried out at or in the vicinity of any high-risk work and likely to pose a risk to the safety or health of persons at work in the shipyard or on board the ship in the harbour should be treated as incompatible work.

4.10 Revocation of Permit-to-Work

If, after issuing a permit-to-work in respect of any high-risk work, the ship repair manager is of the view that carrying out the high-risk work poses or is likely to pose a risk to the safety and health of persons at work in the shipyard or on board the ship in the harbour, he may order the high-risk work to cease immediately and revoke the permit-to-work.

5. Hot Work Permit System

5.1 Implementation of Hot Work Permit

The Occupier of a shipyard, or in the case of a ship in a harbour, the master, owner, or agent of the ship has duties to:

- Implement a permit-to-work system;
- Appoint a safety assessor (a WSHO or competent person) to perform the function and duty of safety assessor.

The hot work permit system implemented shall ensure that:

- The hot work is carried out with due regard to the safety and health of persons carrying out the work;
- The persons carrying out the work are informed of hazards associated with the hot work and precautions they have to take; and
- The necessary safety precautions are taken and enforced when high-risk work is being carried out.

5.2 No Hot Work Without Hot Work Permit

5.2.1 Following persons have duties to ensure that no such high-risk work is carried out without a permit to-work:

Shipyard	Ship in a Harbour
• Occupier; • Employer of any person who carries out the hot work, or • Principal under whose direction any person carries out the hot work	• Employer of any person who carries out the hot work; or • Principal under whose direction any person carries out the hot work

The only exception to such permit-to-work system is during special situations when the system may operate to interfere with or render unlawful any rescue work or other work necessary for the general safety of life or property.

5.3 Application for Hot Work Permit

5.3.1 An application for a permit-to-work should:

- Be made by the supervisor or foreman of a person who is to carry out any high-risk work;
- Be made in such form and manner as may be required by the ship repair manager of the ship to which the high-risk work relates;
- State measures which will be taken to ensure the safety and health of persons who are performing the high-risk work; and
- Be addressed to the ship repair manager and submitted to the safety assessor of the shipyard or the ship in the harbour where the high-risk work is to be carried out.

5.3.2 All hot work permit application should be accompanied by sketches showing the exact locations where the hot work is to be carried out.

5.4 Evaluation of Hot Work Permit

5.4.1 On receipt of an application for a hot work permit, the safety assessor should:

- Assess whether all reasonably practicable measures have been taken to ensure the safety and health of persons who will be performing the high-risk work; and
- Inspect the site (including its surroundings) where high-risk work is to be carried out together with the supervisor or foreman of the person who is to carry out the work to ensure that the hot work can be carried out safely.

5.4.2 The safety assessor should endorse the application for the hot work permit and forward the endorsed application to the ship repair manager if he is satisfied that the hot work can be carried out safely.

5.4.3 It should be the duty of the safety assessor to exercise all due diligence when performing his functions in relation to the evaluation and endorsement of an application for a hot work permit.

5.5 Issue of Hot Work Permit

5.5.1 The ship repair manager may issue a permit-to-work in relation to any high-risk work if he is satisfied that:

- It is necessary to carry out the hot work;
- There is no alternative work method to hot work;
- There has been a proper evaluation of risks and hazards involved in the carrying out of the hot work based on the information available;
- No incompatible work which may pose a risk to the safety and health of the person who is to carry out the high-risk work and other persons at work in the shipyard or on board the ship in the harbour will be carried out at the same time and in the same vicinity as the high-risk work;
- All reasonably practicable measures will or have been taken to ensure the safety and health of persons who are carrying out the high-risk work; and
- All persons who are to carry out the high-risk work are informed of hazards associated with it.

5.5.2 Hot work permit should be a controlled document and should be serialised.

5.5.3 The ship repair manager who issues a permit-to-work for any high-risk work should retain a copy of the permit-to-work.

5.5.4 It should be the duty of the ship repair manager to exercise all due diligence when performing his function in relation to the issue of a permit-to-work.

5.5.5 A permit-to-work should be valid for the period stated therein, and if the high-risk work for which the permit-to-work is issued is not completed within the validity period, a fresh application should be made accordingly.

5.5.6 Posting of the permit and monitoring of the hot work should be done as that described in Sections 4.7 and 4.8 with necessary modification in respect to the hot- work.

5.6 Person Carrying Out Hot Work to be Competent in Hot Work

5.6.1 The Employer of, or Principal who gives direction to, persons who carry out the hot work should ensure that the person:

- Is sufficiently trained and competent in hot work; and
- Has been fully instructed on hazards and precautionary measures to be taken.

5.7 Measures for Hot Work

Before issuing a hot work permit, it should be the duty of the responsible person to:

- Ensure that the site of the intended hot work and its surrounding areas are free from hazardous substance; and
- If necessary prevent danger from the opposite side of the surface on which the hot work is to be carried out, keep watch for fire and prevent introduction of hazardous substance.

5.8 Marking of Hot Work Area

Prior to the start of any hot work in a shipyard or on board a ship in a harbour, it should be the duty of the responsible person to ensure that the site where the hot work is to be carried out is clearly marked for easy identification.

5.9 Fire Watchman

5.9.1 It should be the duty of the responsible person to appoint a person who has been trained in fire fighting as a fire watchman where any hot work is carried out in a shipyard or on board a ship in a harbour.

5.9.2 It should be the duty of the responsible person to ensure that the fire watchman is provided with suitable and adequate fire fighting equipment.

5.9.3 It should be the duty of the fire watchman:

- To keep watch over area and surounding in which the hot work is being carried out throughout the duration of the hot work; and
- To extinguish or control the fire if it is within his means to do so;
- To report to Singapore Civil Defence Force if he is unable to control the fire.

5.10 Duty to Report Incompatible Work

5.10.1 Any person who knows any work performed in a shipyard or on board a ship which is incompatible with the hot work being carried out should report to his supervisor, the WSH officer, the WSH coordinator or the ship repair manager who issued the hot work permit of that hot work immediately.

5.10.2 Incompatible work also includes any work in a shipyard or on board a ship in a harbour which is carried out at or in the vicinity of any hot work and likely to pose a risk to the safety or health of persons at work.

5.11 Daily Review and Revocation of Hot Work Permit

5.11.1 The ship repair manager should review and assess the need of hot work on a daily basis and revoke (when necessary) the hot work permit.

5.11.2 The ship repair manager may order the hot work to cease immediately and revoke the hot work permit if he thinks the hot work poses a risk to the safety and health of persons at work in the shipyard or on board the ship in the harbour.

6. General Provisions

6.1 Safety of Equipment

6.1.1 In the event a person uses an equipment in a shipyard or on board a ship in a harbour for the purpose of any work to which these Regulations apply, the Employer of or Principal under whose direction the person carries out the work should ensure that the equipment is of good construction, sound material and adequate strength; free from defects; and appropriate for the work.

6.2 Approval of Hazardous Substances

6.2.1 Any person should obtain approval from the Occupier of the shipyard or master/ owner/ agent of a ship in a harbour prior to bringing any hazardous substance into a shipyard or on board a ship in a harbour.

6.2.2 "Hazardous substance" refers to any hazardous substance specified in Part II of the Fifth Schedule to the WSH Act.

6.3 Drowning Hazards

6.3.1 For a person carrying out work in a shipyard or on board a ship in a harbour and at risk of falling into water in which he may drown, the responsible person should provide adequate equipment to the person at all times during the exposure to the risk:

- For keeping persons afloat;
- For promptly rescuing persons from the water; and
- For resuscitating rescued persons

6.4 Slipping Hazards

6.4.1 The responsible person should ensure that the passageway, scaffold, platform or other elevated working surface to be used by the person carrying out the work is kept free from slipping hazard.

6.5 Hazards Arising from Protruding Objects

6.5.1 The responsible person should ensure that:

- All passageways, stairs, platforms and other means of access or places of work are kept free from debris or protruding objects or any other obstructions that could cause tripping; and
- Any sharp projection are present in passageway, stair, platform and other means of access or place of work that may injure any person is removed or otherwise made safe.

6.6 Prevention of Accidental Closure of Hatch

6.6.1 The responsible person should ensure that effective means are provided to prevent accidental closure of any cover in the open position of a hatch opening.

6.7 Spray Painting

6.7.1 The Employer or Principal under whose direction a person is carrying out spray painting work should comply with the following:

- Provide suitable and effective breathing apparatus for spray painting works to every person employed in spray painting work;
- Provide and maintain breathing apparatus that is:
  - Of good construction and sound material;
  - Free from defects; and
  - In accordance with generally accepted principles of sound and safe practice.
- Ensure that any area or place where spray painting works are being carried is adequately ventilated.

6.7.2 Every person undertaking spray painting work in any tank, compartment or confined space should use a suitable breathing apparatus where fresh air is constantly supplied by an air-line.

6.7.3 Any person who fails to wear the provided breathing apparatus, upon conviction, is liable to a fine not exceeding $1,000; and for second or subsequent conviction, a fine not exceeding $2,000.

6.8 Vehicular Hazards

6.8.1 The owner of any vehicle used in a shipyard should ensure that the vehicle is of good construction and roadworthy.

6.8.2 No person should drive a vehicle of any class or description in a shipyard prior to obtaining authorisation of the Occupier of the shipyard.

6.8.3 The Occupier of a shipyard should ensure that no person drives a vehicle of any class or description in a shipyard prior to obtaining authorisation.

6.8.4 Employer of or Principal under whose direction the person is driving a vehicle should ensure that he/ she does not drive the vehicle unless he/ she:

- Has been fully briefed on dangers likely to arise and precautions to be observed; and
- Has received sufficient training to drive the vehicle.

6.8.5 A person who fails to obtain authorisation prior to operating a vehicle of any class or description is liable on conviction to a fine not exceeding $1,000 and, for second or subsequent conviction, to a fine not exceeding $2,000.

6.9 Lighting

6.9.1 The responsible person should ensure that there is:

- Sufficient and suitable natural or artificial light, in every part of the shipyard or ship in the harbour in which persons are at work or passing; and
- Emergency lighting of sufficient intensity and distribution for use in the event of a power failure affecting general lighting to allow safe evacuation or rescue of persons in the shipyard or ship in the harbour.

6.10 Disposal of Debris

6.10.1 The responsible person should ensure that:

- The handling and disposal of any debris or other article is done in a manner that will not endanger persons;
- No debris is allowed to accumulate resulting in a hazard; and
- No debris is thrown from heights.

7. Electrical Safety

7.1 Electrical Installation, Equipment and Connections

7.1.1 For any work carried out in a shipyard or on board a ship in a harbour and in the course of which the person carrying out the work may come into contact with any part of an electrical installation or equipment, including motor generators, rectifiers, welding machines or welding sets, the responsible person should comply with the following:

- Provide and maintain all electrical installations and equipment of good construction and sound material; free from defects; and in accordance with generally accepted principles of sound and safe practices;
- Take all practical measures to protect any person against the risk of electric shock arising from or in connection with the use of any electrical installation or equipment;
- Ensure that all electrical connections are in accordance with generally accepted principles of sound and safe practices;
- Ensure that plugs and socket-outlets used for connecting an electrical equipment should be of heavy duty industrial types;
- Ensure that all portable hand-held electrical equipment used in any confined space should be operated at a voltage not exceeding alternating current (AC) 55 volts between the conductor and earth or direct current (DC) 120 volts; and
- Protect all temporary electrical installations supplying electricity to all portable electrical equipment with effective residual current circuit breakers with a tripping current not exceeding 30 mA.

7.2 Electrical Welding Equipment

7.2.1 Any person who provides any AC electric arc welding equipment for use in a shipyard or on board a ship in a harbour should comply with the following:

- Fit all AC electric arc welding equipment with an effective low voltage shock preventer which reduces the open-circuit secondary voltage to not exceeding 25 volts;
- Ensure that the low voltage shock preventer used is:
  - Fitted in accordance with the manufacturer's instructions; and
  - Inspected and tested by a competent person once every 6 months.

8. Welding and Cutting Operations

8.1 Gas Cylinders

8.1.1 For welding or cutting work, it should be the duty of the responsible person to comply with the following:

- No cylinder which contains or has contained oxygen or any flammable gas or vapour should be taken:
  - Below the weather deck of a ship undergoing repair; or
  - Below the topmost completed deck of a ship under construction unless it is installed or placed in a part of the ship which is adequately ventilated to prevent dangerous accumulation of gases.

8.1.2 Liquefied petroleum gas (LPG) should not be taken and used:

- On board a ship undergoing repair; or
- Below the topmost completed deck of a ship under construction, unless all gas outlets have been fitted with effective anti-leakage devices.

8.1.3 The LPG mention in 8.1.3 does not apply to the LPG brought on board for the purpose of maintaining and running of the ship.

8.2 Gas Manifolds

8.2.1 It should be the duty of the Occupier of a shipyard to ensure that all gas manifolds in the shipyard are clearly marked to indicate the substance they contain and they are located in a safe and accessible location in open air.

8.3 Pipe Lines and Gas Hoses

8.3.1 It should be the duty of the responsible person to ensure that all pipes and hoses that supply oxygen, flammable gas or vapour to any apparatus for cutting, welding or heating of metal are:

- Of good construction and sound material;
- Free from defects; and
- Properly maintained.

8.4 Gas Equipment to be of Good Construction

8.4.1 The responsible person should ensure that all equipment used for carrying out hot works such as gas torches, blowpipes, pressure regulators, nozzles and connections are:

- Of a design that is suitable for the gas or vapour being used;
- Of good construction and sound and suitable material;
- Free from defects; and
- Properly maintained.

8.5 Safety Devices

8.5.1 For work involving oxy-fuel and air-fuel gas equipment carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:

- A suitable non-return valve or any other equally effective means prevent the backflow of gas should be fitted as per manufacturer's instructions between each gas torch inlet and gas hose of every oxy-fuel and air-fuel gas equipment;
- A flashback arrestor or any other equally effective means which stop flashbacks should be fitted as per manufacturer's instructions at every fuel gas, oxygen outlet and pressure regulator outlet of each gas cylinder; and
- An anti-leakage device or other equally effective means to stop a leak should be provided on every oxygen and fuel gas line used in a confined space.

8.6 Safety Measures During Break in Gas Welding and Cutting

8.6.1 For work involving welding or cutting in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:

- When welding and cutting operations cease for the day or for a substantial period or during a meal interval:
  - The supply valves of every gas cylinder and manifold should be securely closed; and
  - Every gas torch, manifold and hose for flammable gases and oxidising gases should be taken to the weather deck the topmost completed deck or a safe place that is adequately ventilated to prevent any dangerous accumulation of gases or vapours.
- Where it is impractical to comply with the requirements stated in above during a meal interval, effective measures should be taken to ensure that the work area is safe before work resumes and such measures should include:
  - The provision of effective ventilation to prevent accumulation of gases; and
  - The testing of atmosphere for presence of flammable gases.

8.7 Inspection of Hot Work Equipment

8.7.1 For hot work carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:

- All electrode holders, welding cables, cable connectors and other arc welding equipment should be inspected by a competent person once every 30 days;
- All equipment and fittings used for the purpose of carrying out hot work, including any gas hoses, torches, blowpipes, pressure regulators, nozzles and connections, should be inspected and tested by a competent person or a WSH officer once every 14 days to ensure that they are free from defects and leaks;
- All safety devices should be inspected and tested by a competent person or a WSH officer once every 12 months to ensure that they are effective;

8.7.2 The competent person, or the WSH officer should:

- Record the results of the inspection and test into a register;
- Keep the register of the inspection and test at the shipyard or on board the ship in the harbour; and
- Produce the register for inspection upon request by an inspector.

8.7.3 Any competent person or WSH officer who fails to comply with Section 8.7.2 is guilty of an offence and is liable on conviction to a fine not exceeding $1,000.

8.8 No Welding in Wet Conditions

8.8.1 For electric arc welding work carried out in a shipyard or on board a ship in a harbour, the responsible person should ensure that, so far as reasonably practicable, no electric arc welding work is carried out under wet conditions where there is risk of electrocution.

8.8.2 No person should carry out any electric arc welding in wet conditions where there is risk of electrocution.

8.8.3 Person who contravenes the above is guilty of an offence and upon conviction may be liable to a fine not exceeding $1,000.

8.8.4 No person should require, permit or direct any person to carry out electric arc welding in wet conditions where there is risk of electrocution.

8.8.5 Any person who contravenes the above is guilty of an offence and upon conviction may be liable to a fine not exceeding $20,000 or to imprisonment for a term not exceeding 2 years or to both.

8.9 Adequate Ventilation

8.9.1 For heating, welding, cutting or any other work involving the application of heat carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:

- Provide adequate ventilation when heating, welding, cutting or other work involving the application of heat to be carried out in a confined space;
- Provide effective local exhaust ventilation at the emission source when the heating, welding, cutting or other work involving the application of heat is to be carried out on materials containing lead, cadmium, beryllium, copper or other toxic or harmful substances.

8.9.2 Where the provision of ventilation is not practicable, provide breathing apparatus of the type where fresh air is being constantly supplied by an air-line or other equally suitable breathing apparatus to the person carrying out the work.

8.10 Metallic Fumes

8.10.1 For heating, welding, cutting or any other work involving the application of heat carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:

- Carry out all welding, cutting or other works involving the application of heat, so far as reasonably practicable, in open air or areas with good ventilation;
- Provide effective local exhaust ventilation to remove toxic or harmful fumes or other air impurities at the source of emission if work cannot be carried out in an area with good ventilation;
- If the provision of local exhaust ventilation is not practicable,
  - Use forced ventilation to dilute toxic or harmful fumes or other air impurities; and
  - Provide breathing apparatus of the type where fresh air is being constantly supplied by an air-line or other equally suitable breathing apparatus to and used by the person carrying out the work.

8.11 Welding and Cutting of Containers that Held Flammable Substances

8.11.1 For operation involving welding or cutting in a shipyard or on board a ship in a harbour on any container that has held any explosive or flammable substance or in which flammable gases may have been generated, the Employer of or the Principal under whose direction any person who carries out the operation should ensure that no such operation is carried out on the container unless:

- The container has been thoroughly cleaned by steam or other equally effective means and is completely free from combustible gases or vapours; or
- The atmosphere in the container has been rendered non-flammable or non-explosive.

9. Cranes, Employee's Lifts and Material Handling Machinery

9.1 Strength and Stability

9.1.1 The owner of a crane, an employee's lift or a material handling machinery being used in a shipyard or on board a ship in a harbour should ensure that it is:

- Of good construction, sound material and adequate strength;
- Free from defects; and
- Properly maintained.

9.1.2 The operator of a crane or material handling machinery being used in a shipyard or on board a ship in a harbour should ensure that the crane or machinery, as the case may be, is positioned and operated so as to be stable.

9.2 Capacity Chart

9.2.1 The owner of any crane used in a shipyard or on board a ship in a harbour should comply with the following:

- Where the capacity of the crane is variable, a capacity chart should be provided.
- The capacity chart should:
- Be posted and maintained in the crane which is clearly visible to the operator;
- Set out safe loads for various lengths of jib at various angles and radial distances; and
- Be prepared and certified by an authorised examiner, unless it is furnished by the manufacturer or builder of the crane.

9.2.2 Where outriggers are provided, safe loads with and without use of outriggers should be specified in the capacity chart.

9.3 Thorough Examination and Inspection

9.3.1 Before any crane, employee's lift or material handling machinery is put into service for the first time in the shipyard or on board the ship in the harbour, the responsible person should ensure that:

- It has been thoroughly examined and inspected by a competent person; and
- In the case of a crane or an employee's lift, such examination and inspection is conducted by an authorised examiner.

9.4 Handling of Suspended Loads

9.4.1 For crane or material handling machinery used in a shipyard or on board a ship in a harbour, the operator of the crane or material handling machinery should take, so far as reasonably practicable, measures that are necessary to ensure that a suspended load is not moved over the head of any person.

9.4.2 For any work involving lifting operations which is carried out in a shipyard or on board a ship in a harbour, the Employer of or Principal under whose direction any person who carries out the work, should ensure that loads with a tendency to swing or turn freely during hoisting are controlled by tag-lines.

9.5 Prohibition of Riding on Loads

9.5.1 For work involving the use of crane, hoisting machinery, material handling machinery or excavating machinery carried out in a shipyard or on board a ship in a harbour, the responsible person should ensure that:

- The use of every lifting cage as per the requirements on lifting gears in the WSH (General Provisions) Regulations (Rg 1) and requirements of any approved code of practice.
- No person rides on loads, buckets, skips, cars, slings or hooks of the crane or machinery.

9.5.2 The above shall not apply to lifting cages specially designed to hold persons while it is suspended from a crane.

9.6 Cranes or Machinery at Rest

9.6.1 For work involving the use of a crane or material handling machinery carried out in a shipyard or on board a ship in a harbour, the Employer of or Principal under whose direction any person who carries out the work should ensure that no load is left suspended on the crane or material handling machinery when it is not in use.

9.7 Operator of Employee's Lift

9.7.1 The Occupier of a shipyard shall ensure that:

- No employee's lift in the shipyard is operated unless it is in the charge of a designated person stationed in the car as its attendant;
- No person other than the lift car attendant moves the car of the employee's lift or opens the car door or gate of the employee's lift.

9.7.2 The lift car attendant should:

- Not cause the lift car to move unless he is satisfied that the load is prepared for movement; and
- Exercise all due diligence when operating the employee's lift.

9.8 System for Calling Lifts

9.8.1 The Occupier of a shipyard should ensure that a system for calling a lift car to every landing level where workers are required to board or alight from the lift car is implemented in the shipyard.

9.9 Offence

9.9.1 Any person who contravenes any provision of WSH (Shipbuilding and Ship-repairing) Regulations which imposes a duty on him shall be guilty of an offence and is liable on conviction to a fine not exceeding $20,000 or to imprisonment for a term not exceeding 2 years or to both.

Annex B2: List of SHE-Related Codes of Practice (CP) and Singapore Standards (SS)

	CP / SS	Brief Content (as provided by SPRING e-shop on its website)
	Safety and Health	
1	CP 5: 1998 Code of Practice for Electrical Installations	Applies to design, selection, erection, inspection and testing of electrical installations, other than those specifically excluded. Covers installation utilising extra-low voltage and low-voltage. Excludes systems for transmission and distribution of energy to the public; railway traction equipment, rolling stock and signalling equipment; electrical equipment of motor vehicles; equipment on board ships; equipment of mobile and fixed offshore installations; equipment of aircraft. Applies to items of electrical equipment only so far as selection and application of equipment in the installation are concerned. Does not deal with requirements for construction of prefabricated assemblies of electrical equipment, which are required to comply with appropriate specifications.
2	CP 16: 1991 Code of Practice for Earthing	Gives guidance on methods which may be adopted to earth an electrical system for purpose of limiting potential of current-carrying conductors forming part of the system, and non-current-carrying metalwork associated with equipment, apparatus and appliances connected to system. Does not cover trains, ships and aircraft and is not intended to replace a detailed specification or to instruct untrained persons.
3	CP 17: 1991 Code of Practice for the Maintenance of Electrical Switchgear for Voltages up to and Including 22kV (Under review)	Covers maintenance of switchgear for voltages up to and including 22 kV to ensure the safe and effective operation of an electrical system with minimum risk of breakdown and consequent interruption of supply. Provides information on an organised system of routine maintenance to keep electrical switchgear, both indoor and outdoor, and its associated apparatus in good working order. Also draws attention to precautions taken to maximise safety of personnel while maintenance work is in progress. Excludes special maintenance requirements relating to explosion protected switchgear and control gear.
4	CP 21: 1981 Code of Practice for Safeguarding of Mechanical Power Presses	Establishes safety criteria with respect to design, construction and application of safeguards to points of operation of mechanical power presses. Applies only to those mechanically powered machines that shear, punch, form or assemble metal or other materials by means of tools or dies attached to slides, commonly referred to as mechanical power presses.
5	CP 27: 1999 Code of Practice for Factory Layout - Safety, Health and Welfare Considerations	Provides guidelines on safety, health and welfare to be taken into consideration when planning factory layout.
6	CP 28: 1984 Code of Practice for the Construction, Care and Safe Use of Shears	Establishes safety criteria for construction, care and use of shears designed primarily of metal shearing. Applies to machines constructed with a plate or cast-type ram or both, bed, table, hold-down and housings, utilising one fixed and one moving non-rotary blade for the shearing action, and having a constant rake for any one shearing stroke. It is a useful guide (to be read in relation with the statutory requirements of the Factories Act, 1973) for all users, maintenance personnel and manufacture of shears.
7	CP 30: 1985 Code of Practice for Safe Loading on Vehicles	Serves to guide transport operators, drivers and loading staff on basic safety principles that must be followed generally and precautions to be taken in ensuring the safe carriage of more common types of load.
8	CP 61 - 1: 1994 Code of Practice for Packaging and Containers for Hazardous Substances List of Commonly Used Hazardous Substances	Provides a list of commonly used and transported hazardous substances in Singapore.
9	CP 61 - 2: 1994 Code of Practice for Packaging and Containers for Hazardous Substances Packaging Requirements for Hazardous Substances	Provides a guide to users on packaging requirements of commonly used hazardous substances for safe carriage of the substances.
10	CP 61 - 3: 1994 Code of Practice for Packaging and Containers for Hazardous Substances Tank Requirements for Hazardous Substances	Provides a guide to users on container requirements of commonly used hazardous substances for safe carriage of the substances.
11	CP 62: 1995 Code of Practice for Safe Use of Tower Cranes	Gives general guidance to users on the safety aspect of practice regarding siting, stability, proximity hazards, erection, dismantling, operation, control, maintenance, inspection and repair of tower cranes.
12	CP 74: 1998 Code of Practice for Selection, Use, and Maintenance of Respiratory Protective Devices	Sets forth accepted practices for respirator users; provides information and guidance on selection, use and maintenance of respirators and contains recommendations for establishing respirator protection programmes. Covers use of respirators to protect against inhalation of contaminants and against oxygen-deficient atmospheres in the workplace. Does not cover underwater breathing devices, use of respirators in aircrafts, use of respirators under military combat conditions and use of life support respirators for medical or resuscitation purposes. Contains requirements and recommendations on respirator selection, respirator fit, training, medical fitness, respirator maintenance and breathing air quality.
13	CP 76: 1999 Code of Practice for the Selection, Use, Care and Maintenance of Hearing Protectors	Gives recommendations for selection, use, care and maintenance of hearing protective devices.
14	CP 78: 1999 Code of Practice for the Distribution of Hazardous Chemicals	Covers elements of a safety, health and environmental management systems for storage, handling, transfer, repacking and transportation of hazardous chemicals in Singapore. Does not apply to transportation of chemicals by air, radioactive substances, infectious substances and arms and explosives.
15	CP 84: 2000 Code of Practice for Entry Into and Safe Working in Confined Spaces	Provides guidelines on safety and health control measures relating to entry into and working in confined spaces at normal atmospheric pressure. Also covers procedures for applying and issuing permit-to-work for confined space entry.
16	CP 86: 2000 Code of Practice for Safe Use of Lasers in the Building and Construction Industry	Sets out safety requirements for use of lasers for alignment, levelling, control and survey tasks in the building and construction industry. Does not cover design and manufacture of lasers, nor use of lasers in other applications.
17	CP 87: 2001 Code of Practice for Illumination in Industrial Premises (Under review)	Provides guidelines on provision of appropriate lighting for optimum visual performance in indoor industrial premises. Covers design, installation, maintenance and improvement of lighting systems to ensure safety, comfort, well-being and productivity of workers. Maintenance luminance is recommended for different types of industrial areas, tasks and processes.
18	CP 88-3: 2004 Code of Practice for Temporary Electrical Installations – Shipbuilding and Ship-repairing Yards	Deals principally with provision of temporary electricity supply from shore fixed installations or from mobile generating sets to vessel(s) under construction and during repair and conversion work. Covers all temporary electrical installations in a building and repairing of vessels in the yards. Applies to electrical installations set up for provision of electricity supply during execution of works in: (a) shipbuilding and repairing yards; (b) vessels moored alongside yards; and (c) confined spaces or locations or other similar situations on board vessels. Does not cover: (a) electricity supply for vessel's electrical installation and any such part of such installation set up for use by crew on board vessels; (b) installations operating at voltages exceeding low voltage.

19	CP 91: 2001 Code of Practice for Lockout Procedure	Covers servicing or maintenance of machines where any unexpected energisation or startup of machines, or release of stored energy could cause injury to employees. Establishes minimum performance requirements for control of such hazardous energy.
20	CP 98: 2003 Code of Practice for Preparation and Use of Material Safety Data Sheets (SDS)	Gives recommendations for preparation, review, reissue and application of SDS. Covers responsibility of suppliers and manufacturers of chemical substances and preparations in the compilation and completion of an SDS, and that of users (employers and employees) to make use of information in the SDS to prevent unnecessary exposure to persons in the workplace and in the community. Does not cover use of pharmaceutical substances and preparations by medical physicians and veterinarians in the management of the health of a person or an animal, but applies to production and use of these substances and preparations in an industrial process.
21	SS 98: 2005 Industrial Safety Helmets	Specifies physical and performance requirements, methods of test and marking requirements for industrial safety helmets which are intended primarily to provide protection to wearer against falling objects and consequential brain injury and skull fracture.
22	CP 99: 2003 Code of Practice for Industrial Noise Control	Provides information on industrial noise control by engineering means such as barriers, enclosures, absorbers, damping materials, silencers and isolators. Complements the Factories (Noise) Regulations in recommending measures to control noise and prevent noise-induced deafness. With reference to proper noise criteria, applies to all industrial workplaces except for construction and demolition sites which have been covered by CP 49 - "Code of Practice for Noise Control on Construction and Demolition Sites". Excludes community noise, transportation noise, construction noise and noise from public entertainment.
23	CP 101: 2004 Code of Practice for Safe Use of Powered Counterbalanced Forklifts	Specifies safety requirements for manufacture, application, operation and maintenance of powered counterbalance forklifts. Lays down responsibilities of various parties involved. Does not include industrial trucks that do not apply lifting with fork arms and use of counterweights for balance.
24	SS 102: 1996 Valves and Safety Valves for Land Boilers, Steam Vessels and Piping Installations	Specifies design, construction and testing of safety valves as well as other valves that are intended for use on land boilers, steam vessels and piping installations. Deals with safety valves, stop valves, feed valves, boiler blow down valves/ cocks for application to boilers, main and auxiliary steam pipes, feed and boiler blowdown piping in connection therewith. Does not cover selection, operation or application of valves. Archived July 2004.
25	SS 152: 2003 Identification of Contents of Industrial Gas Containers	Specifies requirements for identification of contents of industrial gas containers. Does not cover identification of medical gas containers.
26	SS 241: 1996 General Requirements for Electrical Accessories	Specifies requirements and tests to check safety in normal use of electrical accessories which are not covered by other specific Singapore Standards. Such accessories are intended for use in household, commercial and light industrial premises where normal supply voltage does not exceed 250 V a.c. single-phase, 50 Hz or 250 V dc; rated current of the accessory does not exceed 63A; - the rated current of an accessory incorporating screwless terminals does not exceed 13A. Also covers "plug-in" and other accessories in which electrical accessory components are incorporated, for example, plug-pins, socket-contacts, switches, terminals, and so on.
27	SS 254 - 0: 2001 Electrical Apparatus for Explosive Gas Atmospheres General Requirements	Specifies general requirements for construction, testing and marking of electrical apparatus, Ex-cable entries and ex-components, intended for use in potentially explosive atmospheres of gas, vapour and mist. Does not specify requirements for safety, other than those directly related to explosion risk.
28	SS 254 - 11: 2003 Electrical Apparatus for Explosive Gas Atmospheres Intrinsic Safety "i"	Specifies construction and testing of intrinsically safe apparatus, intended for use in potentially explosive atmospheres and for associated apparatus, which is intended for connection to intrinsically safe circuits which enter such atmospheres. Contains details of test apparatus previously covered in SS 254: Part 3 which has been withdrawn.
29	SS 254 - 6: 2003 Electrical Apparatus for Explosive Gas Atmospheres Increased Safety "e"	To be used in conjunction with SS 254: Part 0 General Requirements. Specifies requirements for design, construction, testing and marking of electrical apparatus, with a rated value of supply voltage not exceeding 11 kV r.m.s. a.c. or d.c. with type of protection "e" that does not produce sparks, arcs or dangerous temperatures in normal operations.
30	SS 286 - 1: 1984 Caution Labelling for Hazardous Substances Classification and Class Labels for Hazardous Substances	Sets out a system of classification for hazardous substances and a series of caution labels corresponding to designated classes and subdivisions for use in land transportation and storage.
31	SS 402 - 1: 1997 Industrial Safety Belts and Harnesses General Requirements	Describes essential characteristics of each type of belt and harness. Gives guidance for maintenance, inspection and storage of safety belts and harnesses. Also includes recommendations for fixtures for attachment of belts.
32	SS 402 - 2: 1997 Industrial Safety Belts and Harnesses Permanent Anchors	Specifies requirements for eyebolts and ancillary fittings for use as permanent, fixed anchorages for direct attachment of safety lanyards of industrial safety belts and harnesses. Includes recommendations on fixture of such anchorages to existing buildings and new construction together with methods of test and test requirements for assessing suitability of anchorages.
33	SS EN 420: 2003 Protective Gloves General Requirements and Test Methods	Defines general requirements and relevant test procedures for glove design and construction, resistance of glove materials to water penetration, innocuousness, comfort and efficiency, marking and information supplied by manufacturer. Does not apply to gloves used by medical profession, used for protection against electrical hazards or for handling products where cleanliness is of importance (e.g., food, PCB).
34	SS 473 - 1: 1999 Personal Eye Protectors General Requirements	Specifies functional requirements for various types of personal eye-protectors used mainly in industries.
35	SS 473 - 2: 1999 Personal Eye Protectors Selection, Use and Maintenance	Includes eye-protection in relation to the following hazards individually or in combinations: • Mechanical and chemical hazards; • Non-ionising optical radiation hazards; • Combinations of the above.
36	SS 507: 2004 Business Continuity/ Disaster Recovery (BC/ DR) Service Providers	Provides a basis to certify and differentiate BC/ DR service providers, helps end-user organisations in selecting best-fit service providers and provides quality assurance. Also establishes industry best practices to mitigate outsourcing risks.
37	SS 506 - 1: 2004 Occupational Safety and Health (OSH) Management System Specification	This standard is an adoption of the Occupational Health and Safety Assessment Series (OHSAS) 18001: 1999 and gives requirements for an occupational health and safety (OHS) management system, to enable an organisation to control its OHS risks and improve its performance. It does not state specific OHS performance criteria, nor does it give detailed specifications for design of a management system.
38	SS 506 - 2: 2004 Occupational Safety and Health (OSH) Management System General Guidelines for the Implementation of OHS Management System	This standard is an adoption of the Occupational Health and Safety Assessment Series (OHSAS) 18002: 1999 and provides generic advice on application of OHS management system specification in Part 1 of this series. It explains underlying principles of the specification and describes intent, typical inputs, processes and typical outputs, against each requirement in the specification. This is to aid understanding and implementation of OHS management system in the various sectors. This standard also provides a summary on the relationship with elements in the safety management system under the Factories Act (Chapter 104).

39	SS 508 - 1: 2004 Graphical Symbols Safety Colours and Safety Signs Design Principles for Safety Signs in Workplaces and Public Areas	Applies to workplaces and all locations and sectors where safety-related questions may be posed. Does not apply to signalling used for guiding rail, road, river, maritime and air traffic. Establishes safety identification colours and design principles for safety signs to be used in workplaces and public areas for purpose of accident prevention, fire protection, health hazard information and emergency evacuation. Also establishes basic principles to be applied when developing standards containing safety signs.
40	SS 508 - 3: 2004 Graphical Symbols Safety Colours and Safety Signs Safety Signs used in Workplaces and Public Areas	Applies to workplaces and all locations and sectors where safety-related questions may be posed. Does not apply to signalling used for guiding rail, road, river, maritime and air traffic. Prescribes safety signs for purposes of accident prevention, fire protection, health hazard information and emergency evacuation.
41	SS 510: 2005 Code of Practice on Safety in Welding and Cutting (and other operations involving the use of heat)	Covers safety practices to protect persons from injury and illness, and properties (including equipment) from damage by fire and other causes arising from welding and cutting equipment, its installation, operation and maintenance. Includes specific provisions for gas welding, shielded metal arc welding, submerged arc welding, gas metal arc welding, gas tungsten arc welding, brazing, resistance welding, and thermit welding.
42	SS 513 - 1: 2005 Personal Protective Equipment Footwear Safety Footwear	Specifies basic and additional (optional) requirements for safety footwear.
43	SS 513 - 2: 2005 Personal Protective Equipment Footwear Test Methods for Footwear	Specifies methods for testing footwear designed as personal protective equipment.
44	TR 19: 2005 Technical Reference for Business Continuity Management (BCM)	Specifies requirements for organisations intending to build competence, capacity, resilience and readiness to respond to and recover from events which threaten to disrupt normal business operations and activities. Stipulates requirements to attain and maintain readiness to deal with risks and risk events faced by organisations due to nature of their businesses, external environment or regulatory requirements. Does not prescribe how organisations should comply with stipulations in this TR as each organisation's operations and environment are unique, and changes with advancement in technology, business operations and activities, external environment and industry practices, and need to comply with regulatory requirements. Does not deal with management of the BC Plan project, for example, project initiation and gaining of executive management support to endorse project.
	Environmental Protection	
45	CP 100: 2004 Code of Practice for Hazardous Waste Management	Sets out procedures and practices on safe management and handling of hazardous wastes generated from industrial activities. Also sets out the key requirements for collection, transportation, storage, treatment and disposal of hazardous industrial wastes. Does not apply to biohazardous and radioactive wastes.
46	SS ISO 14001: 2004 Environmental Management Systems Requirements with Guidance for Use	Specifies requirements for an environmental management system to enable an organisation to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organisation subscribes, and information about significant environmental aspects. Applies to those environmental aspects that the organisation identifies as those which it can control and those which it can influence. Does not itself state specific environmental performance criteria. Annex B identifies broad technical correspondences between this standard and ISO 9001: 2000 and vice versa.
47	SS ISO 14004: 2004 Environmental Management Systems General Guidelines on Principles, Systems and Supporting Techniques	Provides guidance on establishment, implementation, maintenance and improvement of an environmental management system and its coordination with other management systems. Applicable to any organisation, regardless of its size, type, location or level of maturity. Guidelines in this standard are consistent with ISO 14001 environmental management system model but they are not intended to provide interpretations of the requirements of ISO 14001.
48	SS ISO 19011: 2002 Guidelines for Quality and/ or Environmental Management Systems Auditing	Provides guidance on principles of auditing, managing audit programmes, conducting quality management system audits and environmental management system audits, as well as guidance on competence of quality and environmental management system auditors. Applicable to all organisations needing to conduct internal or external audits of quality and/ or environmental management systems or to manage an audit programme. Application of this standard to other types of audit is possible in principle, provided that special consideration is paid to identifying competence needed by the audit team members in such cases.
	Fire Safety	
49	CP 25: 1999 Code of Practice for Emergency Voice Communication System in Buildings	Applies to planning, design, installation, maintenance and testing of emergency voice communication systems in buildings and sets out requirements for the basic system. Gives recommended procedures for use of system and other information of an advisory nature.
50	CP 29: 1998 Code of Practice for Fire Hydrant Systems and Hose Reels	Covers planning, installation, testing and upkeep of fire hydrant, wet and dry rising main and hose reel systems on building premises.
51	CP 10: 2005 Code of Practice for the Installation and Servicing of Electrical Fire Alarm Systems	Applies to installation and servicing of electrical fire alarm systems in buildings. It covers alarm systems using manual call points, heat detectors, smoke detectors and flame detectors. The revision is intended to update existing requirements to bring the code in line with latest fire alarm concepts and technologies.
52	CP 45: 1989 Code of Practice for Halon 1301 Fire Protection Systems (Achieve)	Specifies minimum requirements for design, construction, installation, testing commissioning, maintenance and operation of automatic Halon 1301 fire protection systems in building. Places emphasis on system reliability and fire safety.
53	CP 52: 2004 Code of Practice for Automatic Fire Sprinkler System	Sets requirements for installation of automatic sprinkler system in buildings and also provides for occupancy classification.
54	CP 55: 1991 Code of Practice for Use and Maintenance of Portable Fire Extinguishers	Covers minimum requirements for selection, installation, inspection, testing and maintenance of portable fire extinguishers.
55	SS 232 - 1: 1999 Portable Fire Extinguishers Description, Duration of Operation, Class A and B Fire Tests	Specifies characteristics of description, duration, operation, residual charge and efficiency test applicable to portable fire extinguishers.
56	SS 232 - 2: 1999 Portable Fire Extinguishers Tightness, Dielectric Test, Tamping Test, Special Provisions	Portable fire extinguishers— Tightness, dielectric test, tamping test, special provisions.
57	SS 232 - 3: 1999 Portable Fire Extinguishers Construction, Resistance to Pressure, Mechanical Tests	Lays down technical specifications for extinguisher bodies and their accessories. Applies to bodies of extinguishers in which service pressure does not exceed 25 bar and to propellant gas cartridges. Also gives requirements relative to carbon dioxide extinguishers' bodies.
58	SS 232 - 4: 1999 Portable Fire Extinguishers Charges, Minimum Required Fire	Specifies charges of portable fire extinguishers and the minimum required fire, that is, the maximum quantity of extinguishing medium that is to be used for extinction of a given fire size.
59	SS 232 - 5: 1999 Portable Fire Extinguishers Specification and Supplementary Tests	Specifies characteristics of effective range of operating temperatures, requirements for components, resistance to corrosion, brackets, identification of extinguisher and periodical checking.
60	SS 299 - 1: 1998 Fire Resistant Cables Performance Requirements for Cables Required to Maintain Circuit Integrity under Fire Conditions	Specifies performance requirements and provide test methods for mechanical and fire tests applicable to cables rated at voltages not exceeding 600/1000 V.

61	SS 332: 2007 Specification for Fire Doors	Specifies requirements for construction and installation of fire-resistant door sets used to protect openings in walls and partitions which are required to resist passage of fire. Includes test standards for various types of hardware. Excludes back check on door closers. Aligns requirements on vision panel location on fire doors with latest Fire Code and Code of Barrier Free Accessibility (CBFA) to allow wheelchair users to avoid being accidentally struck by door swing.
62	SS 489: 2001 Fire Shutters	Specifies requirements and test methods to assess fire-resistance of shutter required to protect openings in walls and resist passage of fire. Applies to fire-resistant vertical roller shutters, lateral shutter, horizontal roller shutters and folding sliding shutters. Does not include requirements necessary for day-to-day operation of fire shutters.
63	SS 532: 2007 Code of Practice for the Storage of Flammable Liquids	Sets out requirements and recommendations for safe storage and handling of flammable liquids, as classified in the chapter on the flammable liquids in the United Nations Globally Harmonised System of Classification and Labelling of Chemicals (GHS). Covers liquids of flash point up to 150 degrees Celsius. Does not apply to shipboard installations, mobile storage, plant or equipment in which liquid is processed, together with any vessels which form an integral part of the processing plant or equipment, bitumen and its mixtures prepared for road-making, flammable liquids stored in tanks exceeding 175 millibar above atmospheric pressure and liquefied gases that are maintained in the liquid phase for storage by means of pressure or refrigeration.
	Ergonomics	
64	SS 514: 2005 Code of Practice for Office Ergonomics	Provides guidelines on designs and improvements of working situations to make the workplace safer, more comfortable and more productive. It covers fundamentals of office ergonomics including physical, environmental and psychosocial elements. For preliminary ergonomics audit, a sample checklist could be used to identify potential problems for further improvements on the design.

Annex C-1: Workplace Safety and Health Management: Risk Assessment Guidelines

Introduction to Risk Assessment Guides

Roles and Responsibilities
Risk Management is a key component of the new safety and health management framework underpinned by the new Workplace Safety and Health Act (WSHA). The Act aims to reduce risks at source by making stakeholders accountable for managing the risks they create.

Under the WSHA, risk management duties are imposed on every employer, self-employed person and principal (including contractor and sub-contractor). These parties must take all reasonably practicable measures to ensure that the workplace is safe and without risks to every person within its premises.

Where contractors and suppliers undertake work for their customers, they must take all reasonably practicable measures to eliminate any risk that may be posed by their machine, equipment or hazardous substances.

Contractors and suppliers must also provide information of any machinery, equipment or hazardous substances to their customers who may require these information to conduct risk assessment in their workplaces. For example, contractors and suppliers should provide manual of operations, manuals of maintenance, material safety data sheet, and so on.

Risk Management
Risk Management entails:
- Risk assessment of any work activity or trade;
- Control and monitoring of such risks; and
- Communicating these risks to all persons involved.

These requirements are enshrined in the WSH Management Regulations which is effective from 1 March 2006.

Risk Assessment
Risk assessment is an integral part of risk management. It is the process of:
- Identifying and analysing safety and health hazards associated with work;
- Assessing risks involved; and
- Prioritising measures to control hazards and reduce the risks.

Every workplace, including factories, should conduct risk assessments for all routine and non-routine work undertaken.

Risk Assessment Guidelines
This set of Guidelines provides a three-step process for Risk Assessment. The three steps are:
- Hazard identification;
- Risk evaluation; and
- Risk control.

Applying these basic principles of risk assessment will help you meet your obligations under the legislation.

Depending on industry and nature of work activities, companies can adopt the activity-based or trade-based risk assessment approaches described in this Guide.

Alternatively, other approaches can be used to achieve the same or higher levels of protection against risks in your workplace.

The information in this Guide will be particularly useful for small and medium enterprises. Larger establishments, including process chemical plants with complex processes and operations, may adopt other established methods of hazard identification and risk analysis commonly used for process plant risk assessment, while still applying the basic principles in this Guide.

Risk Assessment Team
Risk assessment should be conducted by a team of persons who have a thorough knowledge of the work to be assessed. Team members should include management staff, process or facility engineers, technical personnel, supervisors, production operators, maintenance staff and safety personnel if available.

The team leader should also have undergone training in risk assessment. Alternatively, a safety consultant trained in job safety analysis and risk management and experienced in risk assessment could be engaged to conduct risk assessment.

The risk assessment team should also include contractor/ supplier personnel who are involved with the work, whenever necessary.

Roles and Responsibilities
Risk management duties are imposed on every employer, self-employed person and principal (including contractor and sub-contractor). These parties must take all reasonably practicable measures to ensure that the workplace is safe and without risks to every person within its premises.

The Employer should:

- Designate, assign, appoint or engage a competent person leading a team of personnel (including contractors) associated with the process or activity to conduct risk assessments;
- Ensure that the risk control measures are implemented without undue delay after completion of risk assessment;
- Inform all persons working at the workplace of the risks, and means to minimise or, where possible, eliminate risks;
- Provide a risk assessment register to record findings of risk assessment;
- Endorse and approve risk assessments conducted;
- Keep risk assessment record for inspection by an inspector for at least three years from date of the assessment; and submit the record to the Commissioner for WSH if the Commissioner so requires;
- Review and update risk assessment at least once every three years or earlier should there be a significant change in the work, or if there is reason to suspect that the assessment is no longer valid;
- Ensure that all employees are aware of risk assessment for the work activity they carry out;
- Develop and implement safe work procedures for work which poses safety or health risks to workers; and
- Keep a written description of safe work procedures and produce this to inspector for inspection when requested.

The Team Leader should:

- Have adequate knowledge of the risk assessment method;
- Recommend appropriate risk control measures to reduce or eliminate risks identified;
- Prepare a record of the risk assessment for employer after completion of assessment; and
- Assist management in monitoring effectiveness of risk control measures after their implementation.

Employees should:

- Participate in risk assessment or assist in conducting it;
- Adhere to safe work procedures established to reduce any safety and health risks at the workplace; and
- Inform their supervisors of any shortcomings in safe work procedures or risk control measures.

Contractors and Suppliers

Whenever necessary, contractors and suppliers should work with risk assessment team to identify hazards, evaluate and control risks that machinery, equipment or hazardous substances may cause.

Risk Assessment Process

Unless the workplace or worksite is not ready, the risk assessment team should visit the workplace or worksite to ensure that all work areas are covered, including routine and nonroutine operations. Routine operations include activities such as preparatory and troubleshooting work activities. Non-routine operations include commissioning, repair and maintenance of plants.

The team should also consider various environmental situations, for example, weather and soil conditions, where these operations are carried out.

Depending on industry and nature of work activities, companies can adopt the activity-based or trade-based risk assessment approaches described in this Guide.

Other methods of risk assessments may be adopted, but all methods should include the three basic steps of Hazard Identification, Risk Evaluation and Risk Control, and selection of control measures must be based on the principles of Hierarchy of Control.

The outcome of risk assessment conducted, regardless of method used, should be effective risk control measures.

Preparation Work

Prior to conducting a risk assessment, the following information should be obtained as far as possible:

- Plant layout plan;
- Process flowchart;
- List of work activities and/ or trades;
- List of chemicals used;
- List of machinery and tools used;
- Records of past incidents and accidents;
- Relevant legislation;
- Relevant codes of practice or specifications;
- Inspection records;
- Details of existing risk controls;
- Health and safety audit reports;

- Feedback from staff, clients, suppliers or other stakeholders;
- Safe work procedures;
- Other information such as material safety data sheet (MSDS), manufacturer's instruction manual; and
- Copies of any relevant previous risk assessments.

Risk Assessment Process

Step 1. Hazard Identification

Hazard identification is perhaps the most important step in risk assessment because hazards can only be controlled if they are identified. Hazard identification involves identifying hazards associated with activity of each process and type of potential accidents or incidents. During this phase, the aim is to spot hazards, brainstorm on all possible types of accidents and ill-health that can happen due to the hazard, and identify the persons that can be victims of the accident or ill-health.

WSH hazards can be identified by considering:

- Method of work, for example, repeated tasks and unsafe work practices;
- Electrical and mechanical hazards;
- Manual material handling, for example, lifting, pulling and pushing;
- Chemicals, for example, corrosive substances;
- Machinery or plant, for example, unguarded machines;
- Temporary structure, for example, scaffolds;
- Environmental conditions, for example, slippery surfaces, lighting level, unstable soil conditions; and
- Layout and location of equipment.

Possible types of accident or incident and ill-health include:

- Person falling from height
- Slips or falls on the level
- Asphyxiation
- Object falling from height
- Electrocution
- Drowning
- Noise - induced deafness
- Skin dermatitis
- Collapse of structure
- Fire and explosion
- Struck by or against object
- Soft tissue damage (sprains, strains)

Persons-at-risk include:

- Persons directly involved in the operation;
- Persons not directly involved in the operation;
- Visitors of the workplace; and
- Public.

Step 2. Risk Evaluation

Risk evaluation consists of:

- Identifying existing risk control measures;
- Assessing potential severity of hazards;
- Determining likelihood of occurrence; and
- Assessing risk level based on severity and likelihood.

Risk evaluation is the process of estimating risk levels for hazards and their acceptability. This is used as a basis for prioritising actions to control these hazards and minimise safety and health risks.

Existing Risk Control

The presence of existing control measures should first be identified for individual activity for each process. By considering the effectiveness of existing controls and consequences of their failure, the risk of the activity can be assessed.

Examples of risk control measures include engineering controls, safe work procedures and personal protective equipment. For more details on risk control measures, refer to STEP 3 of risk assessment.

Risk is made up of two parts:

1. Expected severity of the hazard; and
2. Likelihood of occurrence of accident/ incident or ill-health taking into account existing risk controls.

Severity of Hazard

Severity is the degree or extent of injury or harm caused by hazards, or as a result of an accident. The severity is classified into three categories as minor, moderate and major. These are described in Table 1.

Table 1: Severity categories and description.

Severity	Description
Minor	No injury, injury or ill-health requiring first aid treatment only (includes minor cuts and bruises, irritation, ill health with temporary discomfort)
Moderate	Injury requiring medical treatment or ill-health leading to disability (includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders)
Major	Fatal, serious injury or life-threatening occupational disease (includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases)

As severity of the hazard refers to intrinsic or inherent nature of the adverse effect (e.g., cancer, amputation or fatal injury) that may result from the hazard, it does not depend on controls in place. Therefore, in assigning the severity level, existing controls should not be taken into account.

Likelihood of Occurrence
Likelihood of occurrence of an accident or incident or ill-health is also classified into three categories as remote, occasional and frequent. These are described in Table 2.

Table 2: Likelihood categories and description.

Likelihood	Description
Minor	Not likely to occur
Moderate	Possible or known to occur
Major	Common or repeating occurrence

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, which should be used by the users in the marine industry.)

To minimise subjectivity of estimating likelihood, in addition to looking at existing controls, the following sources of information should be considered:

- Past incident and accident records;
- Industry practice and experience; and
- Relevant published literature.

Risk Level
Once the severity and likelihood have been established, the risk level can be determined. One approach is to use the following 3 X 3 matrix. The risk level may be classified as low, medium or high and is at the intersection of the severity row and likelihood column.

To determine the risk level, select appropriate row for severity and appropriate column for likelihood; the cell where they intersect indicates the risk level.

For example, if the severity is moderate and the likelihood is occasional, the risk level is medium risk.

Table 3: Risk matrix to determine risk level.

Severity \ Likelihood	Remote	Occasional	Frequent
Minor	Medium Risk	High Risk	
Moderate	Low Risk	Medium Risk	High Risk
Major	Low Risk		Medium Risk

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, which should be used by the users in the marine industry.)

Step 3. Risk Control

Based on risk level determined in STEP 2, risk controls should be selected to reduce risk level to an acceptable level. This can be done by reducing the severity and/ or likelihood.

As indicated in the risk matrix in Table 3, when risk level is "High", effective and practicable risk controls must be implemented to bring the high risk level down to at least "Medium Risk".

Table 4 shows the acceptability of risk and recommended actions for different risk levels, which can be used to guide the selection of risk controls.

Table 4: Acceptability of risk and recommended actions.

Risk Level	Acceptability of Risk	Recommended Actions
Low Risk	Acceptable	No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.
Medium Risk	Moderately Acceptable	No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.
High Risk	Not Acceptable	Level must be reduced to at least Medium Risk before work starts. There should not be any interim risk control measures and risk control measures should not be overly dependent on personal protective equipment or appliances. If need be, the hazard should be eliminated before work starts. Immediate management intervention is required before work starts.

It is essential for risks to be eliminated or reduced "at source". If a risk cannot be controlled completely by engineering measures, it is necessary to protect employees by administrative control or personal protection. The control of hazards and reduction of risks can be accomplished by following the Hierarchy of Control measures below. These control measures are not usually mutually exclusive, for example, engineering controls can be implemented together with administrative controls like training and safe work procedures.

Elimination
Elimination of hazards refers to total removal of hazards and hence effectively making all identified possible accidents and ill-health impossible.

This is a permanent solution and should be attempted in the first instance. If the hazard is removed, all other management controls, such as workplace monitoring and surveillance, training, safety auditing, and record keeping will no longer be required.

For example, Laser marking of semiconductors eliminates the use of solvent for ink marking. Laser cutting eliminates noise hazard from powered saws.

Substitution
This involves replacing the hazard by one that presents a lower risk.

For example, Asbestos can be substituted with non-asbestos materials. A water-based paint can be used instead of a solvent-based paint.

Engineering Controls
Engineering controls are physical means that limit the hazard. These include structural changes to the work environment or work processes, erecting a barrier to interrupt the transmission path between worker and hazard.

For example, Isolation or containment of hazards, application of machine guards and manual handling devices.

Administrative Controls
These reduce or eliminate exposure to a hazard by adherence to procedures or instructions. Documentation should emphasise all steps to be taken and controls to be used in carrying out the activity safely.

For example, Implementation of permit-to-work systems and scheduling of incompatible works; OSH training.

Personal Protective Equipment
This should be used only as a last resort, after all other control measures have been considered, or as a short term contingency during maintenance/ repair or as an additional protective measure. The success of this control is dependent on the protective equipment being chosen correctly, as well as fitted correctly and worn at all times when required by employees.

Safe Work Procedures
Arising from risk assessment, safe work procedures for work which may pose safety and health risks should be established and implemented.

Safe work procedures should include safety precautions to be taken in the course of work and during an emergency, as well as provision of personal protective equipment.

Residual Risks

The risk assessment team should ensure that risk assessment is conducted properly, and that any residual risks are acceptable and manageable. Residual risks are remaining risks for which the planned risk controls are not able to effectively remove or control. The risk assessment team should also highlight residual risks of each controls.

For example, if the risk control involves use of fall arrest harness and lanyards (a type of personal protective equipment), then one of the residual risks is that workers may not hook up the lanyards to protect themselves. In this case, the risk assessment team may highlight training (administrative control) as a further measure to ensure that residual risk is further minimised. Once all the risk controls are selected and their residual risks highlighted, the risk assessment team needs to identify action officers and follow-up dates. In this way, the specific action officers to implement controls can be clearly identified, and follow-up dates will help to ensure timeliness in implementation.

Activity-based and Trade-based Approaches to Risk Assessment

This set of Guidelines also shows you how to conduct risk assessment, based on activity and trade. Worked examples to illustrate the use of both Activity-Based and Trade-Based Risk Assessment Forms can be found in Appendixes A and D.

Activity-based Risk Assessment Form

The Activity-based Risk Assessment Form will help to facilitate the risk assessment process and enable you to record findings of risk assessments based on a particular work activity.

This involves the steps of identifying hazards in each work activity in a work process, evaluation of risk by outlining any existing risk control before determining the severity and likelihood of hazard occurrence to rank the risk level and listing possible additional risk control measures as well as indicating the action officer and follow-up date.

Trade-based Risk Assessment Form

The Trade-based Risk Assessment Form will help you to identify common hazards associated with a particular trade and determine existing or non-existing possible measures to eliminate or reduce the risks. It includes prompts to guide you in considering if these hazards are present in your work situation.

Unlike the activity-based approach which involves a more elaborate determination of risk level based on severity and likelihood of hazard occurrence, in the trade-based approach, the risk evaluation step essentially involves a "Yes" or "No" assessment. "Yes" indicates that a risk is present regardless of whether the risk level is "High", "Medium" or "Low". "No" means that there is no risk present. In other words, as long as a hazard is identified, it is considered a risk, regardless of its severity or likelihood.

Other Methods

There are other methods of conducting risk assessments, but all methods should include the three basic steps of Hazard Identification, Risk Evaluation and Risk Control, and the selection of control measures must be based on the principles of Hierarchy of Control.

Implementation and Review

The results of risk assessment must be approved and endorsed by top management. The employer should as far as is practicable, implement the recommended risk control measures as soon as possible.

An action plan should be prepared to implement the measures. The plan should include a time-line of implementation and responsibilities of persons implementing the WSH measures. The plan should be monitored regularly until all measures are implemented.

Regular review of the risk assessment plan is critical. While employers are required to review their plans every three years, a review should take place whenever:

- New information on safety and health risks surfaces;
- There are changes to the area of work; and/ or
- After any accident or serious accident.

The risk assessment team should undertake the same three steps (hazard identification, risk evaluation and risk control) when conducting a risk assessment review.

Regular auditing is required to ensure that risk control measures have been implemented and are functioning effectively.

Record Keeping

A written description of the risk assessment must be kept for reference for three years. The Risk Assessment Form can be used for risk assessment and recording. All risk assessment records should be concise and kept in a register. The records should include the following information:

- Names and designations of risk assessment team members;
- Inventory of trades and/or work activities by process or location, associated with machinery, equipment and chemicals;
- Hazards identification for each work activity, and possible types of accident or incident;
- Existing risk control measures;
- Risk level for each hazard;
- Recommendations on additional risk controls required;
- Persons involved in implementing measures on risk reduction;
- Signatures, date and designations of persons conducting risk assessment; and
- Signature, date and designation of management approving or endorsing the assessment.

Offences and Penalties

All employers, self-employed persons or principals are required by the WSH (Risk Management) Regulations to:

- Conduct a risk assessment for all routine and non-routine work undertaken in the workplace;
- Take reasonably practicable measures to eliminate hazards identified or reduce safety and health risks and implement safe work procedures to control risks;
- Specify roles and responsibilities of persons involved in the implementation of any measure or safe work procedure;
- Keep records of risk assessment and safe work procedures;
- Inform employees of the nature of risks involved and any risk control measures or safe work procedure implemented; and
- Review or revise risk assessment.

Any person who fails to comply may be fined up to $10,000 for the first offence. For a second or subsequent offence, the person may be fined up to $20,000 or jailed up to 6 months or both.

Terms	Definition
Contractor	A person engaged by another person (referred to as principal) otherwise than under a contract of service: • To supply any labour for gain or reward; or • To do any work for gain or reward, in connection with any trade, business, profession or undertaking carried on by the other person.
Hazards	Anything or any source or situation with potential to cause harm or injury. Hazards may be classified as: • Chemical, e.g., acids, alkalis, solvents; • Biological, e.g., bacteria, fungi and viruses; • Electrical, e.g., frayed wires; • Ergonomic, e.g., repetitive work, awkward postures, prolonged standing; • Mechanical, e.g., damaged equipment, forklifts, cranes, overhead cranes, power press; • Physical, e.g., excessive noise, heat, radiation; • Psychosocial, e.g., overwork, poor supervision.
Likelihood	Probability or frequency of an event occurring.
Principal	A person who, in connection with any trade, business, profession or undertaking carried on by him, engages any other person otherwise than under a contract of service: • To supply any labour for gain or reward; or • To do any work for gain or reward.
Risk	Likelihood that a hazard will cause a specific harm or injury to someone or something. More specifically, it is the likelihood of accidents or ill-health occurring at work and the consequences of such occurrences.
Risk Assessment	WSH risk assessment is the process of identifying hazards, evaluating risks, and determining the appropriate options for risk control.
Risk Management	WSH risk management involves assessment of risks associated with any work activity or trade, control and monitoring of such risks, as well as communicating these risks.

Appendix A: Instructions to Employers and Persons Conducting Activity-based Risk Assessment

1. Before completing the Risk Assessment Form, you have to complete the Inventory of Work Activities Form. You may use one inventory form for each process.
2. Outline the process workflow and indicate the process location under the "Process/ Location" column.
3. For each work process, list all activities (routine and non-routine) under the "Work Activities" column.

You may use one Activity-based Risk Assessment Form for each process.

1. Record names and designations of risk assessment team members in the Risk Assessment Form.
2. Start with the first activity listed in the Inventory of Work Activities Form. Record this in columns 1a and 1b of the Risk Assessment Form.
3. Identify hazards associated with each activity and record these in column 1c.
4. For each hazard identified, determine the consequence (possible accident/ ill-health and persons-at-risk) and record this in column 1d.
5. If there is any existing hazard control measure for the hazard, record this in column 2a.
6. Determine severity of the accident or ill effect based on the following criteria, and record this in column 2b.

Severity	Description
Minor	No injury, injury or ill-health requiring first aid treatment only (includes minor cuts and bruises, irritation, ill health with temporary discomfort).
Moderate	Injury requiring medical treatment or ill-health leading to disability (includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders).
Major	Fatal, serious injury or life-threatening occupational disease (includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases).

7. Taking into consideration the existing hazard control measure(s), estimate likelihood of occurrence of each accident or ill effect based on the following criteria, and record this in column 2c.

Severity / Likelihood	Remote	Occasional	Frequent
Minor	Medium Risk	High Risk	
Moderate	Low Risk	Medium Risk	High Risk
Major	Low Risk		Medium Risk

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, for users in the marine industry.)

8. Based on the severity and likelihood, assign the risk level for each hazard using the risk matrix below, and record this in column 2d.

Likelihood	Description
Remote	Not likely to occur
Occasional	Possible or known to occur
Frequent	Common or repeating occurrence

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, for users in the marine industry.)

9. Based on the risk level assigned, suggest appropriate risk control measures (see Table below) and record these in column 3a following the hierarchy: Elimination, Substitution, Engineering Controls, Administrative Measures and Personal Protective Equipment.

Risk Level	Acceptability of Risk	Recommended Actions
Low Risk	Acceptable	No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.
Medium Risk	Moderately Acceptable	A careful evaluation of hazards should be carried out to ensure that the risk level is reduced to as low as is practicable within a defined time period. Interim risk control measures, such as administrative controls, may be implemented. Management attention is required.
High Risk	Not Acceptable	Level must be reduced to at least Medium Risk before work commences. There should not be any interim risk control measures and risk control measures should not be overly dependent on personal protective equipment or appliances. If need be, the hazard should be eliminated before work starts. Immediate management intervention is required before work starts.

10. With the consensus of management or employer, assign a suitable person to implement the recommended risk control, and indicate the follow-up date in column 3b.
11. Repeat risk assessment for other activities and processes listed in the Inventory of Work Activities Form.
12. Management or employer must endorse and approve the risk assessment results. Employer must communicate all risk assessments to employees, monitor the follow-up actions, and keep the risk assessment records for at least three (3) years.
13. Conduct another round of risk assessment after the risk control measures have been implemented; use a new risk assessment form to indicate the reduction in risk levels.
14. Review the risk assessment records every three (3) years or whenever there are changes in processes or work activities, whichever is earlier.

Inventory of Work Activities

Company:

No.	Process/ Location	Work Activities

Risk Assessment Forms

Company:		Conducted by: (Names, designations)			
Process/ Location		Date			
Approved by (Name, designation)		Last review date		Next review date	
Date					

1. Hazard Identification				2. Risk Evaluation				3. Risk Control	
1a	1b	1c	1d	2a	2b	2c	2d	3a	3b
No.	Work Activity	Hazard	Instructions to Employers and Persons Conducting Activity-based Risk Assessment	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)

Appendix B:

Worked Examples (Activity-based Risk Assessment Form)

The following worked examples illustrate detailed steps in conducting a risk assessment. The activities associated with each process, type of hazards, and risk control measures in these examples are generic and not exhaustive, and may not be applicable to similar work in your workplace.

Scenario 1 – Spray Painting

A factory employs a worker to carry out spray painting of 15 kg metal drums. The work activities of the spray paint worker involve moving the metal drums into a spray paint booth, preparing and mixing solvent-based paint, and carrying out spray painting. The worker is provided with safety shoes, organic vapour respirators, and rubber gloves for his work. He moves 30 drums manually into the spray booth in a typical working day. Material safety data sheets for the spray paint indicate presence of toxic and flammable solvents such as toluene and xylene. Safe work procedures for spray painting are implemented.

Risk Assessment Forms					
Company:	XYP Co Pte Ltd	Conducted by: (Names, designations)	Ho Beng Long, Plant Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Spray Painter.		
Process/ Location	Spray Painting /Workshop	Date			
Approved by (Name, designation)	Song Heng Poh General Manager 01	Last review date	01 Sep 2004	Next review date	01 Sep 2007
Date	September 2005				

1. Hazard Identification				2. Risk Evaluation				3. Risk Control	
1a	1b	1c	1d	2a	2b	2c	2d	3a	3b
No.	Work Activity	Hazard	Instructions to Employers and Persons Conducting Activity-based Risk Assessment	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)
1	Moving metal drums to spray booth	Falling object	Worker's feet can be crushed by metal drum causing injury	Safety shoes	Moderate	Frequent	High	Provide mechanical lifting devices, for example, forklift for moving metal drums to spray booth	Ho Beng Long, Plant Unsafe work Manager (15/12/2004)
		Unsafe work practice	Manual handling of 15kg drum can cause back injury	Training	Moderate	Occasional	Medium		
2	Preparing and mixing paint	Toxic solvent vapours	Exposure to spray paint solvents can cause ill-health	Organic vapour respirators; Safe work procedures; Local exhaust ventilation system for spray booth	Moderate	Remote	Low	Substitute solvent-based paint with high-solid coatings or use airless spray method; Keep minimum quantity of flammable liquids in vicinity of spraying operation; Provide adequate fire extinguishers.	Ho Beng Long, Plant Manager (02/01/2006); (16/02/2005); Tan Ah Lim, Operator; Ong Huat Teng, Supervisor, (15/09/2004); Ho Beng Long, Plant Manager, (30/09/2004)
		Flammable solvents and ignition sources	Fire from solvents can result in serious injury or death of worker and nearby people	Safe work procedures	Major	Remote	Medium		

1. Hazard Identification				2. Risk Evaluation				3. Risk Control	
1a	1b	1c	1d	2a	2b	2c	2d	3a	3b
No.	Work Activity	Hazard	Instructions to Employers and Persons Conducting Activity-based Risk Assessment	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)
3	Carrying out spray painting	Toxic solvent vapours	Exposure to spray paint solvents can result in ill-health	Organic vapour respirators, Safe work procedures; Local exhaust ventilation system	Moderate	Remote	Low	Regular maintenance of spray booth, for example, changing of filters and testing for airflow; monitor worker's exposure to solvent vapours; use explosion-proof type of lights and fixture; use non-spacing exhaust fan; bond and ground spraying equipment and conductive objects.	Ho Beng Long, Plant Unsafe work Manager (15/12/2004)
		Flammable spray paint mists or vapours and ignition sources	Explosion from spray paint mists and vapours can result in serious injury or death of worker and nearby people	Safe work procedures; Emergency plan; PPE	Major	Remote	Medium		

Scenario 2 – Paper Slitting Process

Risk Assessment Forms					
Company:	XYP Co Pte Ltd	Conducted by: (Names, designations)	Ho Beng Long, Plant Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Spray Painter.		
Process/ Location	Spray Painting /Workshop	Date			
Approved by (Name, designation)	Song Heng Poh General Manager 01	Last review date	01 Sep 2004	Next review date	01 Sep 2007
Date	September 2005				

1. Hazard Identification				2. Risk Evaluation				3. Risk Control	
1a	1b	1c	1d	2a	2b	2c	2d	3a	3b
No.	Work Activity	Hazard	Instructions to Employers and Persons Conducting Activity-based Risk Assessment	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)
1	Loading the machine with paper roll	Slitting knives or blades	Small cuts when contacting the knives during setting	Instructions on safe work practice	Minor	Occasional	Low	Use leather hand gloves	Ong Huat Teng, Supervisor; Tan Ah Lim, Operator (30/9/2004)
2	Operating the machine	Unguarded machine	Serious cuts and hands getting caught in the rotating parts of the machine	Audio and visual warning; delayed start-up after "ON-button" pressed	Major	Occasional	High	Introduce daily check on safety function; Install machine guarding on rotating parts start-up	Ong Huat Teng, Supervisor; (13/03/2005) Ho Beng Long, Plant Manager (01/02/2005)
		Flying fragments	Serious cuts and eye injuries by flying fragments of blades that break during slitting	Warning signs; Training of new employees; Face shields; Safety goggles; PPE	Major	Remote	Medium	Use knife with stronger blades; Install machine guarding on rotating parts	Ho Beng Long, Production Manager (10/10/2005); (01/02/2005)

1. Hazard Identification				2. Risk Evaluation				3. Risk Control	
1a	1b	1c	1d	2a	2b	2c	2d	3a	3b
No.	Work Activity	Hazard	Instructions to Employers and Persons Conducting Activity-based Risk Assessment	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action Officer, Designation (Follow-up date)
1	Loading the machine with paper roll	Slitting knives or blades	Small cuts when contacting the knives during setting	Instructions on safe work practice	Minor	Occasional	Low	Use leather hand gloves	Ong Huat Teng, Supervisor; Tan Ah Lim, Operator (30/9/2004)
2	Operating the machine	Unguarded machine	Serious cuts and hands getting caught in the rotating parts of the machine	Audio and visual warning; delayed start- up after "ON-button" pressed	Major	Occasional	High	Introduce daily check on safety function; Install machine guarding on rotating parts start-up	Ong Huat Teng, Supervisor; (13/03/2005) Ho Beng Long, Plant Manager (01/02/2005)
		Flying fragments	Serious cuts and eye injuries by flying fragments of blades that break during slitting	Warning signs; Training of new employees; Face shields; Safety goggles; PPE	Major	Remote	Medium	Use knife with stronger blades; Install machine guarding on rotating parts	Ho Beng Long, Production Manager (10/10/2005); (01/02/2005)
3	Unloading slit papers	Heavy load	Muscular strain when lifting slit papers on pallets	Correct lifting posture	Minor	Occasional	Low	Consider mechanical devices, for example,"scissor" stacker	Ho Beng Long, Production Manager (01/11/2004)
4	Repair and maintenance of the machine	Unguarded machine; unsafe work practice	Serious cuts from knives and getting caught in rotating parts if machine is accidentally started	Delayed start-up after "ON-button" pressed	Major	Occasional	High	Install guarding on rotating parts; Lock-out and tag-out procedure for repair and maintenance	Ho Beng Long, Production Manager (01/02/2005); Ong Huat Teng, Supervisor (01/12/2004)

Appendix C:

Instructions to Employers and Persons Conducting Trade-based Risk Assessment

Before completing the risk assessment form, you have to complete the Inventory of Trades Form.

1. List all trades or jobs and names of persons doing the job under "Trade" column.
2. For each trade or job, list and describe main activities under the "Main Activities" column. You may use one Trade-based Risk Assessment Form for each trade.
3. Record names and designations of risk assessment team members in the Risk Assessment Form.
4. Start with the first trade listed in the Inventory of Trade Form. Record this in the Risk Assessment Form.
5. Identify hazards associated with the activity of the trade, categorise the hazards by type (e.g., chemical, physical, electrical and mechanical hazards) and briefly describe these in column 1.
6. For each hazard identified, indicate whether it can cause harm (i.e., whether the hazard poses a risk) by a tick in the "Yes" or "No" box drawn in column 2.
7. If the hazard can cause harm, list all possible risk control measures (including existing measures) in column 3a to eliminate the hazard or reduce the risk following the hierarchy of control measures: "Elimination, Substitution, Engineering Controls, Administrative Controls and PPE". Leave some blank spaces for later additions.
8. Tick the boxes next to the listed actions that are existing hazard control measures.
9. For items that are not ticked, indicate names of persons who are responsible for implementing the control measures, and state the dates of implementation in column 3b.
10. For any existing hazard control measures to be removed, state the reasons in column 3b.
11. Repeat steps 2 to 8 for other trades listed in the Inventory of Trades Form.
12. Management or employer must endorse and approve the risk assessment results. Employer must communicate all risk assessments to employees, monitor follow-up actions, and keep the risk assessment records for at least three (3) years.
13. After risk control measures have been implemented, conduct another round of risk assessment using a new risk assessment form.
14. Review the risk assessment records every three (3) years or whenever there are changes in trades or work activities, whichever is earlier.

Trade-based Risk Assessment Form					
Company:		Conducted by: (Names, designations) Date			
Job:					
Approved by (Name, designation) Date		Last review date		Next review date	

1. Hazard Identification	2. Risk Evaluation	3. Risk Control	
1	2	3a	3b
Hazards associated with trade	Is hazard likely to harm someone?	List of risk control measures Tick if it is an existing measure	Implementation date and action officer or remarks
	☐ Yes ☐ No	☐	
		☐	
		☐	
	☐ Yes ☐ No	☐	
		☐	
		☐	
	☐ Yes ☐ No	☐	
		☐	
		☐	
	☐ Yes ☐ No	☐	
		☐	
		☐	

Appendix D:

Worked Examples (Trade-based Risk Assessment Form)

The following worked examples illustrate detailed steps in conducting a risk assessment. The activities associated with each process, type of hazards, and risk control measures in these examples are generic and not exhaustive, and may not be applicable to similar work in your workplace.

Scenario 1 – Spray Painting

A factory employs a worker to carry out spray painting of 15 kg metal drums. The work activities of the spray paint worker involve moving the metal drums into a spray paint booth, preparing and mixing solvent-based paint, and carrying out spray painting. The worker is provided with safety shoes, organic vapour respirators, and rubber gloves for his work. He moves 30 drums manually into the spray booth in a typical working day. Material safety data sheets for the spray paint indicate the presence of toxic and flammable solvents such as toluene and xylene. Safe work procedures for spray painting are implemented.

Trade-based Risk Assessment Form

Company:	XYP Co Pte Ltd	Conducted by: (Names, designations) Date	Ho Beng Long, Plant Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Spray Painter		
Job:	Spray Painter				
Approved by (Name, designation) Date	Song Heng Poh General Manager 01 September 2005	Last review date:	01 Sep 2004	Next review date:	01 Sep 2007

1. Hazard Identification	2. Risk Evaluation	3. Risk Control		
1	2	3a		3b
Hazards associated with trade	Is hazard likely to harm someone?	List of risk control measures Tick if it is an existing measure		Implementation date and action officer or remarks
Limbs crushed due to falling metal drum while moving the drum to spray booth.	[X] Yes [ ] No	[ ]	Moving drums using mechanical devices.	15/12/2004 - Ho Beng Long
		[ ]	Use safety shoe.	
		[ ]	Other suggestion for actions can be added here.	
Unsafe work practice causing back injury due to: • Manual handling of drum while moving the drum to spray booth.	[X] Yes [ ] No	[ ]	Handle drums using mechanical devices.	15/12/2004 – Ho Beng Long
		[X]	Conduct training on the correct way of moving a metal drum.	
		[ ]	Other suggestion for actions can be added here.	
Toxic solvent vapour due to: • Exposure to spray paint solvent during preparation and mixing of paint • Exposure to spray paint solvent during spray painting.	[X] Yes [ ] No	[ ]	Substitute solvent-based paint with high-solids coatings.	02/01/2006 – Ho Beng Long
		[ ]	Use airless spray method.	16/02/2005 – Ho Beng Long
		[X]	Install a local exhaust ventilation system.	
	[X] Yes [ ] No	[ ]	Implement safe work procedures.	
		[ ]	Conduct regular maintenance of spray booth.	15/01/2005 – Ho Beng Long
		[ ]	Monitor worker's exposure to solvent vapours.	15/01/2005 – Ho Beng Long
		[X]	Use organic vapour respirators.	
		[ ]	Other suggestion for actions can be added here.	

1. Hazard Identification	2. Risk Evaluation	3. Risk Control		
1	2	3a		3b
Hazards associated with trade	Is hazard likely to harm someone?	List of risk control measures Tick if it is an existing measure		Implementation date and action officer or remarks
Fire and explosion due to: • Flammable solvents and ignition sources; from the preparation and mixing of paints; and • Flammable solvents and ignition sources from spray painting.	[X] Yes [ ] No	[ ]	Substitute solvent-based paint with high-solids coating.	02/01/2006 – Ho Beng Long
		[ ]	Use a non-sparking exhaust fan.	15/09/2004 –Tan Ah Lim; Ong Huat Teng
		[ ]	Use airless spray method.	16/02/2005 – Ho Beng Long
		[ ]	Bond and ground spraying equipment and conductive objects.	15/09/2004 –Tan Ah Lim; Ong Huat Teng
		[ ]	Use explosion-proof type of light and fixtures.	15/09/2004 –Tan Ah Lim; Ong Huat Teng
		[X]	Install a local exhaust ventilation system.	
	[X] Yes [ ] No	[X]	Implement safe work procedures.	
		[X]	Conduct regular emergency response exercise.	
		[ ]	Keep minimum quantity of flammable liquids in spraying vicinity.	15/09/2004 – Ong HuatTeng, Tan Ah Lim
		[ ]	Provide adequate fire extinguishers.	30/09/2004 – Ho Beng Long
		[X]	Use PPE.	
		[ ]	Other suggestion for actions can be added here.	

Trade-based Risk Assessment Form					
Company:	XYP Co Pte Ltd	Conducted by: (Names, designations) Date	Ho Beng Long, Plant Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Spray Painter		
Job:	Operator of paper slitting machine				
Approved by (Name, designation) Date	Song Heng Poh General Manager 01 September 2005	Last review date:	01 Sep 2004	Next review date:	01 Sep 2007

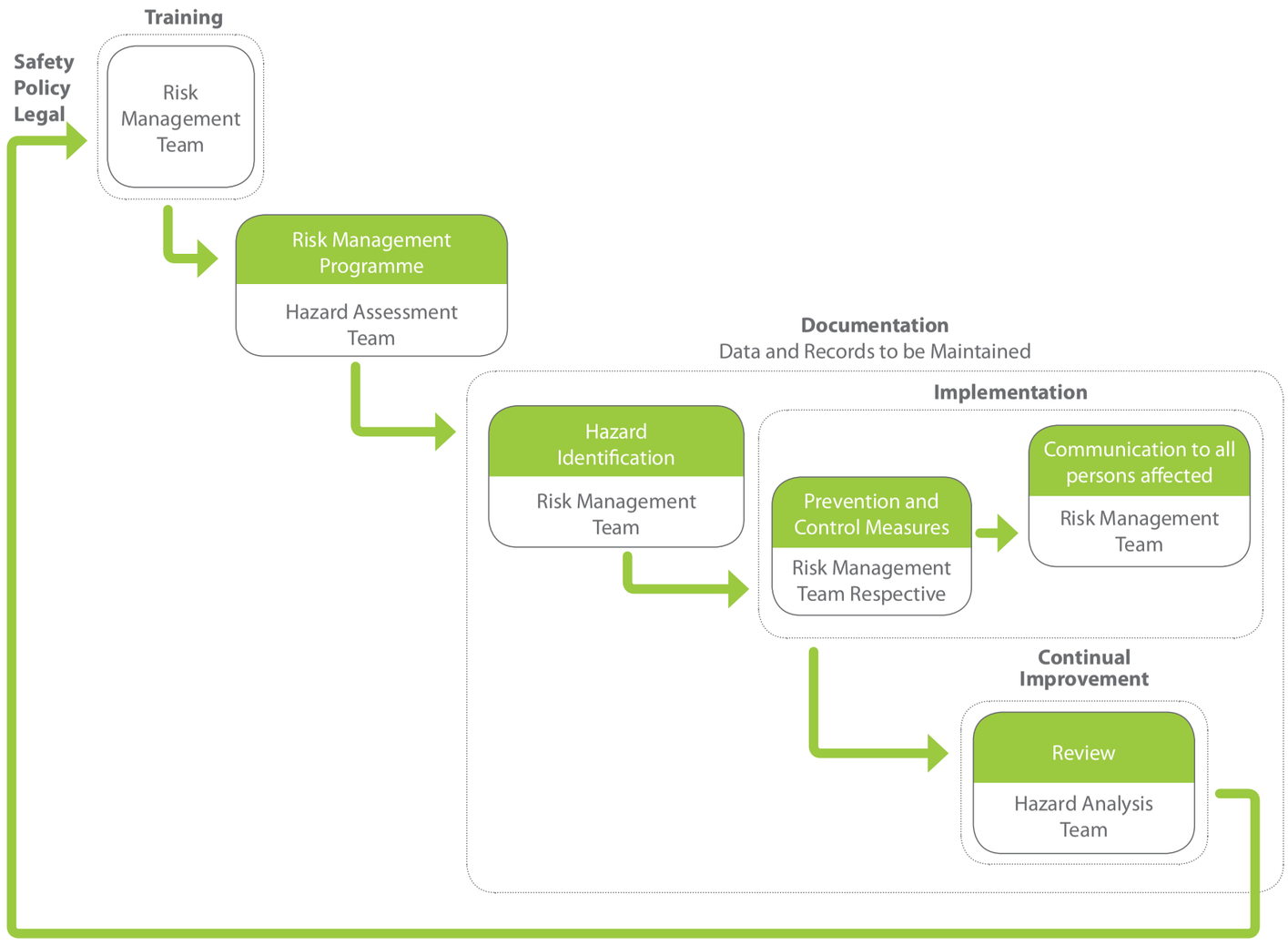
1. Hazard Identification	2. Risk Evaluation	3. Risk Control		
1	2	3a		3b
Hazards associated with trade	Is hazard likely to harm someone?	List of risk control measures Tick if it is an existing measure		Implementation date and action officer or remarks
Cuts from slitting knives due to: • Contact with blades while loading the machine with paper roll.	[X] Yes [ ] No	[X]	Implement safe work practice.	
		[ ]	Use leather hand gloves.	30/09/2004 – Ong Huat Teng, Tan Ah Lim
		[ ]	Other suggestion for actions can be added here.	
Cuts from knives due to: • Accidental start-up of machine during repair and maintenance.	[X] Yes [ ] No	[ ]	Delayed start-up after "ON-button" is pressed.	
		[ ]	Install machine guarding on rotating parts.	01/02/2005 – Ho Beng Long
		[ ]	Implement lock-out and tag-out procedures.	01/12/2004 – Ong Huat Teng
		[ ]	Other suggestion for actions can be added here.	
Limbs/ clothing/ hair getting caught in rotating parts due to: • Unguarded machine during operation; • Unguarded machine during repair; and • Maintenance.	[X] Yes [ ] No	[ ]	Install machine guarding on rotating parts.	02/01/2006 – Ho Beng Long
		[X]	Delayed start-up after "ON-button" pressed.	
		[ ]	Conduct daily start-up check on safety functions.	13/03/2005 – Ong Huat Teng
	[X] Yes [ ] No	[X]	Implement lock-out and tag-out procedures for repair and maintenance.	

Scenario 2: Paper Slitting Process

Trade-based Risk Assessment Form					
Company:	XYP Co Pte Ltd	Conducted by: (Names, designations) Date	Ho Beng Long, Plant Manager; Ong HuatTeng, Supervisor; Tan Ah Lim, Spray Painter		
Job:	Operator of Paper Slitting Machine				
Approved by (Name, designation) Date	Song Heng Poh General Manager 01 September 2005	Last review date:	01 Sep 2004	Next review date:	01 Sep 2007

1. Hazard Identification	2. Risk Evaluation	3. Risk Control		
1	2	3a		3b
Hazards associated with trade	Is hazard likely to harm someone?	List of risk control measures Tick if it is an existing measure		Implementation date and action officer or remarks
Cuts from slitting knives due to: • Contact with blades while loading the machine with paper roll.	[X] Yes No [ ]	[X]	Implement safe work practice.	
		[ ]	Use leather hand gloves.	30/09/2004 – Ong Huat Teng, Tan Ah Lim
		[ ]	Other suggestion for actions can be added here.	
Cuts from knives due to: • Accidental start-up of machine during repair and maintenance.	[X] Yes No [ ]	[ ]	Delayed start-up after "ON-button" is pressed.	
		[ ]	Install machine guarding on rotating parts.	01/02/2005 – Ho Beng Long
		[ ]	Implement lock-out and tag-out procedures.	01/12/2004 – Ong Huat Teng
		[ ]	Other suggestion for actions can be added here.	
Limbs/ clothing/ hair getting caught in rotating parts due to: • Unguarded machine during operation; • Unguarded machine during repair; and • Maintenance.	[X] Yes No [ ]	[ ]	Install machine guarding on rotating parts.	02/01/2006 – Ho Beng Long
		[X]	Delayed start-up after "ON-button" pressed.	
		[ ]	Conduct daily start-up check on safety functions.	13/03/2005 – Ong Huat Teng
	[X] Yes No [ ]	[X]	Implement lock-out and tag-out procedures for repair and maintenance.	
		[X]	Install audio and visual warning alarms and LED.	

1. Hazard Identification	2. Risk Evaluation	3. Risk Control		
1	2	3a		3b
Hazards associated with trade	Is hazard likely to harm someone?	List of risk control measures Tick if it is an existing measure		Implementation date and action officer or remarks
	[X] Yes [ ] No	[X]	Conduct training on safe work procedures.	
		[X]	Tie up loose hair.	
		[X]	Tuck in any loose clothing.	
		[ ]	Other suggestion for actions can be added here.	
Muscular strain due to: • Heavy load when lifting slit papers on pallets for unloading purpose.	[X] Yes [ ] No	[ ]	Replace manual lifting procedures with mechanical devices such as "scissors" stacker.	01/11/2004 – Ho Beng Long
		[X]	Handle smaller loads at a time.	
		[X]	Conduct training on correct lifting posture.	
		[X]	Observe regular rest intervals.	
		[ ]	Other suggestion for actions can be added here.	
Serious cuts and eye injuries due to: • Flying fragments of blades that break during operation of slitting machine.	[X] Yes [ ] No	[ ]	Replace knife with stronger blades.	10/10/2005 – Ho Beng Long
		[ ]	Install machine guarding on rotating parts.	01/02/2005 – Ho Beng Long
		[X]	Conduct training for new employees.	
		[X]	Display warning signs.	
		[X]	Use face shields.	
		[X]	Provide and use safety goggles	
		[ ]	Other suggestion for actions can be added here.	



ANNEX C-3: Risk Assessment Matrix in the Marine Industry

5 by 5 Risk Matrix

Consistent Treatment

Likelihood	Description
Rare	Not expected to occur but still possible.
Remote	Not likely to occur under normal circumstances.
Occasional	Possible or known to occur.
Frequent	Common occurrence.
Almost Certain	Continual or repeating experience.

Consequence

Severity	Description
Catastrophic	Serious injuries or life-threatening occupational diseases (includes amputations, major fractures, multiple injuries, occupational cancers, acute poisoning, disabilities and deafness).
Major	Fatality, fatal disease or multiple major injuries, serious injuries or life-threatening occupational diseases (including amputaions major fractures, multiple injuries, occupational concerns, acute poisoning, disabilities and deafness.
Moderate	Injury or ill-health requiring medical treatment (includes lacerations, burns, sprains, minor fractures, dermatitis and work-related upper limb disorders).
Minor	Injury or ill-health requiring first-aid only (includes minor cuts and bruises, irritation, ill-health with temporary discomfort).
Negligible	Negligible injury.

Note: This risk matrix is meant for reference when developing risk assessment guidelines.

RISK MATRIX

Severity \ Likelihood	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

Risk Level	Acceptability of Risk	Recommended Actions
Low	Acceptable	No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.
Medium	Tolerable	A careful evaluation of the hazards should be carried out to ensure that the risk level is reduced to as low as is practicable within a defined time period. Interim risk control measures, such as administrative controls, maybe implemented. Management attention is required.
High	Not Acceptable	Level must be reduced to at least Medium Risk before work commences. There should not be any interim risk control measures and risk control measures should not be overly dependent on personal protective equipment or appliances. If need be, the hazard should be eliminated before work commences. Immediate management intervention is required before work commences.

ANNEX C-4: Sample of ASMI Templates on Risk Assessment

- RA Templates: Electrical
- RA Templates: Marine Transport
- RA Templates: Mechanical Work
- RA Templates: Painting and Blasting
- RA Templates: Piping
- RA Templates: Steelwork
- RA Templates: Tank Cleaning
- RA Template: Scaffold

Note: The RA templates were drawn up by participants from workshops conducted by ASMI and MOM. These templates derived (which may not be sufficient or comprehensive) are available for reference only as sample formats.

RISK ASSESSMENT – Electrical works

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Renew Main Mast Equipment: a) Navigation Light	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspect faulty navigation light	Falling from height	• Fatal fall	• VSCC • Staging/ Scaffold • Use body harness and anchor on anchorage point	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Supervisor	DD-MM-YY	
2	Installing/ testing and commissioning/ removing existing navigation light	Presence of live wires	• Fatal electrocution	• VSCC • Isolate power supply with lock out/ tag out • Countercheck by multi-meter	5	1	5	• Nil	-	-	-	Supervisor	DD-MM-YY	
		Falling from height	• Fatal fall	• VSCC • Staging/ Scaffold • Use body harness and anchor on anchorage point	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Supervisor	DD-MM-YY	
		Dropped/ falling objects	• Struck by light falling objects	• Use of lanyards to bind tools to worker	3	2	6	• Barricade work area	3	1	3	Commissioning Engineer/ Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Hoisting down existing navigation light and hoisting up new light	Falling objects	• Fatally struck by falling objects	• Qualified signaler/ Rigger • Valid inspection tag for lifting appliances • Provide lifting containers/ casing	5	2	10	• Barricade affected area	5	1	5	Lifting Supervisor	DD-MM-YY	Inspection record for crane and lifting gear to be available on site

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Load Test Generator with Load Bank	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Work Area Assessment	• Presence of slippery or wet surfaces, wires and cables on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep the area clear/ dry • Use cable hanger to hang cable	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Transport of load bank/ cables to work site using fork lift	• Use of heavy vehicle (forklift)	• Fatality, struck by moving vehicle (forklift)	• Ensure that only trained and licensed forklift driver operates forklift • Ensure that the path of forklift is free from obstruction	5	2	10	• Use of warning siren during forklift movement	5	1	5	Supervisor	DD-MM-YY	Use of warning siren during forklift movement
		• Toppling of forklift or falling load	• Fatality	• Ensure that forklift is not overloaded • Secure the load • Ensure that the path of forklift is free from obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Laying of cable from load bank to switchboard using shore crane	• Manual pulling of cable under tension	• Minor injury, cuts	• Ensure use of hand gloves • Ensure that lifting belt is certified and fit for use	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	Inspection record for crane and lifting gear to be available on site
		• Falling cable	• Struck by light falling object	• Ensure that lifting belt is certified and fit for use • Ensure that area is barricaded • Ensure that trained signalmen is present	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	Inspection record for crane and lifting gear to be available on site
4	Isolation of power in switch board	• Live voltage	• Fatal electrocution	• VSCC • Ensure that skilled electrician is used • Lock out/ Tag out at main switch board	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Termination of load bank cable in switch board	• Live voltage	• Fatal electric shock	• Ensure that line test is carried out	5	2	10	• Briefing by supervisor • Ensure lock out/ tag out is done properly	5	1	5	Supervisor	DD-MM-YY	
		• Pinch points/ sharp edges during connection	• Hand and finger injury	• Ensure use of hand gloves	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Load test of generator	Live voltage	• Fatal electric shock	• Ensure that the switchboard and load bank are properly barricaded • Ensure that proper physical checks on the cable	5	2	10	• Use of warning light during operation • Use walkie-talkie to communicate	5	1	5	Supervisor	DD-MM-YY	
7	Disconnect cable of load bank after testing	Live voltage	• Fatal electric shock	• Ensure that load bank is shut off • Ensure that generator is switched off and stopped • Ensure that the main switch board is isolated	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Remove Alternator from Vessel and Overhaul in Workshop	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspect alternator located in E/RM	• Lack of oxygen • Possible presence of toxic gases	• Asphyxiation • Exposure to toxic gases	• Entry permit for confine space • Gas check	5	2	10	• Forced ventilation and general lighting • Portable gas monitor issued to each working group	5	1	5	Supervisor HSE Officer	DD-MM-YY	
		• Debris and liquids on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep the area clear/ dry	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Dismantling the alternator cable	• Live power supply terminals	• Fatal electric shock	• VSCC • Isolate the circuit breaker • Ensure proper Lock Out & Tag Out • Using correct tools	5	2	10	• Checks to ensure that there is no presence of electricity	5	1	5	Supervisor	DD-MM-YY	
3	Remove of corroded mounting bolts	• Spark or molten generated from gas cutting, possible ignition source	• Fire and explosion	• Hot- work permit • Fire watch • Brief workers before work start	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Hoisting the alternator	• Falling object	• Struck by falling object • Body injuries/ fatal	• Only use trained rigger/ signalmen • Check SWL & condition of wire sling or lifting belt • Use bucket container to lift from onboard to shore	5	1	5	Nil	-	-	-	Lifting Supervisor	DD-MM-YY	Inspection record for crane and lifting gear to be available on site
5	Transportation of alternator from dock to workshop and vice versa	• Use of heavy vehicle	• Struck by moving vehicle	• Ensure proper lashing of the load • Use low bed trailer for over site alternator • Keep road clear of obstruction isolated	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Dismantle/ assembly of alternator	• Moving machinery	• Finger/ limb injury	• Avoid/ minimise hand contact and over extension	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Struck by moving objects	• Body injuries	• PPE • Proper tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Noise	• Noise-induced deafness	• Use earplugs	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Chemical cleaning	• Use of toxic chemicals	• Chemical burns • Inhalation of toxic fumes	• Follow advice from SDS • Use appropriate PPE • Permit for cleaning only issued after precautions are in place	2	2	4	Nil	-	-	-	Supervisor HSE Officer	DD-MM-YY	Refer to SDS for details

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
8	Baking	• Hot equipment	• Burns	• Use of heat resistant gloves • Training for workers to use equipment safely	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
9	Testing of alternator	• Live power supply terminals	• Fatal electric shock	• Use only trained personnel • Establish SWP	5	2	10	• Ensure no contact while testing is done • Display warning signboard	5	1	5	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Test and Commission Main Switch Board	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Main switch board cleaning	• Chemical exposure	• Chemical burns • Inhalation of toxic fumes	• VSCC • Follow advice from SDS • PPE (eye protection, hand gloves) • Continuous ventilation	2	2	4	Nil	-	-	-	Supervisor/ Charge hand	DD-MM-YY	Refer to SDS for details
2	MSB Bus Bar Insulation test and check	• Electrical hazard	• Fatal electric shock	• PPE (hand gloves) • Calibrated and tested equipment • Skilled electrician • Rubber mat	5	1	5	Nil	-	-	-	Supervisor/ Charge hand	DD-MM-YY	
3	MSB Control Circuit check	• Electrical hazard	• Fatal electric shock	• PPE • Calibrated and tested equipment • Skilled electrician	5	1	5	Nil	-	-	-	Supervisor/ Charge hand	DD-MM-YY	
4	Bus Bar Torque and Breaker Termination check	• Sharp edges	• Cuts on hands or limbs	• Use appropriate tools • PPE • Skilled electrician	2	2	4	Nil	-	-	-	Supervisor/ Charge hand	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Energise the main switch board	• Short circuit	• Fatal electric shock	• VSCC • Insulation mat • Standby FFA • Insulating PPE • Skilled electrician	5	2	5	• Briefing all personnel • Sign boards • Barricade	5	1	5	Commissioning Engineer/ Supervisor	DD-MM-YY	
6	Function test main switch board	• Short circuit	• Fatal electrical shock	• SWP with checklist • Insulating PPE • Skilled electrician	5	1	5	Nil	-	-	-	Commissioning Engineer/ Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Renewal of Echo Sounder and Speed Log	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspection of echo sounder and speed log	Falling from height	• Fatal fall	• General lighting • Lifeline rope • Body harness/ safety belt • Torchlight • Tank cleaning	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		Lack of oxygen	• Asphyxiation	• Entry permit • Force ventilation	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Disconnect sounder and speed log	Electrical hazard	• Fatal electric shock	• VSCC • Brief workers • Discharge residual voltage • Isolate power supply • Ensure proper Lock Out & Tag Out	5	1	5	Nil	-	-	-	Supervisor and individual electrician	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Hot work	Fire and explosion	• Fatality • Burns	• VSCC • Permit-to-work • Workers briefed • Proper PPE • Proper tool • Fire watchman • Fire fighting equipment	5	1	5	Nil	-	-	-	Supervisor and Hot works workers	DD-MM-YY	
4	Function test main switch board	Falling hazard	• Fracture • Fatality	• VSCC • Permit-to-work • Workers briefed • Safety harness	5	1	5	Nil	-	-	-	Supervisor and Individual Electrician	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Test Commission Main Distribution Board	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Identify the location of the whole loop according to the one-line diagram and P&ID layout drawing	• Live power supply	• Fatal electric shock	• Ensure proper Lock Out & Tag Out • Use walkie-talkie or mobile phone to communicate	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling from height	• Fatal fall	• Lifeline • Body harness/ safety belt anchored to lifeline	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Supervisor	DD-MM-YY	
		• Lack of oxygen	• Asphyxiation	• Apply entry permit and ensure sufficient ventilation	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Visual check grounding cable and cleaning for panel	Live power supply	• Fatal electric shock	• Ensure proper Lock Out & Tag Out • Insulating PPE • Use walkie-talkie or mobile phone to communicate	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Disconnect all cables to do continuous check and insulation test	Live power supply	• Fatal electric shock	• Ensure proper Lock Out & Tag Out • Insulating PPE • Make sure proper tools are used and tools are in good condition • Line check by skilled electrician • Use walkie-talkie or mobile phone to communicate	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Connect back all cables and make sure they follow the connection diagram	Live power supply	• Fatal electric shock	• Insulating PPE • Tag Out and Lock Out power supply unit for the panel • Ensure all termination must be tightened • Out-going must be secured • Line check by skilled electrician • Use walkie-talkie or mobile phone to communicate with electrician	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Power on	Live power supply	• Fatal electric shock	• Put warning symbol of energised • Barricade work area	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Test and Commissioning of High Tension Switchboard	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Cleaning of switchboard	• Presence of chemical fumes, vapour, and dust	• Chemical burns • Inhalation of harmful chemical	• VSCC • Wear mask/ respirator • PPE (eye protection, hand gloves)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	Refer to SDS for details
		• Live power supply	• Fatal electric shock	• Ensure proper Lock Out & Tag Out • Insulating PPE • Use walkie-talkie or mobile phone to communicate	5	1	5	Nil	5	1	5	Supervisor	DD-MM-YY	
2	Line check from main switch board to source supply and internal wiring	• Live power supply	• Fatal electric shock	• Isolate external power source • Lock Out & Tag Out external power source • Use proper tool/ measuring device • Rudder mat • Deploy skilled electrician	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	High potential test and insulation test	• Live power supply	• Fatal electric shock	• Deploy skilled electrician • Do test at night (silent hour) • Discharge residual power • Use proper tool/ measuring device • Rubber mat	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Torque Wrench Test	• Live power supply	• Fatal electric shock	• Ensure proper Lock Out & Tag Out • Barricade work area	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Power up	• Live power supply	• Fatal electric shock	• VSCC meeting • Permit-to-work • Isolate all outgoing breaker • Ensure proper Lock Out & Tag Out at breaker • Communicate through walkie-talkie • Display warning sign	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Rewiring of Power System in Engine Room	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Assessment of area of work	• Lack of oxygen • Possible presence of toxic gases	• Asphyxiation • Exposure to toxic gases	• Entry permit for confine space • Gas meter check	5	2	10	• Forced ventilation and general lighting • Portable gas monitor issued to each	-	-	-	Supervisor Safety assessor	DD-MM-YY	
		• Debris and liquids on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep the area clear/ dry	2	2	4	Nil	5	1	5	Supervisor	DD-MM-YY	
2	Isolation of power	• Live power supply	• Fatal electric shock	• VSCC meeting • Isolate circuit breaker • Ensure proper Lock Out & Tag Out	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Disconnection and removal of existing wires	• Pinch points and sharp edges	• Hand injuries	• PPE (anti-slip gloves) • Use long sleeves overalls	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Cable pulling & strapping	• Falling from height	• Fatal fall	• Staging/ scaffold • Use body harness and anchor on anchorage point	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Supervisor	DD-MM-YY	
5	Termination of cables	• Slippage of tools and over tightening	• Hand, finger or eye injuries	• PPE (anti-slip gloves, goggles) • Use proper tools	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Rewiring of Power System in Engine Room	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Assessment of area of work	• Lack of oxygen • Possible presence of toxic gases	• Asphyxiation • Exposure to toxic gases	• Entry permit for confine space • Gas meter check	5	2	10	• Forced ventilation and general lighting • Portable gas monitor issued to each	-	-	-	Supervisor Safety assessor	DD-MM-YY	
		• Debris and liquids on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep the area clear/ dry	2	2	4	Nil	5	1	5	Supervisor	DD-MM-YY	
2	Isolation of power	• Live power supply	• Fatal electric shock	• VSCC meeting • Isolate circuit breaker • Ensure proper Lock Out & Tag Out	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Disconnection and removal of existing wires	• Pinch points and sharp edges	• Hand injuries	• PPE (anti-slip gloves) • Use long sleeves overalls	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Cable pulling and strapping	• Falling from height	• Fatal fall	• Staging/ scaffold • Use body harness and anchor on anchorage point	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Supervisor	DD-MM-YY	
5	Termination of cables	• Slippage of tools and over tightening	• Hand, finger or eye injuries	• PPE (anti-slip gloves, goggles) • Use proper tools	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Maintenance of Existing Main Switch Board	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Disconnect the main supply	• Live power supply	• Fatal electric shock	• VSCC and production meeting • Isolate power • Ensure proper Lock Out & Tag Out • Supply of temporary lighting • Ensure that only skilled electrician operates the MSB • Warning sign boards • Rubber mat • Line check and communicate by walkie-talkie	5	1	5	Nil	-	-	-	Supervisor Safety assessor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Cleaning breaker and tightening bolt and nut (air blow and hand cleaning)	• Slipping of tools	• Finger/ hand injuries	• PPE (hand gloves) • Use of proper tools	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Dusty environment	• Respiratory illness	• Dust mask	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Check breakers	• Slipping of breakers • -Limited space	• Finger/ hand injuries	• Proper tools • PPE (hand gloves)	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Conduct insulation test on cables	• Live power supply	• Fatal electric shock	• Gloves • Ensure instrument discharge to earth • Use proper tool • Rubber mat • Deploy skilled electrician	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Turn on power to main switch board	• Live power supply	• Fatal electric shock	• Ensure that main cable is properly terminated • Make sure that all tools are removed from main switch board • Barricade work site and display warning sign • Isolate all outgoing breakers • Ensure proper Lock Out & Tag Out breaker	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Replacement of Batteries in Emergency Generator Room	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Access location of emergency generator room (Location Identification)	• Debris and liquids on floor	• Body injuries due to slips, trips and falls	• Housekeeping • Sufficient lighting	2	2	4	Use of torchlights	2	1	2	Supervisor	DD-MM-YY	
2	Switch off battery charger and check cable	• Live power supply terminals	• Fatal electric shock	• PPE (rubber glove, rubber-soled safety boots) • Correct tools • VSCC Meeting • Barricade work area and display warning sign • Brief worker on procedure • Deploy skilled electrician • Cover battery	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Disconnect link and cable	• Slipping of spanner	• Hand injuries	• Use correctly sized or adjusted spanners	1	1	1	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Take out battery from battery box manually and clean the box	• Heavy object, manual lifting	• Back injuries • Hand injuries	• Procedure for safe manual lifting • Require two persons to lift • Correct posture (bending legs, not the back) • PPE (gloves)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Replace new battery into battery box	• Heavy object, manual lifting	• Back injuries • Hand injuries	• Procedure for safe manual lifting • Require two persons to lift • Correct posture (bending legs, not the back) • PPE (gloves)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Reconnect battery link back to cable	• Live terminals of battery	• Minor electric shock	• Use correct tools • PPE • Insulation of the tools breaker	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	

RISK ASSESSMENT – Marine Transport

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Heavy Lifting – 20 tons Hatch Cover	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Attaching lifting gear to the load	Falling hazard (if rigging needs to be done at height)	Fatal fall	• Safety harness/ safety belt to be used above 2m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness	5	1	5	Lifting Supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Dropped lifting gears	Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting Supervisor	DD-MM-YY	
		Pinch points, sharp edges	Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Hoisting of load/ positioning of load/ lowering of load	Load is dislodged or dropped	Struck by falling load	• Verified non-destructive testing report prior to lifting operation. • Welding eye lug, must be checked by competent person (e.g., QA/ QC before work starts. • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	Stop crane movement if load swing is too extensive	5	1	5	Lifting Supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Failure/ Toppling of crane	Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use. • Monthly maintenance and servicing by supplier • Ensure operator has valid training certificate and is registered with MOM with valid licence • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load	Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put sign board and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
3	Removal of lifting gears after load is in position	Falling hazard (if rigging needs to be done at height)	Fatal fall	• Safety harness/ safety belt to be used above 2m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Dropped lifting gears	Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Pinch points, sharp edges	Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Lifting Pipe by Lorry Crane	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Attaching lifting gear to the pipe	• Falling hazard (if rigging needs to be done at height)	• Fatal fall	• Safety harness/ safety belt to be used above 2m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awarenes	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Hoisting of load/ positioning of load/ lowering of load onto lorry	Pipe is dislodged or dropped	Struck by falling load	• Verified non-destructive testing report prior to lifting operation • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Failure/ Toppling of crane	Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use • Monthly maintenance and servicing by supplier • Ensure operator has valid training certificate and is registered with MOM with valid licence • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure that load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load (pipe	Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put sign board and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
3	Transport pipe to work location	Moving vehicle with heavy load	Struck by moving vehicle	• Observe speed limit • Qualified driver • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Foreman Driver	DD-MM-YY	
			Struck by falling object (pipe)	• Load must be properly secured • Red cloth to be tied at end of long pipe • Ensure load capacity of lorry is not exceeded	5	1	5	Nil	-	-	-	Foreman Driver	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Hoisting of load/ positioning of load/ lowering of load off the lorry	Pipe is dislodged or dropped	Struck by falling load	• Verified non-destructive testing report prior to lifting operation • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Failure/ Toppling of crane	Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure that load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load (pipe)	Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put sign board and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Lifting of Steel Plates in Workshop using Overhead Crane	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Attaching lifting gear to the pipe	• Falling hazard (if rigging needs to be done at height)	• Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awarenes	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Hoisting of load/ positioning of load/ lowering of load onto lorry	Load is dislodged or dropped	Struck by falling load	• Welding eye lug, must be checked by competent person (e.g., QA/ QC before work starts • Stop crane movement if load swing is too extensive	5	2	10	Verified non-destructive testing report prior to lifting operation	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Failure/ Toppling of crane	Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load pipe	Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification. • Stop work during poor weather • Put sign board and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
3	Removal of lifting gears after load is in position	Falling hazard (if rigging needs to be done at height)	• Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Transportation of Scaffold Material from Berth Side to Vessel	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Attaching lifting gear to the pipe	• Falling hazard (if rigging needs to be done at height)	• Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awarenes	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Hoisting of load/ positioning of load/ lowering of load onto lorry	Load is dislodged or dropped	Struck by falling load	• Stop crane movement if load swing is too extensive	5	2	10	Verified non-destructive testing report prior to lifting operation.	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Failure/ Toppling of crane	Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use. • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence. • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load	Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put sign board and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
3	Removal of lifting gears after load is in position	Falling hazard (if rigging needs to be done at height)	Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	1	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Floating Crane Lifting/ Heavy Lifting	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Setting up of mooring lines upon arrival of floating crane by tugboat	• Physical handling of taut mooring lines	• Hand and finger injuries	• Personnel to be cleared from mooring line limit • Physical check on bollard and anchoring points by crane section • Ensure proper communication between work parties	4	1	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
2	Floating crane crew to attach lifting gear to the load	• Falling hazard (if rigging needs to be done at height)	• Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
3	Hoisting of load/ positioning of load/ lowering of load onto lorry	• Load is dislodged or dropped	• Struck by falling load	• Stop crane movement if load swing is too extensive	5	2	10	Verified non-destructive testing report prior to lifting operation	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Failure/ Toppling of crane	• Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use. • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure that load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load	Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Ensure adequate lighting is maintained throughout lifting work • Stop work during poor weather • Put sign board and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Removal of lifting gears after load is in position	• Falling hazard (if rigging needs to be done at height)	• Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness	-	-	-	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Lifting Scaffold Material Using Forklift	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Driving forklift to load	• Moving vehicle	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots, and so on • Use of signals (flashing lights, horns) at above locations	5	1	5	Foreman Trained Forklift Operator	DD-MM-YY	
2	Lifting the load	• Load is dislodged or dropped	• Struck by falling objects	• Keep within SWL of forklift • Secure load • Ensure that there are no obstacles in path of movement • Barricade area if need be	5	1	5	• Use larger forklift or an approved adapter if load is too long or unstable	5	1	5	Foreman Trained Forklift Operator	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Transporting load to designated area	Moving vehicle	Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots, and so on • Use of signals (flashing lights, horns) at above locations	5	1	5	Trained forklift operator	DD-MM-YY	
		Load is dislodged or dropped	Struck by falling objects	• Keep within SWL of forklift • Ensure no speeding • Secure load • Ensure no obstacles in path of movement • Pre-plan route • If transported load obstructs forklift operator's view, forklift is to be driven in reverse direction.	5	1	5	Nil	-	-	-	Trained forklift operator	DD-MM-YY	
4	Unloading	Load is dislodged or dropped	Struck by falling objects	• Ensure area is kept clear before commencing unloading • Barricade area if need be	5	1	5	Nil	-	-	-	Foreman Trained forklift operator	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Reversing and parking the forklift	Moving vehicle	Struck by moving vehicle	• Use of warning buzzer or horn • Check that immediate area is clear of people or other obstacles • Direct or divert traffic if need be	5	1	5	Nil	-	-	-	Foreman Trained forklift operator	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:	Reference Number
Process:	Mobile Crane Lifting of Irregularly Shaped Structure	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Attaching lifting gear to the load	Falling hazard (if rigging needs to be done at height)	• Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness through safety briefing/ training	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
2	Operational test lift/ actual load hoisting/ positioning of load/ lowering of load by floating crane crew	Load is dislodged or dropped	• Struck by falling load	• Assess the weight and CG of irregularly shaped structure • Stop crane movement if load swing is too extensive	5	2	10	• Verified non-destructive testing report prior to lifting operation	5	1	5	Lifting supervisor	DD-MM-YY	
		Failure/ Toppling of crane	• Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use. • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure that load is within safe work limit of crane, consult crane's load chart • Check CG of load by second party	5	1	5	• Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load	Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put sign board and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen Pre-briefing before test lift	DD-MM-YY	
3	Removal of lifting gears after load is in position	Falling hazard (if rigging needs to be done at height)	Fatal fall	• Safety harness/ safety belt to be used above 2 m and on hanging staging	5	2	10	• Supervisor checks workers for harness and anchor before work • Increase safety awareness	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Dropped lifting gears	• Struck by falling object	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (hand glove, etc.)	2	2	4	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

RISK ASSESSMENT – Mechanical Work

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Bow Thruster Overhaul	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Isolate hydraulic system and power supply	• Live power supply	• Fatal electric shock	• Lock out tag out system	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Possible oil spill	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep area clear/ dry	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Dismantle bow thruster at working platform	• Falling from height	• Fatal fall	• VSCC • Staging/ scaffold • Use body harness and anchor on anchorage point	5	2	10	Supervisor checks workers for harness and anchor before work	5	1	5	Supervisor	DD-MM-YY	
		• Dropped/ falling objects	• Struck by light falling objects	• Use of lanyards to bind tools to worker	3	2	6	Barricade work area	3	1	3	Supervisor	DD-MM-YY	
3	Lifting and shifting of bow thruster	• Falling objects	• Fatally struck by falling objects	• Qualified signaler/ rigger • Valid inspection tag for lifting appliances • Provide lifting containers/ casing	5	2	10	Barricade affected area	5	1	5	Lifting supervisor	DD-MM-YY	Inspection record for crane and lifting gear to be available on site
4	Repairing and replacing worn material	• Hands caught in between objects	• Hand injuries	• Proper communication between work parties and use of suitable PPE • Highlight hazards during toolbox meeting.	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Inspecting and assembling bow thruster	• Hands caught in between objects	• Hand injuries	• Proper communication between work parties and use of suitable PPE • Highlight hazards during toolbox meeting.	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Testing and completion	• High pressure hydraulic leakage	• Struck by highly pressurised liquids	• Barricade testing area and coordinate job in VSCC meeting • Ensure no incompatible work is carried out	4	1	4	Nil	-	-	-	Ship representative/ Testing engineer	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Cargo Pump Overhaul	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspection of Pump room	• Lack of oxygen • Possible presence of toxic gases	• Asphyxiation • Exposure to toxic gases	• Entry permit for confine space • Gas check	5	2	10	• Forced ventilation and general lighting • Portable gas monitor issued to each	5	1	5	Supervisor HSE Officer	DD-MM-YY	
		• Debris and liquids on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep area clear/ dry	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Isolate system	Struck by spanner	Hand and finger injuries	• Use of PPE • Use of suitable tools, correctly sized or adjusted spanners	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Dismantling pipe lines	Struck by tools/ pipe	Hand and finger injuries	• Use of PPE • Use of suitable tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Remove dismantle pump casing impeller	Leakage of oil	Bodily injuries due to slip and fall	• Use saw dust to absorb spilled oil • Collect oil in oil container	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Clearing access for shifting of pump	Struck by falling objects	Bodily injuries	• Barricade work area • Conduct safety briefing	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Dismantling pump equipment in workshop	Struck by dropped objects/ pressurised liquids	Hand, finger and eye injuries	• PPE (e.g., anti-slip gloves, goggles) • Barricade work area and display signboards	2	2	4	Nil	-	-	-	Workshop foreman	DD-MM-YY	
7	Cleaning, inspecting and measuring pump parts	Struck by dropped objects/ equipment	Hand and finger injuries	• Use proper PPE/ proper tools	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
8	Replace bearing/ mechanical seal	Struck by dropped objects/ equipment	Hand and finger injuries	• Use proper PPE/ proper tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
9	Install back shaft, impeller, couplings	Struck by dropped objects/ equipment	Hand and finger injuries	• Use proper PPE/ proper tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
10	Reinstall on board the vessel	Struck by dropped objects/ equipment	Hand and finger injuries	• Use proper PPE/ proper tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
11	Alignment and commissioning	Struck by object/ pressurised liquid	Hand/ finger/ eye injuries	• PPE (e.g., anti-slip gloves, goggles) • Barricade work area and display signboards • Conduct safety briefing	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Measurement of Rudder	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspection of rudder	• Falling from height	• Fatal fall	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work • Tool box meeting to brief workers	5	1	5	Nil	-	-	-	Mechanical supervisor	DD-MM-YY	
2	Remove rudder bottom plug	• Oil spillages, slip and Fall	• Body injuries	• Apply permit-to-work • Prepare container for collecting drain oil, clean up any spilt oil	2	2	4	Nil	-	-	-	Mechanical supervisor	DD-MM-YY	
3	Remove access cover (bolted type)	• Struck by dropped object	• Fatality	• Coordinate and wear proper PPE • Barricade and restrict access to area where objects can fall	5	1	5	Nil	-	-	-	All trade supervisors	DD-MM-YY	
4	Check clearance	• Struck or cut by hand tools	• Finger injuries	• Wear hand gloves • Provide adequate lighting	3	2	6	Tool box meeting to brief workers	2	2	4	Mechanical supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Final Inspection	• Falling from height	• Fatality	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work • Tool box meeting to brief workers	5	1	5	Nil	-	-	-	Mechanical supervisor	DD-MM-YY	
6	Close rudder access	• Struck by dropped object	• Major injuries	• Wear proper PPE • Ensure area is barricaded	4	1	4	Nil	-	-	-	All trade supervisors	DD-MM-YY	
7	Refit the rudder bottom plug	• Struck by hand tool	• Hand and finger injuries	• Wear hand gloves • Provide adequate lighting	2	3	6	• Tool box meeting to brief workers	2	2	4	Mechanical supervisor	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:		Reference Number
Process:	Propeller Withdrawal	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Erect staging	• Falling from height	• Fatal fall	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work • Tool box meeting	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
2	Weld eye piece on ship hull	• Falling from height	• Fatal fall	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work • Tool box meeting to brief workers	5	1	5	Nil	-	-	-	Welding supervisor	DD-MM-YY	
		• Live voltage	• Fatal electric shock	• Inspect equipment and wires before usage	5	1	5	Nil	-	-	-		DD-MM-YY	
		• Ignition source	• Finger injuries	• Apply for permit to work • Assign trained fire watchman to area	5	1	5	Nil	-	-	-		DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Set up chain blocks and slings to support propeller, rope guard and cone	• Falling from height	• Fatality	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work • Tool box meeting to brief workers	5	1	5	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
		• Struck by dropped object	• Major injuries	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed • Ensure that area is barricaded	4	1	4	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
4	Remove rope guard using gas cutter	• Ignition source	• Fire or explosion	• Apply for permit-to-work • Assign trained fire watchman to area	5	1	5	Nil	-	-	-	Immediate supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Remove cement and cone's bolts	• Falling from height	• Fatal fall	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work • Tool box meeting to brief workers	5	1	5	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
		• Struck by dropped object	• Major injuries	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed • Ensure that area is barricaded	4	1	4	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
6	Modify staging for cone removal	• Falling from height	• Fatal fall	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work • Tool box meeting to brief workers	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
7	Remove cone and propeller nut	Falling from height	Fatal fall	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor	5	1	5	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
		Struck by dropped object	Major injuries	• All loose items must be secured or removed • Ensure that area is barricaded	4	1	4	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
8	Modify staging to facilitate propeller removal	Falling from height	Fatal fall	• Use body harness and anchor on anchorage point • Supervisor checks workers for harness and anchor before work	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
9	Swing out propeller using crane and chain blocks	Struck by dropped object	Major injuries	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed • Ensure that area is barricaded	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Turbo Generator Overhaul	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Isolate system	• Hot steam present	• Scalding	• Proper heat resistant PPE	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live power supply	• Fatal electric shock	• Lock out tag out system	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Drain steam and oil	• Slip and fall	• Body, head and finger injuries	• Housekeeping and cleaning spilled oil by saw dust	1	1	1	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Use chain block to lift up cover and remove motor	• Struck by dropped object	• Major injuries	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed • Ensure that area is barricaded	4	1	4	Nil	-	-	-	Immediate supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Hydraulic Mooring Winch Overhaul	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Opening of foundation bolts and bearings	• Struck by flying objects	• Injuries to hands and eyes	• PPE (e.g., anti-slip gloves, goggles)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Loose objects on ground	• Injury due to slips, trips and falls	• Good housekeeping to keep area clear/ dry	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Remove hydraulic hoses	• Struck by hydraulic oil pressure	• Bodily injuries	• Barricade work area • Conduct safety briefing	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Oil leak onto ground	• Injury due to slips, trips and falls	• Follow SWP to drain oil properly	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Remove brake band	• Struck by dropped object	• Major injuries	• Follow PTW system • Use proper PPE	2	3	6	• Tool box briefing • Check hose before work	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Lifting the complete assembly to trailer and then to workshop	Caught in between objects	Body injuries	• Select correct lifting gear for task (size and capacity) • Use qualified riggers and signalmen • Use taglines to guide load • Maintain communication • All loose items must be secured or removed • Ensure that area is barricaded	4	1	4	Nil	-	-	-	Supervisor, signalman and rigger	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Crank Shaft Deflection	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Isolate LO system	• Oil spill	• Injury due to slips, trips and falls	• Confirm C/E to LO pump shut position(lock out/ tag out) • Supervisor to confirm and C/E to highlight in VSCC	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Open crank case door	• Heavy door	• Body injuries, struck by door	• Secure door to prevent unwanted movement	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
		• High heat	• Burns or scalds	• Ensure engine is cooled sufficiently • Supervisor to confirm with C/E	1	5	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Check turning gear. Engage condition to fly wheel. Switch On/ Off turning motor	• Electric shock	• Fatality	• During VSCC meeting, ensure condition of electric motor connections • Use proper PPE • Competent and trained person to operate	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Struck by rotating propeller	• Fatality	• Ensure nobody goes near propeller, using barricades and warning signs	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Set deflection gauge on web. Turn crank engine to record reading	• Oil on floor	• Injury due to slips, trips and falls	• Make sure work place must be clean and free from oil	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Reinstall crank case door	• Heavy door	• Body injuries, struck by door	• Make sure no person is inside crank case throughout the work	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Main Engine Piston Overhaul	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Dismantle cylinder head and lift it out using special tools	• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.) and suitable tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Struck by falling objects	• Bodily injuries	• Barricade work area • Conduct safety briefing	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Dismantle piston rod and stuffing box	• Slips and fall	• Body injuries	• Use proper work platform and suitable tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
3	De-carbon combustion area of liner by grinding	• Use of cutting tools	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Ignition source	• Fire or explosion	• Apply for permit-to-work • Assign trained fire watchman to area	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Tighten lifting tools on piston crown	• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Lift up piston using shore crane for vessel	• Load (piston) is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	Stop crane movement if load swing is too extensive	-	-	-	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Failure/ toppling of crane	• Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence • Daily pre-operational check by crane operator • Check maintenance record to ensure crane is serviced • Ensure load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Moving load (motor)	• Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put signboard and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
6	Transfer piston to workshop by 10 T lorry	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified driver • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Foreman Driver	DD-MM-YY	
			• Struck by falling object (piston)	• Load must be properly secured • Ensure that load capacity of lorry is not exceeded	5	1	5	Nil	-	-	-	Foreman Driver	DD-MM-YY	
7	Dismantle stuffing box piston rod at horizontal position	• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.) and suitable tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
8	Dismantle piston crown at vertical position using overhead crane in workshop	• Load (piston) is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.) and suitable tools	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
9	Chemical cleaning of piston rod crown	• Chemical exposure	• Chemical burns • Inhalation of toxic fumes	• Follow advice from SDS • Use appropriate PPE • Permit for cleaning only issued after precautions are in place	2	2	4	Nil	-	-	-	Supervisor HSE Officer	DD-MM-YY	Refer to SDS for details
10	Take clearance and measurements	• Measuring tape	• Finger injuries	• Appropriate PPE used (e.g., hand gloves, etc.)	1	1	1	Nil	-	-	-	Supervisor	DD-MM-YY	
11	Dye check piston crown	• Chemical exposure	• Health problems	• Follow advice from SDS • Use appropriate PPE • Permit for cleaning only issued after precautions are in place	2	2	4	Nil	-	-	-	Supervisor HSE Officer	DD-MM-YY	Refer to SDS for details

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Hydraulic Motor Overhaul	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Open up oil lines	• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.)	2	2	4	• Immediate supervision • Tool box briefing	2	1	2	Foreman	DD-MM-YY	
		• Oil on floor	• Injury due to slips, trips and falls	• Make sure workplace must be clean and free from oil	2	2	4	• Immediate supervision • Tool box briefing	2	1	2	Foreman	DD-MM-YY	
2	Remove mounting bolts	• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.) • Follow SWP	2	2	4	• Immediate supervision • Tool box briefing	2	1	2	Foreman	DD-MM-YY	
3	Hoisting motor from and back to its original position	• Load (motor) is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	• Stop crane movement if load swing is too extensive	5	1	5	Supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Failure/ Toppling of crane	• Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use. • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence. • Daily pre-operational check by crane operator. • Check maintenance record to ensure crane is serviced • Ensure load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Moving load (motor)	• Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put signboard and alert workers about the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
4	Fit back the motor and connect back oil lines	• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.) • Follow SWP	2	2	4	• Immediate supervision • Tool box briefing	2	1	2	Foreman	DD-MM-YY	
5	Testing the system	• High pressure	• Struck by highly pressurised liquids/ gases	• Barricade testing area and coordinate job in VSCC meeting • Ensure no incompatible work is carried out	4	1	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Steering Gear Pump Overhaul	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Lock up system and remove power supply	• Electrical hazard	• Finger/ hand injuries	• Brief workers • Discharge residual voltage • Isolate power supply • Ensure proper Lock Out & Tag Out	5	1	5	Nil	-	-	-	Trade leader	DD-MM-YY	
2	Isolate hydraulic system valves and drain oil	• Possible oil spill	• Minor injuries due to slips, trips and falls	• Open flanges to be blanked • Use of saw dust to absorb spilled oil	2	2	4	Nil	-	-	-	Trade leader	DD-MM-YY	
3	Hoisting to remove and replace pump, for overhauling and testing	• Load (pump) is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation. • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Failure/ Toppling of crane	• Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use. • Monthly maintenance and servicing by the supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence. • Daily pre-operational check by crane operator. • Check maintenance record to ensure crane is serviced • Ensure load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Moving load (pump)	• Struck by moving load	• Barricade work area and use tagline • Ensure crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification. • Stop work during poor weather • Put signboard and alert workers on the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
4	Reinstalling pump after overhauling and system testing	• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.) • Follow SWP	2	2	4	• Immediate supervision • Tool box briefing	2	1	2	Trade leader	DD-MM-YY	
		• Possible oil spill	• Minor injuries due to slips, trips and falls	• Use of saw dust to absorb spilled oil	2	2	4	Nil	-	-	-	Trade leader	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Air Compressor Overhaul	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Dismantling of pipe and valves	• Struck by ejected materials	• Injuries to hands and eyes	• PPE (e.g., anti-slip gloves, goggles) • Use of proper hand tools • Immediate supervision	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Dismantling of compressor casing and motor	• Electrical hazard	• Fatal electric shock	• VSCC • Brief workers • Discharge residual voltage • Isolate power supply • Ensure proper Lock Out & Tag Out	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Removal of cylinder head cover, connecting rod, bearings, and pistons springs and valve plates	• Struck by falling objects	• Bodily injuries	• Barricade work area • Conduct safety briefing • Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger • All loose items must be secured or removed	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Calibrate and replace with new parts	• Flying particles	• Eye injuries	• Wear face shield and highlight in safety briefing	4	1	4	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Re-assemble all previously dismantled parts	• Struck by falling objects	• Bodily injuries	• Barricade work area • Conduct safety briefing	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Testing and running of compressors	• Electrical hazard	• Fatal electric shock	• VSCC • Brief workers • Discharge residual voltage • Isolate power supply • Ensure proper Lock Out & Tag Out	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Engine Room Crane Overhaul	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Isolating the system	• Electrical hazard	• Fatal electric shock	• VSCC • Brief workers • Discharge residual voltage • Isolate power supply • Follow proper Lock Out & Tag Out procedures	5	1	5	Nil	-	-	-	Electrical supervisor	DD-MM-YY	
2	Erect Hanging Scaffold	• Falling hazard	• Fatal fall	• Highlight in VSCC meeting • Barricade work place • Use body harness and anchor on appropriate anchor (lifeline)	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Scaffold supervisor	DD-MM-YY	
			• Drowning	• All scaffolders to wear life vests • Use body harness and anchor on lifeline	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Removal of overhead crane from current position	• Falling hazard	• Fatal fall	• Highlight in VSCC meeting • Barricade work place • Use body harness and anchor on appropriate anchor	5	2	10	• Supervisor checks workers for harness and anchor before work	5	1	5	Mechanical supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Appropriate PPE used (e.g., hand glove, etc.) • Follow SWP	2	2	4	• Immediate supervision • Tool box briefing	2	1	2	Mechanical supervisor	DD-MM-YY	
4	Lifting and shifting crane out from vessel, hoisting in new crane during refit	• Load is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded	5	2	10	• Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Failure/ Toppling of crane	Fatal injuries, crushed by crane	• Yearly testing and examined by approved person. LM certificate issued before use. • Monthly maintenance and servicing by supplier • Ensure that operator has valid training certificate and is registered with MOM with valid licence. • Daily pre-operational check by crane operator. • Check maintenance record to ensure crane is serviced • Ensure that load is within safe work limit of crane, consult crane's load chart	5	1	5	Ensure that crane is on solid ground	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Moving load	• Struck by moving load	• Barricade work area and use tagline • Ensure that crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure that all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put signboard and alert workers on the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
4	Transporting crane to workshop by forklift	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit and SWL • Qualified forklift driver • Direct/ control traffic at junctions • Use beacon lights	5	1	5	Nil	-	-	-	Foreman Forklift driver	DD-MM-YY	
			• Struck by falling object (piston)	• Load must be properly secured • Ensure that load capacity of forklift is not exceeded	5	1	5	Nil	-	-	-	Foreman Forklift driver	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
6	Install back the overhead crane	• Struck by falling objects	• Bodily injuries	• Qualified rigger/ signalman, certified lifting gears, use guide rope and qualified crane operator • Tool box meeting • Highlight in VSCC • No person allowed under suspended load	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

RISK ASSESSMENT – Painting and blasting

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Grit Blasting in Confined Space (Ballast Tank/ Cargo Tank) with Scaffold	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Confined space entry	• Oxygen deficiency • Possible presence of toxic gases/ substances	• Fatality • Asphyxiation	• Entry Permit (PTW), display of boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Liquids or obstacles on floor	• Minor injuries due to slips, trips and falls	• Adequate lighting	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Mobilisation of equipment	• Moving vehicle	• Struck by moving vehicle	• Observe speed limit • Qualified driver • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Supervisor Driver	DD-MM-YY	
3	Setting up and testing of equipment	• Pressurised air usage	• Injuries, struck by compressed air/ hose	• Conduct pre-use checks • Wear appropriate PPE • Ensure that air receiver is in serviceable condition, check for validity	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Top up blasting grit	• Falling hazard	• Body injuries	• Barricade top area • Qualified signal/ rigger	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Inspection of scaffold	• Falling hazard	• Fatal fall	• Ensure scaffold certificate validity	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Commencement of grit blasting	• High pressure	• Injuries, struck by compressed air/ grit hose	• PTW • Provide appropriate PPE-equipment checklist • Provide adequate lighting • Maintenance to verify equipment safety after job completion	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Inhalation of grit/ dust	• Lung disease	• Wear appropriate PPE (particulate filters/ masks)	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Overcome by carbon monoxide when using diesel operated air compressor for breathing air supply	• Asphyxiation	• CO monitoring device installed (visual or audible alarm) • Checking of air filter • Maintenance to verify equipment safety after job completion	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
7	Grit removal and emptying the grit	• Dust/ grit inhalation	• Lung disease	• Wear appropriate PPE (particulate filters/ masks)	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Grit Blasting at Shipside with Cherry Picker (Dry Dock)	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Transporting of blasting equipment and material by forklift/ lorry truck from store to worksite	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified driver • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
		• Falling equipment	• Struck by falling object	• Load must be properly secured • Ensure clear passageway from surrounding area • Ensure that the load capacity of the lorry is not exceeded	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
2	Setting up of grit-blasting equipment	• Struck by falling objects	• Bodily injuries	• Barricade work area • Conduct safety briefing	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Pinch points, sharp edges	• Finger/ hand injuries	• Hand gloves • Maintain two-way communication • Using trained personnel • Observe safe manual handling practices	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
		• Slip, trip and fall	• Slip and fall on slippery work surface or trip and fall over hoses placed at passageway	• 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	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
3	Blasting operation	• High pressure	• Body injuries	• Physical check on hose condition • Secure hoses • Relief valve in safe working condition • Trained personnel • Functional test (gradually turn on) • Protective clothing	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Noise	• Noise-induced deafness (NID)	• Wear ear plugs	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Dust / grit inhalation	• Lung disease	• Blasting hood (air-fed) • Wear appropriate PPE (particulate filters/ masks)	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Overcome by carbon monoxide when using diesel operated air compressor for breathing air supply	• Asphyxiation	• CO monitoring device installed (visual or audible alarm) • Checking of air filter • Maintenance to verify equipment safety after job completion	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3.1	Operating cherry picker	• Moving vehicle (cherry picker)	• Collision, toppling of cherry picker	• Cherry picker in good working condition • Trained operator • Certification of cherry picker to be valid • Travelling path to be clear of obstruction and on even ground	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Work at height	• Fall from basket	• Wear travel restraint system and anchor to anchor point • Keep within SWL • Lower basket while travelling	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Contact with electric cables	• Electrocution	• Access path of travel and work area surroundings before operating • Ensure no contact between cherry picker and electrical cable	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Demob of blasting equipment	High pressure gases	Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Grit Blasting at Main Deck Onboard Ship	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Accessing work area for grit blasting	• Uneven, oily surfaces, hoses on floor	• Minor injuries due to slips, trips and falls	• Safety shoes • Use cable harness to hang up hoses • Keep surface clear and dry	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Equipment mobilisation using forklift and lorry crane	• Use of heavy vehicle (forklift)	• Fatality, struck by moving vehicle (forklift)	• Ensure that only trained and licensed forklift driver operates forklift • Ensure that the path of forklift is free from obstruction	5	2	10	• Use of warning siren during forklift movement	5	1	5	Supervisor	DD-MM-YY	Prepare forklift manual or checklist
		• Toppling of forklift or falling load	• Fatality	• Use proper pallet • Ensure not to overload • Secure load • Ensure that the path of forklift is free from obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Setting up of equipment	• Uneven surface, oily surface	• Minor injuries due to slips, trips and falls	• Safety shoes • Use cable harness to hang up hoses • Keep surface clean and dry	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Heavy equipment	• Musculoskeletal disorder (MSD)	• Brief workers • Do not lift heavy load manually • Use forklift or crane to lift equipment	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Blasting Operation	• High pressure	• Body injuries	• Physical check on hose condition • Secure hoses • Relief valve in safe working condition • Trained personnel • Functional test (gradually turn on) • Protective clothing	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Noise	• Noise-induced deafness (NID)	• Wear ear plugs	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Dust/ grit inhalation	• Lung disease	• Blasting hood (air-fed) • Wear appropriate PPE (particulate filters/ masks)	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Demob of blasting equipment	• High pressure gases	• Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Hydro-jetting with Rotor Gun in a Confined Space	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Transporting of hydro-jetting equipment by forklift from store to worksite	• Use of heavy vehicle (forklift)	• Fatality, struck by moving vehicle (forklift)	• Ensure that only trained and licensed forklift driver operates forklift • Ensure that the path of forklift is free from obstruction	5	2	10	• Use of warning siren during forklift movement	5	1	5	Supervisor	DD-MM-YY	Prepare forklift manual or checklist
		• Toppling of forklift or falling load (e.g., spray gun)	• Fatality	• Make use of proper pallet • Ensure not to overload • Secure load • Ensure that path of forklift is free from obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Setting up of hydro-jetting equipment	• Struck by falling objects	• Bodily injuries	• Barricade work area • Conduct safety briefing	2	2	4	• Supervision • Briefing to workers	2	1	2	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Pinch points, sharp edges	• Finger/ hand injuries	• Hand gloves • Maintain two-way communication • Observe safe manual handling practices	2	2	4	• Supervision • Briefing to workers	2	1	2	Supervisor	DD-MM-YY	
		• Unintentional high pressure discharge	• Leg injuries • Knocked down by pressure	• Ensure hydro-jetting equipment is tested and free from defects	3	2	6	• Supervision • Briefing to workers	3	1	3	Supervisor	DD-MM-YY	
3	Confined space entry	• Oxygen deficiency • Possible presence of toxic gases/ substances	• Fatality • Asphyxiation	• Entry Permit (PTW), display of boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Presence of great heights/ depths	• Fatal fall into depth	• Fall arrest system	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Liquids or obstacles on floor	• Minor injuries due to slips, trips and falls	• Adequate lighting	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Hydro-jetting with rotor gun	• High pressure discharge	• Leg injuries • Knocked down by pressure	• Ensure hydro-jetting equipment is tested and free from defects	3	2	6	• Supervision • Briefing to workers	3	1	3	Supervisor	DD-MM-YY	
5	Demob of hydro-jetting equipment	• High pressure gases	• Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Transporting of hydro-jetting equipment by forklift from worksite back to store	• Use of heavy vehicle (forklift)	• Fatality, struck by moving vehicle (forklift)	• Ensure that only trained and licensed forklift driver operates forklift • Ensure that the path of forklift is free from obstruction	5	2	10	• Use of warning siren during forklift movement	5	1	5	Supervisor	DD-MM-YY	Prepare forklift manual or checklist
		• Toppling of forklift or falling load (e.g., spray gun)	• Fatality	• Make use of proper pallet • Ensure not to overload • Secure load • Ensure that the path of forklift is free from obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Hydro-jetting on Main Deck with Rotor Gun	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Transporting of hydro-jetting equipment by forklift from store to worksite	• Use of heavy vehicle (forklift)	• Fatality, struck by moving vehicle (forklift)	• Ensure that only trained and licensed forklift driver operates forklift • Ensure that the path of forklift is free from obstruction	5	2	10	• Use of warning siren during forklift movement	5	1	5	Supervisor	DD-MM-YY	Prepare forklift manual or checklist
		• Toppling of forklift or falling load (e.g., spray gun)	• Fatality	• Make use of proper pallet • Ensure not to overload • Secure load • Ensure that path of forklift is free from obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Hydro-jetting with rotor gun	• High pressure discharge	• Leg injuries • Knocked down by pressure	• Ensure that hydro-jetting equipment is tested and free from defects	3	2	6	• Supervision • Briefing to workers	3	1	3	Supervisor	DD-MM-YY	
3	Demob of hydro-jetting equipment	• High pressure gases	• Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Transporting of hydro-jetting equipment by forklift from worksite back to store	• Use of heavy vehicle (forklift)	• Fatality, struck by moving vehicle (forklift)	• Ensure that only trained and licensed forklift driver operates forklift • Ensure that the path of forklift is free from obstruction	5	2	10	• Use of warning siren during forklift movement	5	1	5	Supervisor	DD-MM-YY	Prepare forklift manual or checklist
		• Toppling of forklift or falling load (e.g., spray gun)	• Fatality	• Make use of proper pallet • Ensure not to overload • Secure load • Ensure that path of forklift is free from obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:	Reference Number
Process:	Hydro-jetting with Rotor Gun at Shipside using Cherry Picker	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Transporting of hydro-jetting equipment by forklift/ lorry truck from store to worksite	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified driver • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
		• Falling equipment	• Struck by falling object	• Load must be properly secured • Ensure clear passageway from surrounding area • Ensure load capacity of lorry is not exceeded	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
2	Setting up of hydro-jetting equipment	• Struck by falling objects	• Bodily injuries	• Barricade work area • Conduct safety briefing	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Hand gloves • Maintain two-way communication • Using trained personnel • Observe safe manual handling practices	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
		• Slip, trip and fall	• Slip and fall on slippery work surface or trip and fall over hoses placed at passageway	• Maintain clean and dry work place at all times • Do not place blasting hoses at passageway • Hang blasting hoses using cable hanger	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
3	Hydro-jetting with rotor gun using cherry picker	• High pressure	• Body injuries	• Assigned trained operator/ blaster • Use of hose/ parts/ fittings of correct rating (SWP) without damage kinks • Release trigger of gun, release pressure in M/C and stop M/C before adjusting nozzle • Keep hands away from nozzle during operation • Secure all hoses, fittings adequately	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Noise	• Noise-induced deafness (NID)	• Wear ear plugs	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3.1	Operating cherry picker	• Moving vehicle (cherry picker)	• Collision, toppling of cherry picker	• Cherry picker in good working condition • Trained operator • Certification of cherry picker to be valid • Travelling path to be even and clear of obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Work at height	• Fall from basket	• Wear travel restraint system and anchor to anchor point • Keep within SWL • Lower basket while travelling	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Contact with electric cables	• Electrocution	• Access path of travel and work area surroundings before operating • Ensure no contact between cherry picker and electrical cable	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	De-setting of hydro-jetting equipment at worksite	• Presence of hoses and small parts on floor	• Minor injuries due to slips, trips and falls	• Keep workplace clean and neat • Do not place hoses at passageway, roll them properly and pack • Disconnect fittings carefully and store in M/C's • Disconnect guns and store properly • Finally pack all accessories/ secure it/ lock the M/C • Clear passageway	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Demob of hydro-jetting equipment	• High pressure gases	• Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Transporting of hydro-jetting equipment by forklift from worksite back to store	• Use of heavy vehicle (forklift)	• Fatality, struck by moving vehicle (forklift)	• Ensure that only trained and licensed forklift driver operates forklift • Ensure that path of forklift is free from obstruction	5	2	10	• Use of warning siren during forklift movement	5	1	5	Supervisor	DD-MM-YY	Prepare forklift manual or checklist
		• Toppling of forklift or falling load (e.g., spray gun)	• Fatality	• Use proper pallet • Ensure not to overload • Secure load • Ensure path of forklift is free from obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Spray Painting with Airless Spray Gun in a Confined Space	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Transporting of painting equipment by forklift from store to worksite	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified operator • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
		• Falling equipment	• Struck by falling object	• Load must be properly secured • Ensure clear passageway from surrounding area • Ensure load capacity of lorry is not exceeded	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
2	Lifting of equipment on board vessel by crane	• Falling equipment	• Struck by falling object	• Adhere to lifting plan • Assign trained signaller and rigger • Assign trained crane operator • Check and inspect all lifting devices before use • Load secured properly • No obstruction	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Setting and connecting all equipments	• Pinch points, sharp edges	• Finger/ hand injuries	• Hand gloves • Maintain two-way communication • Using trained personnel • Observe safe manual handling practices	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
		• Slip, trip and fall	• Slip and fall on slippery work surface or trip and fall over loose objects placed on passageway	• Maintain clean and dry workplace at all times • All hoses and cables laid out properly	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
4	Testing of equipment	• High noise level	• Noise-induced deafness (NID)	• Wear ear plugs	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• High pressure splashing	• Eye injuries	• Wear eye protection goggles	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Mixing paint	• Emission of toxic fumes	• Inhalation of harmful vapour	• Ensure work area is well-ventilated	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flammable substances	• Fire or explosion	• Ensure work area is well-ventilated • Ensure no ignition sources are present • Ban smoking • Barricade work area, display warning sign	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
6	Spray painting in confined spaces with airless gun	• Flammable gases may be present in confined space	• Fire or explosion	• Perform gas testing before and during work • Provide air supply with ventilation • Have trained fire watchman and fire fighting equipment nearby	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Presence of great heights/ depths	• Fatal fall from height	• Fall arrest system • Provide sufficient lighting	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Oxygen deficiency • Possible presence of toxic gases/ substances	• Fatality due to asphyxiation or toxic gases	• Entry permit (PTW), display of boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• High pressure discharge	• Body injuries • Knocked down by pressure	• Ensure hydro-jetting equipment is tested and free from defects • Keep spray gun tip pointed away from persons	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Demobilising	• High pressure gases	• Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Paint may be sprayed out accidentally	• Health problems	• Use proper PPE • Clear all empty paint drums and do housekeeping upon completion of work	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Paint injection	• Serious body injuries	• Spray gun must not be pointed at persons • Workers must be trained not to stop any leaks with their hand or body	4	1	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:	Reference Number
Process:	Spray Painting Using Airless Spray Gun at Shipside with Cherry Picker	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Work area assessment	• Presence of slippery or wet surfaces, wires and cables on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep area clear/ dry • Use cable hanger to hang cable	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Transporting of painting equipment by forklift from store to worksite	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified operator • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
		• Falling equipment	• Struck by falling object	• Load must be properly secured • Ensure clear passageway from surrounding area • Ensure load capacity of vehicle is not exceeded	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Setting up of spray painting equipment	• Struck by falling objects	• Bodily injuries	• Barricade work area • Conduct safety briefing	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
		• Pinch points, sharp edges	• Finger/ hand injuries	• Hand gloves • Maintain two-way communication • Using trained personnel • Observe safe manual handling practices	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
		• Slip, trip and fall	• Slip and fall due to objects on ground	• Maintain clean and dry workplace at all times	2	2	4	• Supervision • Briefing to workers	2	1	2	Immediate supervisor	DD-MM-YY	
4	Mixing paint	• Emission of toxic fumes	• Inhalation of harmful vapour	• Ensure work area is well-ventilated • Wear appropriate face mask	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flammable substances	• Fire or explosion	• Ensure work area is well-ventilated • Ensure no ignition sources are present • Ban smoking • Barricade work area, display warning sign	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Spray painting using airless spray gun with cherry picker	• High pressure	• Body injuries due to paint injection	• Assigned trained operator/ painter • Keep hands away from nozzle during operation • Ensure equipment are checked before use	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Flammable substances	• Fire or explosion	• Ensure no ignition sources are present • Ban smoking • Barricade workarea, display warning sign	5	1	5	Nil	-	-	-	Immediate Supervisor	DD-MM-YY	
		• Exposure to toxic vapours	• Health problems due to inhalation	• Wear appropriate PPE (face mask, goggles, etc)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
5.1	Operating cherry picker	• Moving vehicle (cherry picker)	• Collision, toppling of cherry picker	• Cherry picker in good working condition • Trained operator • Certification of cherry picker to be valid • Travelling path to be even and clear of obstruction	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Work at height	• Fall from basket	• Wear travel restraint system and anchor to anchor point • Keep within SWL • Lower basket while travelling	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Contact with electric cables	• Electrocution	• Access path of travel and work area surroundings before operating • Ensure no contact between cherry picker and electrical cable	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
7	Demobilisation of painting equipment	• High pressure gases	• Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Paint may be sprayed out accidentally	• Health problems	• Use proper PPE • Clear all empty paint drums and do housekeeping upon completion of work	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Paint injection	• Serious body injuries	• Spray gun must not be pointed at persons • Workers must be trained not to stop any leaks with their hand or body	4	1	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Spray Painting with Airless Spray Gun on Main Deck	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Transporting of painting equipment by forklift from store to worksite	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified operator • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
		• Falling equipment	• Struck by falling object	• Load must be properly secured • Ensure clear passageway from surrounding area • Ensure that load capacity of lorry is not exceeded	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
2	Blanking-up all pipelines by rubber gaskets, wooden plugs, covering protection on electrical equipment and etc.	• Presence of slippery or wet surfaces, wires and cables on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep area clear/ dry • Use cable hanger to hang cable	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Presence of sharp wires	• Hand injuries (cuts)	• Wear PPE (e.g., gloves)	1	2	2	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Barricade workarea	• Presence of slippery or wet surfaces, wires and cables on floor	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep area clear/ dry • Use cable hanger to hang cable	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Arrangement of equipment such as compressor, spray pumps, spray guns, paint, paints, rubbish bins	• Presence of slippery or wet surfaces	• Minor injuries due to slips, trips and falls	• Good housekeeping to keep the area clear/ dry	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling paint drums, hose (wharf arranging)	• Struck by falling objects	• Barricade workarea	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Mixing paint	• Emission of toxic fumes	• Inhalation of harmful vapour	• Ensure workarea is well-ventilated • Wear appropriate face mask	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flammable substances	• Fire or explosion	• Ensure workarea is well-ventilated • Ensure no ignition sources are present • Ban smoking • Barricade workarea, display warning sign	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
6	Spray painting using airless spray gun	• High pressure	• Body injuries due to paint injection	• Assigned trained operator/ painter • Keep hands away from nozzle during operation • Ensure equipment are checked before use	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flammable substances	• Fire or explosion	• Ensure no ignition sources are present • Ban smoking • Barricade work area, display warning sign	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Exposure to toxic vapours	• Health problems due to inhalation	• Wear appropriate PPE (e.g., face mask, goggles, etc)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Demobilisation of painting equipment	• High pressure gases	• Body injuries due to being struck by pressured gas hoses	• Turn off main valve • Release pressure in hoses before disconnecting • Brief workers • Supervision	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Paint may be sprayed out accidentally	• Health problems	• Use proper PPE • Clear all empty paint drums and do housekeeping upon completion of work	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Paint injection	• Serious body injuries	• Spray gun must not be pointed at persons • Workers must be trained not to stop any leaks with their hand or body	4	1	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Power Tooling at Open Space/ Decks	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Transporting of painting equipment by forklift from store to worksite	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified operator • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
		• Falling equipment	• Struck by falling object	• Load must be properly secured • Ensure clear passageway from surrounding area • Ensure that load capacity of lorry is not exceeded	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
2	Setting up of power tooling equipment	• Struck by falling air manifolds and air hoses	• Bodily injuries	• Barricade work area • Ensure hoses are shut before connecting • Conduct safety briefing	2	2	4	• Supervision • Briefing to workers	-	-	-	Immediate supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Power tooling work	• Sparks generated during work	• Fire/ explosion	• Check and ensure no flammable liquids are in surrounding areas • Co-ordinate work in VSCC meeting • Assign experienced workers • Close all air hoses when not in use	5	1	5	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
		• Particulates and hoses may affect eyes or body	• Injuries to eyes/ body	• Wear eye protection goggles • Use whip arrestor for connections	3	2	6	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
4	Demobilisation of power tooling equipment	• Presence of hoses on passageway	• Minor injuries due to slips, trips and falls	• Good housekeeping to clear area of hoses	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling air manifolds and hoses	• Struck by falling objects	• Barricade workarea • Secure loads and use proper lifting equipment	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Transporting of power tools/ equipment by forklift from worksite back to store	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit • Qualified operator • Direct/ control traffic at junctions	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	
		• Falling equipment	• Struck by falling object	• Load must be properly secured • Ensure clear passageway from surrounding area • Ensure that load capacity of vehicle is not exceeded	5	1	5	Nil	-	-	-	Immediate supervisor Driver	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Power Tooling in Confined Space	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspecting the location (confined space)	• Oxygen deficiency • Possible presence of toxic gases/ substances	• Fatality • Asphyxiation	• Entry Permit (PTW), display of boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Presence of great heights/ depths	• Fatal fall into depth	• Fall arrest system • Provide sufficient lighting	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Setting up of power tooling equipment	• Struck by falling air manifolds and air hoses	• Bodily injuries	• Barricade work area • Ensure hoses are shut before connecting • Conduct safety briefing	2	2	4	• Supervision • Briefing to workers	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Equipment distribution	• Pinch points	• Finger/ hand injuries	• Hand gloves • Maintain two-way communication	2	2	4	• Supervision • Briefing to workers	2	1	2	Supervisor	DD-MM-YY	
		• Falling objects	• Bodily injuries	• Secure loads and use proper lifting equipment and rigging • Conduct safety briefing	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Power tooling work	• Sparks generated during work	• Fire/ explosion	• Check and ensure no flammable liquids are in surrounding areas • Co-ordinate work in VSCC meeting • Assign experienced workers • Close all air hoses when not in use • Station fire watchman at confined space entry point	5	1	5	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
		• Particulates and hoses may affect eyes or body	• Injuries to eyes/ body	• Wear eye protection goggles • Use whip arrestor for connections	3	2	6	Nil	-	-	-	Immediate supervisor	DD-MM-YY	
5	General cleaning (vacuuming)	• Dust generated	• Respiratory disease	• Use proper respirator	2	1	2	Nil	-	-	-	Immediate supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
6	Demobilisation of power tooling equipment	• Presence of hoses on passageway	• Minor injuries due to slips, trips and falls	• Good housekeeping to clear the area of hoses	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling air manifolds and hoses	• Struck by falling objects	• Barricade work area • Secure loads and use proper lifting equipment	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

RISK ASSESSMENT – Piping

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Fabrication of Pipes in a Workshop	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Arranging materials in workshop using crane	• Falling pipe	• Fatality, crushed by pipe	• Use of wedges or side stoppers • Use chain or belt to secure • Use taglines	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Pinch points	• Finger/ hand injuries	• Hand gloves • Maintain two-way communication • Using trained personnel • Observe safe manual handling practices	2	2	4	• Supervision • Briefing to workers • Use crowbar to assist	2	1	2	Lifting supervisor	DD-MM-YY	
2	Cutting of pipe	• Sparks generated during cutting	• Fire	• Remove all combustible materials near workarea • Apply hot work permit	4	1	4	Nil	-	-	-	Workshop engineer	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
			• Injuries to eyes or hands	• Wear eye goggles and gloves	3	1	3	Nil	-	-	-	Workshop engineer	DD-MM-YY	
		• Falling objects	• Crushing injuries	• Secure pipe adequately • Control entry into work area • Use of LIG • Toolbox meeting	4	1	4	Nil	-	-	-	Workshop engineer	DD-MM-YY	
3	Grinding of pipe (electrical)	• Live current	• Electrocution	• Monthly inspection • Pre-use visual check • Cable routing on "S" hook/ cable rack/ housekeeping	5	2	10	Nil	-	-	-	Workshop engineer	DD-MM-YY	
		• Particles generated during grinding	• Injury to eyes or hands	• PPE (e.g., eye goggle, gloves, etc)	2	2	4	Nil	-	-	-	Workshop engineer	DD-MM-YY	
		• Sharp, moving machinery	• Cut or abrasion to hands	• Grinder guard • Use both hands to carry out work • PPE (e.g., gloves)	3	2	6	Nil	-	-	-	Workshop engineer	DD-MM-YY	
4	Fitting and welding	• Live current	• Electrocution	• Daily check for defects (e.g., exposed cable, etc) • Monthly servicing/ maintenance • Inspection tag • Shock preventer	5	1	5	Nil	-	-	-	Workshop engineer	DD-MM-YY	
		• High impact manual work	• Struck by hammer	• Limit to 21/2 pound hammer • Anti-slip handle grip • Training • Tool box meeting	4	2	8	Nil	-	-	-	Workshop engineer	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Installation of Sounding Pipe Inside Tank	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Pre-inspection and marking (within confined space)	• Oxygen deficiency • Possible presence of toxic gases/ substances	• Asphyxiation, overcome by gases	• Entry Permit (PTW) • Display boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling hazard, slips trips and falls	• Fatality due to fall	• Provide sufficient lighting • Three point contact maintained while climbing ladders • Workers to wear rubber boots • Briefing during toolbox meeting	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Possible presence of flammable gases	• Fire/ explosion	• Adequate ventilation • Only use explosion-proof lighting • Briefing during toolbox meeting	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Falling objects/ obstructions	• Struck by falling objects	• Ensure all workers wear safety helmet	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Fabrication of pipe spool on deck	• Welding	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
			• Burns	• Long sleeves with leather gloves • Covered safety shoes/ boots	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Pinch points/ sharp edges	• Hand/ finger injuries	• Maintain effective communication between co-workers • Wear gloves	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flying particles	• Eye injuries	• Wear safety glasses	4	1	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Loose parts and components on floor	• Slips, trips and falls	• Practice good house keeping • Keep passageways clear	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Cutting pipe penetration on main deck	• Use of acetylene torch	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Falling hazard	• Injury due to fall	• Cover up openings on ground • Standby watchmen	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Tripping hazards	• Sprained ankle, injuries due to fall	• Cover up openings on ground • Standby watchmen	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Welding double plate on tank bottom	• Welding	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Oxygen deficiency • Possible presence of toxic gases/ substances	• Asphyxiation, overcome by gases	• Entry Permit (PTW) • Highlight in VSCC • Display boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Valid inspection tag • Pre-use check by users • Do not use tools with damaged cables • Wear leather gloves and boots • No wet clothes • Toolbox meeting	5	1	5	Nil	-	-	-	Holder Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Lowering pipe to the tank	• Pipe can be dislodged	• Struck by falling objects (fatal)	• Do not hoist loads over persons • Maintain communication, ensure that workers can understand each other	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Pinch points/ sharp edges	• Hand/ finger injuries	• Maintain effective communication between co-workers • Wear gloves • Remove sharp edges	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Install pipe (bottom to top)	• Scaffold defect	• Fatal fall from height	• Ensure scaffold was inspected and has a valid "ok" tag • Visually inspect scaffold before use	5	2	10	• Ensure no modification to scaffold	5	1	5	Supervisor	DD-MM-YY	
7	Housekeeping	• Objects dropped onto others	• Injuries due to being struck by falling objects	• Secure all tools • Collect all rubbish in bags	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Installation of Drain Line below Helipad	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Scaffold erection	• Falling from height	• Fatal fall	• Only use trained scaffold erectors • Use fall protection systems • Provide anchorage (e.g., independent vertical lifelines)	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
2	Collection and mobilisation of materials and tools from workshop	• Falling objects	• Struck by falling objects	• Ensure no overloading • Inspect lifting gears and their certificates before use	5	1	5	Nil	-	-	-	Piping supervisor	DD-MM-YY	
		• Pinch points	• Finger/ hand injuries	• Wear suitable gloves • Brief workers to watch out for pinch points	2	2	4	Nil	-	-	-	Piping supervisor	DD-MM-YY	
3	Lifting of spools using yard cranes	• Caught between objects	• Hand injuries	• Wear hand gloves • Secure bundle of pipes properly • Beware of pinch point • Use proper lifting gears	2	4	8	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Transfer tools and spool to install at location by chain blocks	• Falling objects	• Struck by falling objects	• Selection of appropriate belts and chain blocks • Proper secure points of chain block • Barricade area and display no entry sign	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
5	Installation of pipe and pipe's supports followed by welding	• Pinch points	• Hand/ finger injuries	• Beware of pinch point • Wear gloves • Proper tools box to be used	2	2	4	Nil	-	-	-	Piping supervisor	DD-MM-YY	
6	Removal of tools and leftover materials and housekeeping	• Falling objects	• Struck by falling objects	• Keep all materials in bags during removal • No throwing of items downwards	2	2	4	Nil	-	-	-	Piping supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Installation of PVC Pipes in Accommodation Quarters	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspecting location that the PVC pipe spool will be installed	• Small, loose materials on floor	• Sprains and bruises due to slips, trips and falls	• Maintain good housekeeping	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Preparing tools and equipment	• Small flying objects	• Eye/ hand injuries	• Tools to be inspected and in good condition before work • Wear safety glasses and gloves	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Installation of pipe support	• Use of welding equipment	• Fire and explosion	• Fire watchman present • Valid hot work permit • Fire cloth • Fire extinguisher	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Laying of pipe	• Falling objects	• Struck by falling objects	• Workers to communicate and coordinate work • No worker stands directly below pipe • Follow safe work procedures	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Bonding of pipe	• Use of chemicals	• Skin irritation	• Consult SDS • Use appropriate PPE (e.g., gloves)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Clamping of pipe	• Creation of pinch points	• Finger injuries	• Use of correct tools • Follow SWP	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Removal and Replacement of Portable Hot Water Pipes in Accommodation Quarters	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Remove ceiling panel for access	• Falling objects	• Struck by falling objects	• Cordon off workarea	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working at height	• Fall from height	• Use proper work platform	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Contact with insulation	• Skin irritation	• Wear protective clothing	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Removing pipe insulation	• Falling objects	• Struck by falling objects	• Cordon off workarea	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working at height	• Fall from height	• Use proper work platform	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Contact with insulation	• Skin irritation	• Wear protective clothing	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Dismantling bolt-nut and clamp	• Contact with hot water	• Scalding	• Shut off system and drain it of water before work commences	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Struck by hammer during work	• Hand/ finger injuries	• Use proper tools, chisel with cap • Provide sufficient lighting • Wear hand gloves	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Shifting out pipe	• Pinch points	• Finger injuries	• Use mechanical means to move the pipe • Wear hand gloves	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Transport to workshop	• Moving vehicle (forklift)	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spot, and so on • Use of signals (flashing lights, horns) at above locations	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	
		• Loose material	• Struck by object falling from forklift	• Keep within SWL of forklift • Secure load (web sling) • Ensure no obstacles in path of movement	5	1	5	• Use larger forklift or an approved adapter if load is too long or unstable	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
6	Fabrication of pipe spool on deck	• Hot works	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Proper insulation of electrical tools • Ensure body and hands are kept dry	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• UV radiation from welding	• Arc eye	• Use tinted welding masks/ goggles that block UV rays	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flying particles	• Eye injuries	• Wear safety glasses	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Struck by objects during work	• Hand/ finger injuries	• Make use of proper tools • Wear hand gloves	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Transport to workshop	• Moving vehicle (forklift)	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots, and so on • Use of signals (flashing lights, horns) at above locations	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	
		• Loose material	• Struck by object falling from forklift	• Keep within SWL of forklift • Secure the load (web sling) • Ensure no obstacles in path of movement	5	1	5	• Use larger forklift or an approved adapter if load is too long or unstable	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	
8	Box up the pipe	• Contact with hot water	• Scalding	• Shut off system and drain it of water before work commences	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Struck by hammer during work	• Hand/ finger injuries	• Use proper tools, chisel with cap • Provide sufficient lighting • Wear hand gloves	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
9	System test	• Possible leakages	• Injuries due to slips, trips and falls on wet floor	• Cordon off workarea • Practice good housekeeping • Display warning signs	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
10	Box up insulation	• Falling objects	• Struck by falling objects	• Cordon off workarea	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working at height	• Fall from height	• Use proper work platform	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Contact with insulation	• Skin irritation	• Wear protective clothing	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Removal of Exhaust Pipes from Engine Room	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Removal of insulation from existing pipes	• Work at height	• Fatal fall	• Use certified scaffold/ working platform with "ok" tag • Highlight in VSCC	5	1	5	Nil	-	-	-	Piping supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Clear all unwanted materials and tools from platform • Keep all loose items in bags or boxes	5	1	5	Nil	-	-	-	Piping supervisor	DD-MM-YY	
		• Fine (fibre) particles created	• Inhalation of fine particles	• Use appropriate PPE (e.g., particulate face masks) • Briefing to workers	3	2	6	Nil	-	-	-	Piping supervisor	DD-MM-YY	
2	Proper securing of pipe	• Work at height	• Fatal fall from height	• Use certified scaffold/ working platform with "ok" tag • Highlight in VSCC	5	1	5	Nil	-	-	-	Piping supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Falling objects	• Struck by falling object	• Using of certified lifting gears • Liaise with vessel's C/E to ensure strength of securing point • Close monitoring and supervision	5	1	5	Nil	-	-	-	Piping supervisor	DD-MM-YY	
		• Caught in between objects	• Hand/ finger injuries	• Maintain communication • Close monitoring and supervision • Wear gloves	3	2	6	Nil	-	-	-	Piping supervisor	DD-MM-YY	
3	Removal of bolt and nuts (cold works)	• Work at height	• Fatal fall from height	• Use certified scaffold/ working platform with "ok" tag • Highlight in VSCC	5	1	5	Nil	-	-	-	Piping supervisor	DD-MM-YY	
		• High impact manual work	• Struck by tools (e.g., hammer)	• Anti-slip handle grip • Wear gloves • Training • Tool box meeting	4	2	8	Nil	-	-	-	Piping supervisor	DD-MM-YY	
4	Shifting and lifting of pipes from engine room	• Falling objects	• Struck by falling object	• Using of certified lifting gears • Close monitoring and supervision • Deployment of qualified riggers and signalmen	5	1	5	Nil	-	-	-	Piping supervisor	DD-MM-YY	
		• Caught in between objects	• Hand/ finger injuries	• Maintain communication • Close monitoring and supervision • Wear gloves	3	2	6	Nil	-	-	-	Piping supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Repair of Pipe Joint that Failed Radiography Test	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Gouge out weldment	• Hot works (welding)	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Proper insulation of electrical tools • Ensure body and hands are kept dry	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• UV radiation from welding	• Arc eye	• Tinted welding masks/ goggles that block UV rays to be used	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Edge preparation — levelling	• Hot works (grinding)	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• UV Radiation from welding	• Arc eye	• Tinted welding masks / goggles that block UV rays to be used	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Edge preparation - levelling	• Hot works (grinding)	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flying particles	• Hand/ finger or face/ eye injuries	• Face shield • Gloves	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Fit and joint realignment	• Pinch points	• Hand/ finger injuries	• Use correct tools • Wear gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Pre-heating using heating torch	• Use of torch	• Fire	• Use of flame proof PPE • Allocate sufficient space for pre-heating	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Welding	• Hot works (welding)	• Fire/ explosion	• Valid hot work permit • Pre-use check by supervisor • Qualified fire watchman with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Proper insulation of electrical tools • Ensure body and hands are kept dry	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• UV radiation from welding	• Arc eye	• Tinted welding masks/ goggles that block UV rays to be used	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Metallic fumes generated	• Metal fume fever due to inhalation	• Provide ventilation/ exhaust system • Wear proper respirator	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Surface-power brushing	• Flying particles	• Hand/ finger or face/ eye injuries	• Face shield • Gloves	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Dust generated	• Inhalation of dust	• Use appropriate PPE (particulate face masks) • Briefing to workers	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Renewal of High Pressure Hydraulic Pipes from Main Deck	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Dismantling pipes in sequence	• Work at height	• Fatal fall	• Use certified scaffold/ working platform with "ok" tag • Highlight in VSCC	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Clear all unwanted materials and tools from platform • Keep all loose items in bags or boxes	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Transportation of pipes from main deck to quay side by shore crane	• Falling objects	• Struck by falling objects	• Use tag line • Qualified signalmen • No hoisting above persons • Proper lashing/ rigging • Ensure validity of lifting belts • Keep within SWL	5	1	5	Nil	-	-	-	Lifting Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Transport pipes from quay side to workshop	• Moving vehicle (forklift)	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators can operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots, and so on • Use of signals (flashing lights, horns) at above locations	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	
		• Loose material	• Struck by object falling from forklift	• Keep within SWL of forklift • Secure load (web sling) • Ensure no obstacles in path of movement	5	1	5	• Use larger forklift or an approved adapter if load is too long or unstable	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	
4	Collect newly fabricated pipe from workshop	• Falling objects	• Struck by falling objects	• Use tag line • Qualified signalmen • No hoisting above persons • Proper lashing/ rigging • Ensure validity of lifting belts • Keep within SWL	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
5	Installing pipe back in position	• Work at height	• Fatal fall	• Use certified scaffold/ working platform with "ok" tag • Highlight in VSCC	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Pinch points	• Hand/ finger injuries	• Use correct tools • Wear gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Hydrotest of Hydraulic Lines at 3,000psi Pipe Renewal Main deck	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Preparing equipment	• Pinch points	• Finger injuries	• LOTO system info c/e VSCC meeting (permit-to-work) • PPE • Certified testing equipment • Briefing of work to worker	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Transport from store to berth by lorry	• Moving vehicle (lorry)	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure lorry is in good condition • Perform daily inspection checklist and report defects found. • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots etc. • Use of signals (e.g., horns) at above locations	5	1	5	Supervisor Lorry driver	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Loose material	• Struck by object • Falling from forklift	• Keep within SWL of forklift • Secure load (pallet/ containers) • Ensure no obstacles in path of movement	5	1	5	Nil	-	-	-	Supervisor Lorry driver	DD-MM-YY	
3	Lifting by shore crane	• Caught between objects	• Hand injuries	• Wear hand gloves • Secure bundle of pipes properly • Beware of pinch point • Use proper lifting gear	2	4	8	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Selection of appropriate belts and chain blocks • Proper secure points of chain block • Ensure operator is trained and certified • Barricade area and display no entry sign	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Setting up testing equipment	• Caught in between objects	• Hand/ finger injuries	• Use correct tools • Wear gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live currentl	• Electrocution	• Lockout/ tag out • Safety signboards (e.g., "High Pressure Testing in progress")	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Dismantling of existing hydraulic pipe	• Oil spillage	• Injury due to slipping and falling	• To follow safe work procedure • Oil collect container • Oil absorbent sheet	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Presence of flammable substances	• Fire/ explosion	• Hot work permit • Fire watchmen stationed	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Struck by objects/ tools	• Hand injuries	• Use proper tools • Wear hand gloves	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Blanking of pipe ends and hook up to pump	• Caught in between objects	• Hand/ finger injuries	• Follow SWP for blanking • Use correct tools • Wear gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Oil spill	• Injury due to slipping and falling	• Oil collect container • Oil absorbent sheet	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Filing water of hydro test pipe line (150psi)	• Pressured overflow	• Injuries to eyes	• Barricade testing area and display signs • Conduct briefing • Wear appropriate PPE (e.g., eye goggles or face shield)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
8	Checking of increasing of hydro test (750psi)	• Leakage at the joint pipe	• Injuries to eyes	• Barricade testing area and display signs • Conduct briefing • Wear appropriate PPE (e.g., eye goggles or face shield)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
9	Increasing pressure slowly from 750 to 3000psi	• Pipe burst	• Body injuries	• Check pipe joints • Continuous close monitoring of situation	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
10	Release of pressure (slowly)	• Sudden pressure release	• Body injuries	• Follow SWP • Wear appropriate PPE (e.g., eye goggles or face shield)	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
11	Dismantling of testing connections	• Struck by objects	• Hand/ finger injuries	• Follow SWP • Wear appropriate PPE (e.g., gloves)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	

RISK ASSESSMENT – Steelwork

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Renewal of Pump Room Bulkhead	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Entry into confined space (pump room and cargo tank)	• Oxygen deficiency • Possible presence of toxic gases/ substances	• Fatality • Asphyxiation	• Entry Permit (PTW), display of boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Liquids or obstacles on floor	• Minor injuries due to slips, trips and falls	• Provide adequate lighting	2	2	4	Nil	2	1	2	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Cut deck access opening	• Hot works	• Fire and explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working at height	• Fatal fall	• Barricade in cargo tank • Weld support on 4 sides	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Lifting of plate	• Caught between objects	• Hand injuries	• Wear hand gloves • Secure bundle of pipes properly • Beware of pinch point • Use proper lifting gear	2	4	8	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Selection of appropriate belts and chain blocks • Proper secure points of chain block • Qualified signalmen, riggers • Ensure operator is trained and certified • Barricade area and display no entry sign	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Cutting of damaged bulkhead	• Hot works	• Fire and explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working at height	• Fatal fall	• Barricade in cargo tank • Weld support on 4 sides	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Removal of cut steel plate to shore	• Falling object	• Struck by falling object	• Barricade lifting area • Qualified rigger • Qualified signalmen, riggers • Ensure operator is trained and certified • Valid lifting gear and in good working condition	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Caught between objects	• Hand injuries	• Wear hand gloves • Use tag lines • Keep people from entering work area	4	2	8	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
6	Lifting of new plate from shore to cargo hold	• Falling object	• Struck by falling object	• Barricade lifting area • Qualified rigger • Qualified signalmen, riggers • Ensure operator is trained and certified • Valid lifting gear and in good working condition	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
		• Caught between objects	• Hand injuries	• Wear hand gloves • Use tag lines • Keep people from entering work area	4	2	8	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
7	Fitting and welding of bulkhead	• Hot works	• Fire and explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working at height	• Fatal fall	• Barricade in cargo tank • Weld support on 4 sides	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Shellplate Renewal	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Steelwork • Marking • Cutting • Fitting • Welding • Grinding	• Hot works	• Fire or explosion	• Barricade work area • Valid hot work permit • Ensure equipment is in good condition • Only qualified personnel to do the work • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
	Steelwork • Lifting	• Falling object	• Struck by falling object	• Barricade lifting area • Qualified rigger • Qualified signalmen, riggers • Ensure operator is trained and certified • Valid lifting gear and in good working condition	5	1	5	Nil	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Testing/ NDT (vacuum test, X-ray visual)	• Falling objects	• Struck by falling object	• Barricade work area • Apply permit to work	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Hose under pressure, whipping, bursting	• Struck by whip, body injuries	• Use whip arrestor	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Radiation	• Radiation illness	• Barricade affected areas, display warning signs • Use of protective equipment against radiation • Monitor radiation exposure through film badges or dosimeters	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Renewal of Tank Top Plates	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Cutting out damaged plate	• Hot works	• Fire or explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Production supervisor/ Hull supervisor/ Contractor supervisor	DD-MM-YY	
		• Smoke and fumes from hot works	• Overcome by fumes	• Provide adequate ventilation	4	1	4	Nil	-	-	-			
2	Hoist out old plate and hoist in new plate	• Falling objects	• Struck by falling object	• Qualified signalmen, riggers • Ensure operator is trained and certified • Tag line • Clear and barricade lifting area • Valid lifting gear and in good working condition	5	1	5	Nil	-	-	-	Lifting supervisor		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Fit new plate	• Falling objects	• Struck by falling object	• Qualified signalmen, riggers • Ensure operator is trained and certified • Right fitters • Lifting supervisor • Clear and barricade lifting area • Valid lifting gear and in good working condition	5	1	5	Nil	-	-	-	Production supervisor/ Hull supervisor/ Contractor supervisor	DD-MM-YY	
4	Welding of new plate	• Hot works	• Fire and explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Site supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Daily check for defects (exposed cable, etc) • Monthly servicing/ maintenance • Good earthing for welding equipment • Hand gloves	5	1	5	Nil	-	-	-			
5	Gouging	• Hot works	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Site supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Sparks from hot work	• Burns	• Face shield • Gloves	3	2	6	Nil	-	-	-		DD-MM-YY	
		• Fumes generated	• Asphyxiation	• Provide adequate ventilation	5	1	5	Nil	-	-	-			
		Noise	• Noise-induced deafness (NID)	• Ear plugs	4	2	8	Nil	-	-	-			
6	Grinding	• Hot works	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Site supervisor	DD-MM-YY	
		• Sparks from hot work	• Burns	• Face shield • Gloves	3	2	6	Nil	-	-	-			
		• Fumes generated	• Asphyxiation	• Provide adequate ventilation	5	1	5	Nil	-	-	-			
		• Noise	• Noise-induced deafness	• Ear plugs	4	2	8	Nil	-	-	-			

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	To Remove and Renew all Platform Support and Gratings in E/R room	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Remove portable platform	• Material handling	• Struck by objects	• Barricade work area, display warning signs	2	3	6	Nil	-	-	-	Hull supervisor	DD-MM-YY	
		• Tripping hazards	• Tripping and falling	• Barricade work area, display warning signs • Place friction floor mats	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Cleaning E/R bottom	• Generation of flammable fumes	• Fire/ explosion	• Wear proper PPE (e.g., respirator) • Not hot work is allowed within vicinity • Highlight in VSCC	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Slippery ground surface	• Slipping and falling	• Provide safety shoes with non-slip soles	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Cutting, fitting and welding of platform support	• Hot works	• Fire and explosion	• Valid hot work permit • Firewatch • Fire clothes/ lines • Ventilation/ lighting	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Material handling	• Body injuries	• Tag lines • Hand gloves	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Lifting and cut off support and platform and lifting new platform	• Falling objects	• Struck by falling objects	• Cordon off operation area • Qualified signalmen, riggers • Ensure operator is trained and certified • Lifting gears checked • Use guide ropes	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
5	Install new platform (change plate)	• Material handling	• Body injuries	• Tag lines • Hand gloves	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Renewal of Steel Plate IWO Cargo Dome	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Pre-job inspection and marking	• Lack of oxygen	• Asphyxiation	• Ventilation and lighting • Gas meter • Gas checking periodically	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Toxic gas	• Overcome by gas		5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Preparation for hot work	• Defective tools	• Possible fire, when contacted with gas leak/ oxygen enriched atmosphere	• Periodical checking of cutting tools (2 weeks) and welding tools (30 days) • Elevation of gas hoses and separation of hoses/ cables	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Fitting, welding and grinding off new plate	• Hot work	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Pinch points	• Hand/ finger injuries	• Hand gloves • Suitable tools	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working at height	• Fatal fall from height	• Fall protection system • Valid (ok) scaffold tag • Safe access to work location	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Vacuum test	• Air line burst	• Struck by high pressure	• Use proper tools • Ensure tools are in good condition	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Noise	• Noise-induced deafness	• Ear plugs	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Renew BHD IWO Pump Room	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Remove insulation	• Contact with hazardous substance (asbestos)	• Asbestos-related illnesses • Skin irritation	• Cordon off area • Conduct sample testing for asbestos • Engage approved contractors for dealing with asbestos • Provide respiratory protection • Proper removal and disposal of dust generated.	4	2	8	Nil	-	-	-	Hull supervisor	DD-MM-YY	
2	Cutting of existing BHD	• Hot works	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Fire cloth to protect equipment • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Hull supervisor	DD-MM-YY	
3	Removal of scraps	• Sharp edges	• Cuts to hands	• Hand gloves • Follow SWP	2	2	4	Nil	-	-	-	Hull supervisor	DD-MM-YY	
4	Transportation of new BHD to site	• Falling objects	• Struck by falling objects	• Cordon off area during lifting • Ensure no overloading • Ensure lifting supervisor/ signalmen/ riggers/ crane operator are trained • Inspect lifting gears and their certificates before use	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
5	Installing new BHD	• Falling objects	• Struck by falling objects	• Cordon off area during work • Certified lifting gear	5	1	5	Nil	-	-	-	Hull supervisor	DD-MM-YY	
6	Welding/ grinding	• Hot works	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Fire cloth to protect equipment • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Hull supervisor	DD-MM-YY	
		• Sparks generated	• Injuries to eyes or hands	• Wear eye goggles and gloves	3	1	3	Nil	-	-	-	Hull supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Monthly inspection • Pre-use visual check	5	2	10	Nil	-	-	-	Hull supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Partial Renewal of Funnel Casing	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Check or mark hot work area	• Work at height	• Fatal fall from height	• Fall protection system • Valid (ok) scaffold tag • Safe access to work location	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Lack of oxygen	• Asphyxiation	• Perform gas check on area before entering • Gas monitoring throughout work duration	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Contact with hot surface	• Burn injuries	• Wear heat resistant hand gloves	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Preparing for hot work	• Objects on floor/ decking	• Bodily injuries due to trip and fall	• Safely erected staging • Good housekeeping	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Pinch points	• Finger/ hand injuries	• Safe manual handling • Wear hand gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Cut and remove the plate as marked	• Hot works	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Fire cloth to limit spark scattering • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Objects on floor/ decking	• Bodily injuries due to trip and fall	• Safely erected staging • Good housekeeping	2	1	2	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Particles generated during grinding	• Injury to eyes or hands	• PPE (e.g., eye goggle, gloves, apron)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Install/ fit the plate	• Handling heavy load	• Severe injuries	• Cordon off work area • Safe use of lifting equipment • Hand gloves	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Use of tools at elevation	• Struck by falling tools	• Store tools in tool box/ bag when not using • Use tethered tools • Enforce wearing of helmet in work area	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Clearing the area of debris	• Pinch points	• Finger/ hand injuries	• Safe manual handling • Wear hand gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Flying particles	• Eye injury or irritation	• Safety goggles to be worn	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Renewal of Hatch Coaming Plate I.W.O No. 7 Cargo Hold at 2nd deck	RA Member 1:	Signature:		
Process/ Activity Location:	2nd deck	RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspection and marking	• Work at height	• Fatal fall from height	• Fall protection system • Check anchor points	5	1	5	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	
		• Falling tools	• Struck by falling tools	• Store tools in tool box/ bag when not using • Use tethered tools • Enforce wearing of helmet in work area	3	2	6	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	
2	Gas cutting	• Hot works	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Fire cloth to limit spark scattering • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	
3	Removal of existing plate, and lifting of new plate	• Working at height	• Fatal fall from height	• Fall protection system	5	1	5	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	
		• Falling objects (plate)	• Struck by falling objects	• Cordon off operation area • Qualified signalmen, riggers • Ensure operator is trained and certified • Lifting gears checked • Use guide ropes	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
4	Fit-up of new plate	• Working at height	• Fatal fall from height	• Fall protection system	5	1	5	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	
		• Falling objects (tools)	• Struck by falling tools	• Store tools in tool box/ bag when not using • Use tethered tools • Enforce wearing of helmet in work area	3	2	6	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	
5	Welding, gouging and grinding	• Toxic fumes	• Inhalation of toxic fumes	• Provide sufficient ventilation	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Noise	• Noise-induced deafness	• Ear plugs/ muffs	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Particles generated	• Injury to eyes or hands	• PPE (e.g., eye goggle, gloves, apron)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Monthly inspection • Pre-use visual check	5	2	10	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
8	Close back access	• Hot works	• Fire/ explosion	• Valid hot work permit • Ensure equipment is in good condition • Fire cloth to limit spark scattering • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	
		• Working at height	• Fatal fall from height	• Fall protection system	5	1	5	Nil	-	-	-	Steelwork supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Partial Renewal of Aft Bulkhead at Fr. 174	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspection and marking with owner	• Oxygen deficiency	• Asphyxiation	• Entry Permit (PTW), display boarding pass on entry of tank • Continuous atmospheric monitoring • Adequate ventilation • Buddy system • ERP, tank watchman	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Objects/ protrusions on floor	• Injuries due to slips, trips and falls	• Provide sufficient lighting • Individual torch lights • Good housekeeping	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Cutting/ weilding upper deck plate	• Hot works	• Fire or explosion	• Barricade work area • Valid hot work permit • Ensure equipment is in good condition • Only qualified personnel to do the work • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Lifting of upper deck plates	• Falling objects (plate)	• Struck by falling objects	• Cordon off operation area • Qualified signalmen, riggers • Lifting gears checked • Use guide ropes	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
4	Grinding of work pieces	• Flying objects	• Eye or hand injuries	• Wear face shield • Grinder disc guard in place • Sufficient lighting	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Welding of new plate	• Hot works	• Fire and explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		Live current	Electrocution	• Daily check for defects (e.g., exposed cable) • Monthly servicing/ maintenance • Good earthing for welding equipment • Hand gloves	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Clearing area of debris	Pinch points	Finger/ hand injuries	• Safe manual handling • Wear hand gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		Flying particles	Eye injury or irritation	• Safety goggles to be worn	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Renewal of Bosun Store and Chain Locker Plating	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Cut and install access openings (main deck and bosun store deck)	• Hot works	• Fire and explosion	• Valid hot work permit • Ensure equipment is in good condition • Trained fire watchman stationed with fire-fighting equipment	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling objects (loose materials/ tools)	• Struck by falling objects	• All loose objects on scaffolding to be kept in containers or bags when not in use	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Removal of plating and installation of new plating	• Falling object (plate)	• Struck by falling objects	• Cordon off operation area • Qualified signalmen, riggers • Lifting gears checked • Use guide ropes	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

RISK ASSESSMENT – Tank cleaning

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Pump Room Cleaning (Bottom) in Dry Dock	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Pre-work inspection by supervisor	• Lack of oxygen in tank	• Asphyxiation	• Obtain valid confined space permit to work • Provide continuous ventilation • Carry portable gas meter for monitoring	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Gaps or openings	• Fatal fall from height	• Ensure sufficient lighting • Barricades	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Obstacles or slippery substances	• Injury due to slips, trips and falls	• Ensure sufficient lighting • PPE (e.g., safety boots with non-slip sole)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Preparation of material for cleaning and manpower	• Falling objects (hoisted materials and equipment)	• Struck by falling objects	• Valid/ tested lifting equipment • Qualified rigger and signaller • Barricade falling zone	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Live current	• Electrocution	• Ensure all electrical tools are in good condition • Monthly inspection • Pre-use visual check	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Manual handling	• Back injuries	• Use correct manual lifting techniques • Teamwork for heavier items	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Working near depth	• Fatal fall into depth	• Barricade work area • Provide fall protection systems • Enforce anchoring of workers to anchorage points	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Commence cleaning	• Lack of oxygen	• Asphyxiation	• Sufficient ventilation	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Openings on floor	• Fatal fall into depth	• Barricade all openings	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Slippery floor	• Injuries due to slips, trips and falls	• Sufficient lighting • Proper coordination • Communication • Safety boots with non-slip soles	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Use of chemicals	• Skin problems	• Consult SDS, follow precautions • Wear rubber gloves and boots	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Oil leak	• Pollution to environment	• Ensure highlight to VSCC meeting/ valid cleaning permit LOTO	2	4	8	• All connection to be secured with safety tag	2	2	4	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Housekeeping	• Falling objects	• Struck by falling objects	• Lifting equipment used are tested and in serviceable condition • Use correct lifting techniques	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Manual handling	• Cut by sharp edges, finger/ hand injuries	• Wear hand gloves • Beware of pinch point	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Small, narrow work area	• Struck by object	• Proper coordination • Appropriate PPE	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Oil spill	• Pollution to environment	• Ensure bags have no leak and are disposed in designated rubbish box	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Completion of work	• Work completion not signed off	• Poor coordination	• Ensure proper endorsement	1	1	1	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Cleaning of Chain Locker	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspection by supervisor	• Lack of oxygen in tank	• Asphyxiation	• Obtain valid confined space permit to work • Carry portable gas meter for monitoring	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Gaps or openings	• Fatal fall from height	• Ensure sufficient lighting • Barricades • Provide secured ladder	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Obstacles or slippery substances	• Injury due to slips, trips and falls	• Ensure sufficient lighting • PPE (e.g., safety boots with non-slip sole)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Transferring equipment onto vessel	• Moving vehicle	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are allowed to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots, and so on • Use of signals (flashing lights, horns) at above locations	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	
		• Load is dislodged or dropped	• Struck by falling objects	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger, signalmen and operator • All loose items must be secured / removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	
3	Setting up equipment	• Struck by moving equipment	• Body injuries	• Provide handhold for air winch and pump • Wear hand gloves	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Body injuries													
4.1	Pumping out water	• High pressured hose	• Body injuries from being struck by whipping hose from pump	• Ensure that all connections are tightened properly • Provide hose arrestor • Discharge water to drain	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4.2	Cleaning out mud	• Slippery surface due to flooding	• Body injuries due to slips, trips and falls	• Wear rubber safety boots with non-slip soles	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
				• Clear walkways of slippery substances	2	3	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4.3	Scarping out loose scale (rust)	• Flying particulates	• Particles in eyes	• Down hand (hard) scrapping • Avoid standing directly below loose scale • Wear goggles	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4.4	Removing mud and scale bag from chain locker	• Heavy objects hoisted	• Struck by falling objects	• Only lift 1 bag at a time • Personnel to stay clear of lifting zone	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Moving winch wire rope	• Permanent disability • Caught by moving winch wire rope	• Provide hand hold for winch wire rope • Keep hands away moving wire rope	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Manual lifting	• Back injuries	• Adopt correct manual lifting technique/ posture	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Inspection done by owner	• Lack of oxygen in tank	• Asphyxiation	• Obtain valid confined space permit to work • Carry portable gas meter for monitoring	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Gaps or openings	• Fatal fall from height	• Ensure sufficient lighting • Barricades	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Obstacles or slippery substances	• Injury due to slips, trips and falls	• Ensure sufficient lighting • PPE (safety boots with non-slip sole)	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Transport equipment back to workshop	• Moving vehicle	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are allowed to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots, and so on • Use of signals (e.g., flashing lights, horns) at above locations	5	1	5	Supervisor Trained forklift operator	DD-MM-YY	
		• Load is dislodged or dropped	• Struck by falling objects	• Select correct lifting gear for task (size and capacity) • Work to be carried out by qualified rigger, signalmen and operator • All loose items must be secured/ removed	5	1	5	Nil	-	-	-	Lifting supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Sewage Tank Cleaning	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Highlighting during VSCC and raising PTW	• Applying for wrong location or permit	• Work cannot start	• Daily work plan checklist	1	2	1	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Arranging for ventilation and lighting	• Lack of oxygen	• Suffocation or asphyxiation	• Conduct gas check/ monitoring with gas meter	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Supervisor	DD-MM-YY	
		• Presence of flammable gases	• Fire/ explosion	• Use explosion proof lighting	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Checking location to be cleaned	• Lack of oxygen	• Suffocation or asphyxiation	• Conduct gas check/ monitoring with gas meter	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Supervisor	DD-MM-YY	
4	Disinfect tank with chemicals	• Chemical fumes generated	• Overcome by chemical fumes	• Use supplied air line and adhere to SDS precautions • Use less toxic chemicals	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Tank Cleaning of Cargo Oil Tank (Bottom) for Hot Work	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remark
1	Before highlighting in VSCC	• Mis-communication in date/ time	• Incompatible work may be carried out	• Ensure all trade supervisors (already trained in SSSC) must attend VSCC	5	1	5	Nil	-	-	-	SRM	DD-MM-YY	
2	Before gas-free certificate is obtained	• Possible presence of flammable gases	• Fire and explosion	• Gas monitoring • Obtain PTW before work starts	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Safety personnel	DD-MM-YY	
3	Entering tank	• Lack of oxygen	• Asphyxiation	• Continuous ventilation • Explosion proof lighting provided • Obtain PTW before work starts	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Supervisor	DD-MM-YY	
4	Mobilise equipment and manpower	• Falling objects	• Struck by falling object	• Trained riggers and signalmen • Conduct toolbox meeting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Unsafe act	• Body injuries	• Familiarise inexperienced worker with work environment • Buddy system	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Identify exact location for cleaning	• Lack of oxygen	• Asphyxiation	• Continuous forced ventilation • Explosion proof lighting provided • Obtain PTW before work starts	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Supervisor	DD-MM-YY	
		• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Commencing work	• Fumes and gases generated	• Overcome by fumes	• Provide forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Residual oil to be pumped out	• Oil on work surface	• Body injuries, slip and fall	• Provide sufficient lighting • Saw dust to absorb oil	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Fumes and gases generated	• Overcome by fumes	• Provide forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• High noise level	• Noise-induced deafness	• Noise monitoring • Ear plugs/ muffs	4	2	8	Nil	-	-	-	Safety officer	DD-MM-YY	
8	Manual cleaning of sludge	• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Fumes and gases generated	• Overcome by fumes	• Provide forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Contact with sludge	• Dermatitis	• Rubber gloves • Barrier cream	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
9	Manual wiping of surfaces	• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Fumes and gases generated	• Overcome by fumes	• Provide adequate forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Contact with sludge	• Dermatitis	• Rubber gloves • Barrier cream	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
10	Packing sludge bags	• Fumes and gases generated	• Overcome by fumes	• Provide forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
11	Disposal of sludge bags on deck to sludge bin	• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Proper material handling to be adopted • Conduct briefing	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
12	Moving sludge to shore	• Falling objects	• Struck by falling objects	• Proper material handling to be adopted • Conduct briefing	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Hoisted load	• Struck by moving load	• Use tagline to control swing of load	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
13	Final inspection by safety assessor/ production supervisor	• Remaining gas and fumes	• Dizziness	• Provide adequate forced ventilation • Monitor gas from bell mouth drop line (change of condition)	3	3	9	Nil	-	-	-	Safety officer and trade foreman	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Cargo Oil Tank Cleaning	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Mobilisation of ventilation and lighting	• Struck by object	• Body injuries	• Trained rigger and signalmen	3	1	3	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Live current	• Electrocution	• Ensure all electrical tools are in good condition • Monthly inspection • Pre-use visual check • Qualified electrician	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Cargo oil tank cleaning	• Oxygen deficiency	• Asphyxiation	• Sufficient forced ventilation • Regular check on gas every 4 hours • Must indicate gas reading in tank • Every group should have a portable gas meter	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Presence of fumes and gases	• Dizziness from prolonged exposure	• Use flexi-hard trunking to provide continuous forced ventilation	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Presence of gaps and openings	• Fatal fall	• Fall protection systems • Hook onto secured structure • Conduct toolbox briefing	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Check soles of boots regularly	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Possible presence of flammable gases	• Fire/ explosion in tank	• Only use explosion proof lighting in the tank	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Presence/ use of chemicals	• Skin problems	• Consult SDS, follow precautions • Wear rubber gloves and boots • Educate workers on personal hygiene	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Moving sludge to the shore	• Falling objects	• Struck by falling objects	• Proper material handling to be adopted • Conduct briefing	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Final inspection by safety assessor/ production supervisor	• Remaining gas and fumes	• Dizziness	• Provide adequate forced ventilation • Monitor gas from bell mouth drop line (change of condition)	3	3	9	Nil	-	-	-	Safety officer and trade foreman	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Slop Tank Cleaning	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Before gas-free certificate is attained	• Possible presence of flammable gases	• Fire and explosion	• Gas monitoring • Obtain PTW before work starts	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Safety personnel	DD-MM-YY	
2	Gas testing for confined space entry permit	• Lack of oxygen	• Asphyxiation	• Continuous ventilation • Explosion proof lighting • Workgroup should bring along portable gas detector	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Mobilise equipment and manpower	• Falling objects	• Struck by falling object	• Trained riggers and signalmen • Conduct toolbox meeting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Unsafe act	• Body injuries	• Familiarise inexperienced worker with work environment • Buddy system	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Identify exact location for cleaning	• Lack of oxygen	• Asphyxiation	• Continuous forced ventilation • Obtain PTW before work starts	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Supervisor	DD-MM-YY	
		• Possible presence of fumes and gases	• Dizziness	• Continuous forced ventilation • Obtain PTW before work starts	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Residual oil to be pumped out	• Oil on work surface	• Body injuries, slip and fall	• Provide sufficient lighting • Saw dust to absorb oil	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Fumes and gases generated	• Overcome by fumes	• Provide forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety officer	DD-MM-YY	
		• High noise level	• Noise-induced deafness	• Noise monitoring • Ear plugs/ muffs	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Manual cleaning of sludge	• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Fumes and gases generated	• Overcome by fumes	• Provide forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Contact with sludge	• Dermatitis	• Rubber gloves • Barrier cream	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Manual wiping of surfaces	• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Fumes and gases generated	• Overcome by fumes	• Provide adequate forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Contact with sludge	• Dermatitis	• Rubber gloves • Barrier cream	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
8	Packing sludge bags	• Fumes and gases generated	• Overcome by fumes	• Provide adequate forced ventilation • Regular gas monitoring	4	2	8	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
9	Disposal of sludge bags on deck to sludge bin	• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Saw dust to absorb oil	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Proper material handling to be adopted • Conduct briefing	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:	Reference Number
Process:	Water Ballast Tank Cleaning	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Before highlighting in VSCC	• Mis-communication in date/ time	• Incompatible work may be carried out	• Ensure all trade supervisors (already trained in SSSC) must attend VSCC	5	1	5	Nil	-	-	-	PJM	DD-MM-YY	
2	Gas monitoring	• Defective gas meter	• Hazardous environment not detected	• Work team leader to ensure that gas meter is in working condition	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Arranging for ventilation and lighting	• Lack of oxygen	• Suffocation or asphyxiation	• Conduct gas check/ monitoring with gas meter	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Safety personnel	DD-MM-YY	
		• Obstacles	• Body injuries due to slips and falls	• Designate safe points of access • Use butterworth opening to lay out lighting instead of manhole	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Display entry permit at location	• Display at wrong location or fail to display	• Incompatible work may be carried out	• Chargehand and supervisor level to display permit at easily seen location near work site	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
5	Display of entry tag (confined space)	• Fail to display tag	• Persons unaccounted for	• Work team leaders to ensure all persons display their tag before entry	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Access ladder usage	• Climbing ladder	• Injuries, falling from ladder	• Use torchlight and clipping hammer to check ladder before use • Provide alternative means of access if ladder is found unsafe	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Moving tools and equipment into tank	• Lack of oxygen	• Suffocation or asphyxiation	• Conduct gas check/ monitoring with gas meter	5	1	5	• Ensure each workgroup has 1 gas meter	-	-	-	Safety personnel	DD-MM-YY	
		• Obstacles	• Body injuries due to slips and falls	• Designate safe points of access • Use butterworth opening to lay out lighting instead of manhole	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
8	Cleaning operation	• Oxygen deficiency	• Asphyxiation	• Sufficient forced ventilation • Regular check on gas every 4 hours • Must indicate gas reading in tank • Every group should have a portable gas meter	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Presence of gaps and openings	• Fatal fall	• Fall protection systems • Hook onto secured structure • Conduct toolbox briefing	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Check soles of boots regularly	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
9	Post-work inspection	• Loose items on ground	• Body injuries due to slips, trips and falls	• Clear all left over material after work is complete	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Fuel Oil Bunker Tank Cleaning	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Opening manhole in the way of the fuel oil bunker tank	• Opening created	• Fatal fall into depth	• Barricade the opening	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Possible release of harmful gases	• Exposed to toxic gases	• Gas monitoring • Ensure good air flow in work area • Follow SWP	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Arranging for ventilation	• Falling objects	• Struck by falling object	• Trained riggers and signalmen • Conduct toolbox meeting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Identify job location	• Lack of oxygen	• Asphyxiation	• Gas monitoring with gas meter • Provide adequate ventilation	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Opening on floor surface	• Fall into depth	• Provide sufficient lighting • Provide proper access • Highlight in toolbox meeting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Commence cleaning	• Openings on floor surface	• Fall into depth	• Provide sufficient lighting • Barricade the opening • Highlight in toolbox meeting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Fumes generated	• Overcome by fumes	• Continuous ventilation • Gas monitoring using portable gas meter	5	1	5	Nil	-	-	-	Safety personnel	DD-MM-YY	
5	Moving sludge to the shore	• Falling objects	• Struck by falling objects	• Proper material handling to be adopted • Conduct briefing	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Final inspection	• Uneven surfaces	• Body injuries due to slips, trips and falls	• Arrange more lighting and ventilation	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Clean the Wing Ballast Tank for Tankers	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspecting ventilation, lighting and conducting gas checks	• Openings on floor (manhole), cables on floor	• Body injuries due to tripping and falling from main deck to tank bottom	• Barricades around manhole • Cable stands, or cable hangers on deck • Supervisors ensure proper housekeeping	4	1	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Entering wing ballast tanks	• Lack of oxygen in tank	• Asphyxiation	• Obtain valid confined space permit to work • Provide continuous ventilation • Carry portable gas meter for monitoring	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Climbing ladder	• Body injuries, falling off ladder	• Maintain 3-point contact while climbing • Ensure steady descent	3	2	6	Nil	-	-	-	Supervisor & group leader	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Falling of loose objects, such as rusty scales	• Injuries, struck by falling objects	• Works to keep clear of ladder after reaching tank bottom • Toolbox meeting for workers	3	3	9	Nil	-	-	-	Supervisor and Group leader	DD-MM-YY	
3	Commencement of cleaning	• Slippery material, obstacles on floor	• Slips, trips and falls	• Adequate lighting • Non-slip soles • Check soles of boots regularly	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Falling rusty scales	• Struck by rusty scales	• Proper job co-ordination for locations • Enforce wearing of hard hats	3	3	9	Nil	-	-	-	Supervisor and Group leader	DD-MM-YY	
4	Inspection by owner's representative, QC	• Obstacles on ground	• Body injuries dues to slips, trips and falls	• Final housekeeping prior to inspection	2	2	4	Nil	-	-	-	Supervisor and Group leader	DD-MM-YY	
		• Falling rusty scales	• Struck by rusty scales	• Proper job co-ordination for locations • Enforce wearing of hard hats	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:		Reference Number
Process:	Fuel Oil Tank Cleaning (Bottom Area)	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Preparation of equipment • Winch • Pumps • Chemicals • Rags • Bum bags • Scrapper • Scoop	• Pinch points	• Hand/ finger injuries	• Wearing of gloves • Briefing to remind workers to keep hands and fingers away from pinch points	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Use of chemicals	• Skin irritation	• Consult SDS • Use of PPE (e.g., rubber gloves)	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Possible splashing of chemicals into eyes	• Eye irritation	• Wear safety goggles when handling chemicals	2	2	4	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Transport equipment to work location using forklift	• Moving vehicle with heavy load	• Struck by moving vehicle	• Observe speed limit and SWL • Qualified forklift driver • Direct/ control traffic at junctions • Use beacon lights	5	1	5	Nil	-	-	-	Supervisor Forklift driver	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Uneven ground/ toppling of load	• Struck by falling objects	• Load must be properly secured in metal cage • Ensure load capacity of the forklift is not exceeded	5	1	5	Nil	-	-	-	Supervisor Forklift driver	DD-MM-YY	
3	Lifting of equipment to ship by crane	• Load is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation • Lifting equipment must be in good working condition (with valid certificate), and safe working load is not exceeded • Prevent persons from entering lifting zone	5	2	10	• Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to
		• Moving load	• Struck by moving load	• Barricade work area and use tag line • Ensure crane operator, rigger and signalman have clear communication (walkie talkie) • Ensure all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put signboard and alert workers on operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Setting up equipment: Ventilation, lighting, compress air hose connection	• Live current	• Electric shock	• Daily check for defects (exposed cable etc) • 110V supply to be used • Tag equipment after monthly servicing/ maintenance • Hand gloves	5	1	5	Nil	-	-	-	Maintenance personnel	DD-MM-YY	
		• Pressured hoses	• Struck by compressed air hoses when connecting	• Use correct rating of whip arrestor to prevent back lash • Shut off air manifold before disconnecting	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Slippery floor surface	• Body injuries due to slip and fall	• Rubber boots with non-slip soles to be worn	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Lack of oxygen	• Asphyxiation	• Provide adequate ventilation • Regular gas monitoring with portable gas meter	5	1	5	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Possible presence of flammable gases	• Fire/ explosion	• Only explosion proof lighting to be used in the confined space	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
5	Cleaning of pump	• Openings on floor surface	• Fall into depth	• Provide sufficient lighting • Barricade opening • Highlight in toolbox meeting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Fumes generated	• Overcome by fumes	• Continuous ventilation • Gas monitoring using portable gas meter	5	1	5	Nil	-	-	-	Safety personnel	DD-MM-YY	
		• Obstacles	• Body injuries due to trips and falls	• Provide adequate lighting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
6	Remove sludge bags from tank	• Falling objects	• Struck by falling objects	• Proper material handling to be adopted • Conduct briefing	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
7	Inspection	• Obstacles	• Body injuries due to trips and falls	• Provide adequate lighting	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

RISK ASSESSMENT – Scaffolds

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Erection of Tower Scaffold at Open Space	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Material handling	• Pinch points (between planks)	• Injuries to hands/ fingers	• Briefing before work starts • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Struck by planks/ pipes	• Body injuries	• Barricade work area • Maintain good communication	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
2	Erecting main members of a scaffold (i.e., base plate; standards; ledger; transom; bracing, etc.)	• Working at height	• Fatal fall	• Use of fall protection system • Workers are trained to work at height • Provide anchor points/ lifelines	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Loose items at height	• Struck by falling objects	• Barricade work area, display warning sign	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Loose items on work surface	• Slips, trips and falls	• Keep all loose items not in use in bags or containers	4	2	8	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Small flying objects	• Eye injuries	• Wear safety glasses/ goggles	4	2	8	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
3	Installing: • Ladder • Planks • Handrail • Toe board	• Loose items at height	• Struck by falling objects	• Barricade work area, display warning signs	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Loose items on work surface	• Slips, trips and falls	• Keep all loose items not in use in bags or containers	4	2	8	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Small flying objects	• Eye injuries	• Wear safety glasses/ goggles	4	2	8	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
4	Install outriggers/ tie-back	• Collapse of staging	• Fatality	• Securing of tie back for every 2 lift, 3 buoy • Install outrigger in accordance with height of scaffold • If tower scaffold exceeds 15m, installation must be done accordance to PE drawing	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
5	Inspection of scaffold	• Work at height	• Fatal fall from height	• Use of anchored fall protection system	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Erecting of Multi-tier Scaffold in Confined Space	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Lifting equipment into confined space	• Lack of oxygen	• Asphyxiation	• Obtain valid confined space permit to work • Provide continuous ventilation • Carry portable gas meter for monitoring • Conduct briefing before work starts	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
2	Installing lifelines	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	• Maintenance programme for harnesses and accessories	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Wires under tension	• Hand cut by wires	• Wearing of hand gloves	2	3	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
3	Front base frame from ship's ladder platform	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	• Maintenance programme for harnesses and accessories	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Wires under tension	• Hand cut by wires	• Wearing of hand gloves	2	3	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
4	Routing of staging wires	• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Wires under tension	• Hand cut by wires	• Wearing of hand gloves	2	3	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
5	Install and secure wooden planks provided with standards, guardrails and toeboards	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	• Maintenance programme for harnesses and accessories	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Wires under tension	• Hand cut by wires	• Wearing of hand gloves	2	3	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
6	Erect second tier scaffold platform with transom, ledger and putlog	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	• Maintenance programme for harnesses and accessories	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Wires under tension	• Hand cut by wires	• Wearing of hand gloves	2	3	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
7	Installing vertical ladder	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	• Maintenance programme for harnesses and accessories	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Wires under tension	• Hand cut by wires	• Wearing of hand gloves	2	3	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
8	Secure wooden planks and install guardrails and toeboards	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	• Maintenance programme for harnesses and accessories	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Wires under tension	• Hand cut by wires	• Wearing of hand gloves	2	3	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Erect Cantilever Scaffolding in Confined Space	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Enter confined space for inspection	• Lack of oxygen	• Asphyxiation	• Obtain valid confined space permit to work • Provide continuous ventilation • Carry portable gas meter for monitoring • Conduct briefing before work starts	5	1	5	Nil	-	-	-	HSE officer Staging supervisor	DD-MM-YY	
		• Possible presence of toxic gas	• Exposed to toxic gases	• Gas monitoring • Ensure good air flow in work area • Follow SWP	5	1	5	Nil	-	-	-	HSE officer Staging supervisor		
		• Possible presence of flammable gases	• Fire/ explosion	• Only use explosion proof lighting	5	1	5	Nil	-	-	-	HSE officer Staging supervisor		
2	Inspection of work area	• Sludge/ mud on work surface	• Body injuries due to slips, trips or falls	• Provide sufficient lighting/ explosion proof torch lights • Buddy system • Safety boots with non-slip soles	4	2	8	Nil	-	-	-	Staging supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Arranging materials	• Materials in poor condition	• Collapse of staging	• Store to check materials • Workers must be trained	-	-	-	Nil	-	-	-	Staging supervisor Storekeeper	DD-MM-YY	
4	Transporting materials with forklift	• Moving vehicle	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are allowed to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots, and so on • Use of signals (flashing lights, horns) at above locations	5	1	5	Supervisor Forklift operator		
		• Uneven ground/ toppling of load	• Struck by falling objects	• Load must be properly secured in metal cage • Ensure load capacity of forklift is not exceeded	5	1	5	Nil	-	-	-	Supervisor Forklift driver		
5	Lifting materials into confined space	• Load is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation. • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded • Prevent persons from entering lifting zone	5	2	10	• Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Moving load	• Struck by moving load	• Barricade work area and use tagline • Ensure crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put signboard and alert workers on the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
6	Setting up base of scaffold	• Uneven ground surface	• Unstable scaffold, may collapse	• Use level gauge • Use base plate	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
7	Building up the levels	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	• Maintenance programme for harnesses and accessories	-	-	-	Staging supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
8	Extending tubes from main tower	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	Maintenance programme for harnesses and accessories	-	-	-	Staging supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
9	Put up planks and secure them	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	Maintenance programme for harnesses and accessories	-	-	-	Staging supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
10	Put up tie backs, toe-board, guard rail, and so on	• Working at height	• Fatal fall from height	• Anchored body harness with twin lanyard • Harnesses must be visually inspected for defects by user before use	5	1	5	Maintenance programme for harnesses and accessories	-	-	-	Staging supervisor	DD-MM-YY	
		• Use of equipment while working at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
11	Inspection of scaffold	• Working at height	• Fatal fall from height	• Use of anchored fall protection system	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Erect Ship Side Hanging Staging (Afloat)	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Assemble frame	• Pinch points	• Hand/ finger injuries	• Briefing before work starts • Maintain communication • Wear gloves	2	2	4	Nil	-	-	-	Staging supervisor	DD-MM-YY	
2	Lowering frame to location	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication	5	1	5	Nil	-	-	-	Staging supervisor		
3	Secure staging wires	• Wire whipping	• Hand/ finger injuries	• Ensure stagers are qualified • Use correct methods of tying	2	2	4	Nil	-	-	-	Supervisor		
		• Sharp ends of wires	• Eye injuries	• Wear eye goggles	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Erect frame for landing platform	• Pinch points	• Hand/ finger injuries	• Briefing before work starts • Maintain communication • Wear gloves	2	2	4	Nil	-	-	-	Staging supervisor		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication • Add pipe to prevent tilt	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
5	Installing ladder	• Hand pinched by ladder	• Hand/ finger injuries	• Wear hand gloves • Communication	2	1	2	Nil	-	-	-	Staging supervisor	DD-MM-YY	
6	Set up working platform	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
		• Using equipment at height	• Struck by falling objects	• Work area to be cordoned off (if accessible) • Secure tools	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Erection Scaffold at Anchor Pocket	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Inspection of work area by supervisor	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Loose items on ground	• Body injuries due to slips, trips and falls	• Housekeeping	4	2	8	Nil	-	-	-	Scaffold supervisor		
2	Selection and sorting out of material	• Pinch point	• Hand/ finger injuries	• Briefing before work starts • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
3	Transportation to wharf using forklift	• Moving vehicle	• Struck by moving vehicle	• Pre-planned maintenance schedule to ensure forklift is in good condition • Perform daily inspection checklist and report defects found • Only licensed forklift operators are allowed to operate forklifts • Observe speed limit	5	2	10	• Slow down at corners, junction, blind spots etc. • Use of signals (e.g., flashing lights, horns) at above locations	5	1	5	Scaffold supervisor Forklift operator	DD-MM-YY	
		• Uneven ground/ toppling of load	• Struck by falling objects	• Load must be properly secured in metal cage • Ensure load capacity of forklift is not exceeded	5	1	5	Nil	-	-	-	Scaffold supervisor Forklift driver	DD-MM-YY	
4	Lifting materials to work area	• Load is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation. • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded • Prevent persons from entering lifting zone	5	2	10	• Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Moving load	• Struck by moving load	• Barricade work area and use tagline • Ensure crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put sign board and alert workers on the operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	
5	Choosing of anchor pocket (hanging wire and lifeline)	• Wire under tension	• Hand injuries (cut by wire)	• Wear gloves • Supervisor to inspect	3	2	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
6	Base erection	• Pinch point	• Hand/ finger injuries	• Qualified scaffolders • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
7	Secure frame with wires	• Pinch point	• Hand/ finger injuries	• Qualified scaffolders • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
8	Secure planks on frame	• Pinch point	• Hand/ finger injuries	• Qualified scaffolders • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
9	Lower frame to exact location	• Mishandling of wires	• Structural collapse	• Qualified scaffolders • Follow SWP • Proper tying methods	4	2	8	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
10	Install resting platform	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
11	Install ladder for access	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Pinch point	• Hand/ finger injuries	• Qualified scaffolders • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
12	Erector climb onto scaffold	• Loading of unfinished scaffold	• Platform swing or overturn	• Maximum 2 persons on scaffold • Supervisor to coordinate movement to maintain stable CG	3	2	6	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
13	Secure platform to hull	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Using equipment at height	• Struck by falling objects	• Work area to be cordoned off (if accessible) • Ensure rigid tie-back • Secure tools	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
14	Lower planks manually by ropes	• Using equipment at height	• Struck by falling objects	• Work area to be cordoned off (if accessible) • Watchman to keep area below work area clear	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
15	Secure planks	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy • Maintain communication	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
16	Lower pipes	• Pinch point	• Hand/ finger injuries	• Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
17	Install guard rails	• Pinch point	• Hand/ finger injuries	• Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
18	Tie backs	• Pinch point	• Hand/ finger injuries	• Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
19	Install toe-boards	• Pinch point	• Hand/ finger injuries	• Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
20	Install resting platform every SM	• Pinch point	• Hand/ finger injuries	• Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
21	Inspection by scaffold supervisor	• Working at height over water	• Fall from height into water, risk of drowning	• Anchored fall protection system • Life jackets, life buoy	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:		Reference Number
Process:	Modify Tower Staging in Confined Space	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Entering confined space	• Lack of oxygen	• Asphyxiation	• Obtain valid confined space permit to work • Provide continuous ventilation • Carry portable gas meter for monitoring	5	1	5	Nil	-	-	-	HSE officer Staging supervisor	DD-MM-YY	
		• Possible presence of toxic gas	• Exposed to toxic gases	• Gas monitoring • Ensure good air flow in work area • Follow SWP	5	1	5	Nil	-	-	-	HSE officer Staging supervisor		
		• Possible presence of flammable gases	• Fire/ explosion	• Only use explosion proof lighting	5	1	5	Nil	-	-	-	HSE officer Staging supervisor		
		• Gaps or openings	• Fatal fall from height	• Ensure sufficient lighting • Barricades	5	1	5	Nil	-	-	-	Supervisor		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
2	Lowering tools and materials into confined space	• Scaffold material dislodged	• Struck by falling objects	• Use proper equipment and method • Use tag lines • No overloading • Sufficient manpower • Barricade work area, display signboard	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Modification work	• Working at height	• Fatal fall from height	• Provide anchorage, lifeline, and so on • Anchored fall arrest system	-	-	-	Nil	-	-	-	Supervisor		
4	Inspection of scaffold	• Working at height	• Fatal fall from height	• Anchored fall protection system	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Loose items on work surface	• Body injuries due to slips, trips and falls	• Housekeeping	2	2	4	Nil	-	-	-	Supervisor		

Risk Assessment Forms				
Department:		RA Leader:	Approved by: Signature:	Reference Number
Process:	Dismantling of Multi-tier Hanging Scaffold in Confined Space	RA Member 1:		
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Entering confined space	• Lack of oxygen	• Asphyxiation	• Obtain valid confined space permit to work • Provide continuous ventilation • Carry portable gas meter for monitoring	5	1	5	Nil	-	-	-	HSE officer Staging supervisor	DD-MM-YY	
		• Possible presence of toxic gas	• Exposed to toxic gases	• Gas monitoring • Ensure good air flow in work area • Follow SWP	5	1	5	Nil	-	-	-	HSE officer Staging supervisor		
		• Possible presence of flammable gases	• Fire/ explosion	• Only use explosion proof lighting	5	1	5	Nil	-	-	-	HSE officer Staging supervisor		
2	Inspect scaffold before dismantling	• Damaged scaffold, uneven work surface	• Tripping and falling	• Rectify damaged parts before dismantling • Provide lighting	3	3	9	Nil	-	-	-	Supervisor		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Loose parts on work surface	• Struck by falling objects	• Housekeeping • Barricade work area	4	2	8	Nil	-	-	-	Supervisor	DD-MM-YY	
3	Dismantle of multi-tier hanging scaffold	• Loose materials	• Struck by falling objects	• Keep all loose items/ tools when not in use • No throwing of materials allowed	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Material handling	• Lacerations	• Maintain communication • Proper material handling techniques/ postures used	3	2	6	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Lifting of material from vessel to wharf	• Load is dislodged or dropped	• Struck by falling load	• Verified non-destructive testing report prior to lifting operation. • Lifting equipment must be in good working condition (with valid cert), and safe working load is not exceeded • Prevent persons from entering lifting zone	5	2	10	• Stop crane movement if load swing is too extensive	5	1	5	Lifting supervisor	DD-MM-YY	Lifting plan must be prepared by a competent lifting supervisor and adhered to

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		Moving load	Struck by moving load	• Barricade work area and use tagline • Ensure crane operator, rigger and signalman have clear communication (walkie-talkie) • Ensure all lifting crew are trained and qualified with valid certification • Stop work during poor weather • Put signboard and alert workers on operation	5	1	5	Nil	-	-	-	Lifting supervisor, riggers and signalmen	DD-MM-YY	

Risk Assessment Forms

Department:		RA Leader:	Approved by:	Reference Number
Process:	Dismantling of Tower Scaffold in Open Space	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Installing lifelines	• Working at height	• Fatal fall from height	• Use of fall arrest system, with self-retracting lifeline anchored to a secure anchorage point	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
2	Open scaffold guard-rails	• Working at height	• Fatal fall from height	• Use of fall arrest system, anchored to lifelines	5	1	5	Nil	-	-	-	Staging supervisor		
		• Using equipment at height	• Struck by falling objects	• Work area to be cordoned off • Secure tools and materials when not in use	5	1	5	Nil	-	-	-	Staging supervisor		
3	Open platform at the top for access	• Working at height	• Fatal fall from height	• Use of fall arrest system, anchored to lifelines	5	1	5	Nil	-	-	-	Staging supervisor		
		• Pinch points	• Hand/ finger injury	• Wear hand gloves	3	3	9	Nil	-	-	-	Staging supervisor		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
4	Lowering of materials	• Material handling at height	• Struck by falling object	• Maintain communication • Pass materials carefully, following SWP	4	2	8	Nil	-	-	-	Staging supervisor	DD-MM-YY	
5	Removal of bracing	• Potential scaffold instability	• Scaffold collapse	• Closely follow SWP for dismantling • Close supervision	5	1	5	Nil	-	-	-	Staging supervisor	DD-MM-YY	
6	Remove all ledger's and pot tie's and lastly standards	• Pinch points	• Hand/ finger injuries	• Maintain communication • Wear hand gloves	3	3	9	Nil	-	-	-	Staging supervisor	DD-MM-YY	

Risk Assessment Forms					
Department:		RA Leader:	Approved by:		Reference Number
Process:	Dismantling of Anchor Pocket Scaffold	RA Member 1:	Signature:		
Process/ Activity Location:		RA Member 2:			
Original Assessment Date:		RA Member 3:	Name:		
Last Review Date:		RA Member 4:	Designation:		
Next Review Date:		RA Member 5:	Date:		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Highlighting during VSCC and raising PTW	• Applying for wrong location or permit	• Work cannot commence	• Daily work plan checklist	1	2	1	Nil	-	-	-	Supervisor	DD-MM-YY	
2	Access work area for inspection	• Openings on work surface	• Fatal fall from height	• Use of fall arrest system attached to a fall-arrest block, which is anchored to independent rigid point	5	1	5	Nil	-	-	-	Supervisor		
		• Loose materials	• Struck by falling objects	• Barricade area below work zone	5	1	5	Nil	-	-	-	Supervisor		
3	Removing and lowering from top tier: • Ladder • Toe-board • Handrail • Plank • Transom • Ledger	• Working at height	• Fatal fall from height	• Use of fall arrest system, anchored to lifelines	5	1	5	Nil	-	-	-	Supervisor		
		• Material handling at height	• Struck by falling object	• Maintain communication • Close supervision by supervisor • Pass materials carefully, following SWP	5	1	5	Nil	-	-	-	Supervisor		
		• Pinch points and sharp edges	• Hand/ finger injuries	• Wearing of glove	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	
4	Dismantling of remaining tiers	• Material handling at height	• Struck by falling object	• Maintain communication • Close supervision by supervisor • Pass materials carefully, following SWP	5	1	5	Nil	-	-	-	Supervisor	DD-MM-YY	
		• Pinch points and sharp	• Hand/ finger injuries	• Wearing of glove	3	3	9	Nil	-	-	-	Supervisor	DD-MM-YY	

Risk Assessment Forms				
Department:		RA Leader:	Approved by:	Reference Number
Process:	Erecting of Cargo Hold Loaming Hanging Scaffold Erection	RA Member 1:	Signature:	
Process/ Activity Location:		RA Member 2:		
Original Assessment Date:		RA Member 3:	Name:	
Last Review Date:		RA Member 4:	Designation:	
Next Review Date:		RA Member 5:	Date:	

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Fix frame work and secure hanging wire ropes according to PE design	• Slippery work surface	• Body injuries due to slips, trips and falls	• Clear oil from work surface • Wear safety boots with non-slip soles	4	2	8	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Pinch points	• Hand/ finger injuries	• Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor		
2	Securing two planks on scaffold before lowering	• Caught in between objects	• Hand/ finger injuries	• Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor		
		• Sharp edges	• Cuts to hands/ fingers	• Trim preheated wires • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor		
3	Put two inner vertical standard down from frame	• Material handling at height	• Struck by falling object	• Maintain communication • Close supervision by supervisor • Pass materials carefully, following SWP	5	1	5	Nil	-	-	-	Scaffold supervisor		

Hazard Identification			Risk Evaluation					Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
		• Caught in between objects	• Hand/ finger injuries	• Wearing of glove	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Sharp edges	• Cuts to hands/ fingers	• Trim preheated wires • Wear hand gloves	3	3	9	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
4	Centre of frame fix one lowering rope before lowering	• Falling objects	• Struck by falling objects	• Barricade work area • Display warning signs near work area	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
5	Lowering complete frame work on exact location	• Working at height	• Fatal fall from height	• Use of fall arrest system, anchored to lifelines/ strong anchor point	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Barricade work area • Display warning signs near work area	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
6	Securing of hanging wires	• Rope not secured sufficiently	• Frame collapse	• Use two and half clover hitch	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
7	Fix ladder (if more than 3m high from hatch loaming erect one resting platform)	• Use of equipment at height	• Struck by falling object	• Barricade work area • Display warning signs near work area	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
8	One man move down to frame to complete platform	• Working at height	• Fatal fall from height	• Use of fall arrest system, anchored to lifelines/ strong anchor point	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

Hazard Identification			Risk Evaluation				Risk Control					
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
9	Fixing guardrails and toe-boards	• Working at height	• Fatal fall from height	• Use of fall arrest system, anchored to lifelines/ strong anchor point	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
		• Falling objects	• Struck by falling objects	• Barricade work area • Display warning signs near work area	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	
10	Inspection of completed hanging scaffold	• Obstacles or loose objects on work surface	• Body injuries due to slips, trips and falls	• Balance preheated wires to be trimmed • Housekeeping to be done once erection is completed	5	1	5	Nil	-	-	-	Scaffold supervisor	DD-MM-YY	

ANNEX D-1:

Matrix on Mandatory Safety Training and Trade-related Training Required for Shipbuilding and Ship-repairing.

	Mandatory Safety Training Course									Mandatory Trade-related Training Course				
Trade / Course	Shipyard Safety Instruction Course for General Trade	Shipyard Safety Instruction Course for Painter Trade	Shipyard Safety Instruction Course for HotWork Trade	Shipard Supervisor Safety Course	Lifting Supervisors Safety Course	Shipyard Safety Assistants Course	Shipyard Safety Assessors (HotWork Certification Course)	Safety Officers Training Course	Safety Instruction Course for Ship Repair Managers	Marine Metal Scaffold Erectors Course	Marine Metal Scaffolding for Supervisors Course	Training Programme for Marine Signalmen	Training Programme for Marine Riggers	Dockside Crane Operators Training Course
Hot Work*	•													
Painting	•													
Rigging	•													
Signalling	•													
Scaffolding	•													
Crane Operating	•													
Other Production Workers	•													
Scaffolding Supervisors				•										
Lifting Supervisor				•										
Other Production Supervisors				•										
Safety Supervisor				•										
Safety Assistant				•										
Safety Assessor							•							
Safety Officer								•						
Ship Repair Manager									•					

* Hot Work includes riveting, welding, flame cutting or burning and any other work involving the use or generation of heat or the production of sparks.

ANNEX D-2:

Safety Training Courses for Management Personnel, Supervisory Personnel and Workers (shall include, but not be limited to the following)

Level	Safety Training Programmes
Management Personnel	Safety Management System Training for Ship-repair Manager Training for Noise Monitoring Officer Training for Noise Control Officer Training for Workplace Safety and Health Officer (WSHO) Training for Fire Safety Manager Training for Safety Committee Member Accident/ Incident Investigation Group Communication Personnel Communication Emergency Preparedness Planned Inspection Behavioural-based Safety
Supervisory Personnel	Safety Instruction Course for Supervisors Safety Management System Training for Scaffold Supervisor Training for Lifting Supervisor Training for Safety Assessor for Hot Work Certification Training for Confined Space Assessor Training for Safety Committee Member Emergency Response Safe Work Practices Group Communication Accident/Incident Investigation Hazard Analysis Technique Behavioural-based Safety
Marine Worker/ Tradesman	Shipyard Safety Instruction Courses Safety Orientation for New Employees/ Contractors Training for Safety Committee Members Training for Hot Work Tradesmen Training for Painters Training for Crane Operators Training for Forklift Operators Training for Scaffold Erectors Training for Self-propelled Platform Operators Training for Respirator Users Training for Riggers and Signalers Training for Fire Watchman Training for High Pressure Equipment Users Training for First Aiders Training for Powered Tools Users Hazard Identification Safe Work Practices Emergency Response Housekeeping Training Behavioural-based Safety

ANNEX E-1:

In-House Safety Rules and Regulations (Shall Include, but not Be Limited to the Following) (shall include, but not be limited to the following)

- Compliance with safe work practices and permit-to-work system;
- Provision and use of personal protective equipment;
- Removal or making safety devices or provisions inoperative;
- Operation and maintenance of machinery and equipment and tools;
- Handling, storage and use of substances and materials;
- Reporting of accidents, incidents and hazards;
- Removal of hazards at the workplace;
- Maintenance of housekeeping and cleanliness at the workplace;
- Prohibition of horseplay;
- Operation of equipment without authority;
- Prohibition and misuse of equipment;
- Ensuring competency at work;
- Prohibition of smoking except at designated areas; and
- Prohibition of speeding of motorised vehicles and equipment.

Annex E-2:

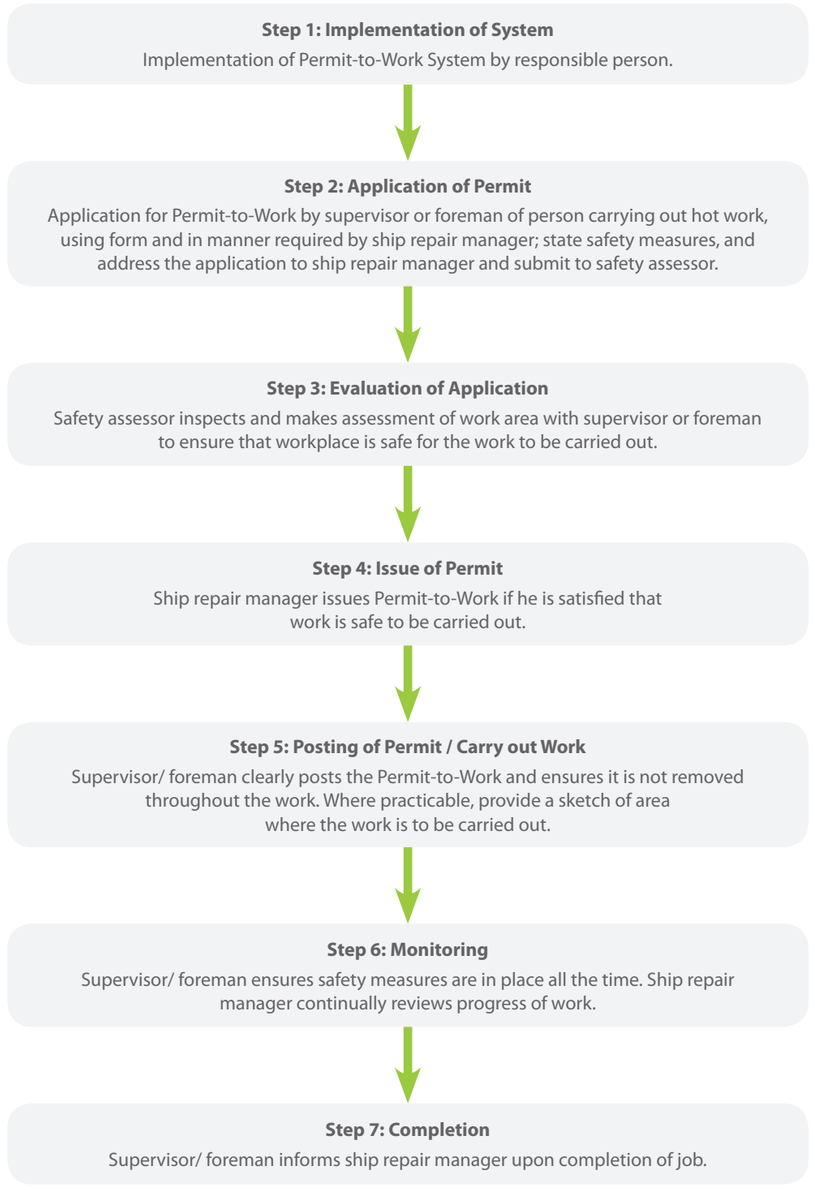
List of High-Risk Work as Defined by the WSH (Shipbuilding and Ship-repairing) Regulations

The following types of work that are carried out in relation to a ship (including a ship under construction) in a shipyard or on board a ship in a harbour are referred to in the Regulations as "high-risk works". Carrying out these works requires application of permit-to-work asstipulated in the Regulations:

- Work which involves use of any hazardous, volatile, corrosive or flammable chemical, material or solvent in significant quantities;
- Spray painting work;
- Grit-blasting work carried out in a confined space;
- Testing or dismantling of any pipe or equipment that
  - Contains, or had contained, oil or substances that are flammable, toxic or corrosive; or
  - Contains steam;
- Ballasting and deballasting of a ship;
- Repair or maintenance work carried out on the hydraulic system of a ship;
- Bunkering and transferring of fuel oil;
- Radiography work; and
- Such other work as the Commissioner may specify in writing to the occupier of the shipyard or the master, owner or agent of the ship or the employer or principal of the person carrying out the work.

Annex E-3:

Permit-to-Work Flow Chart



Annex E-4:

Permit-To-Work Formats (sample)

The following types of work that are carried out in relation to a ship (including a ship under construction) in a shipyard or on board a ship in a harbour are referred to in the Regulations as "high-risk works". Carrying out these works requires application of permit-to-work asstipulated in the Regulations:

1. Permit for Hot Work
2. Permit for Painting
3. Permit for Grit Blasting in Confined Spaces
4. Permit for Ballasting/ Deballasting
5. Permit for Dismantling/ Testing of Pipes Valves and Heating Coils
6. Permit for Radiography Work
7. Permit for Repair/ Maintenance Work of Hydraulic System
8. Permit for Bunkering by Barge
9. Permit for Transferring Oil
10. Permit for Chemical Cleaning of Generators/Motors
11. Permit for Chemical Cleaning/ Flushing/ Pickling Boiler/ Heat Exchanger/ Pipe System
12. Permit for Entry into Confined Spaces

1. Permit for Hot Work

S/No.		Hot Work shall not 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 start 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 confirmed 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

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

*Delete where not applicable.

See overleaf for explanatory notes.

Procedure for Obtaining Approval of Permit for Hot Work

1. The Trade Foreman/ Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The Trade Foreman/ Supervisor shall be familiar with the work schedule, the nature of the work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. The Trade Foreman/ Supervisor shall take relevant safety measures such as ensuring that the hot work area and its surroundings are free from combustible and flammable substances.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of hot work, start/ completion date and time, type and details of the hot work to be carried out. He shall also include a sketch of the hot work area.
6. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done, and risks and hazards involved with respect to the work to be done; and
   b) Make a physical inspection of the site of intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the permit's applicant unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all reasonably practicable measures will or have been taken for the safety and health of persons carrying out the work;
    d) All persons carrying out the high-risk work are informed of hazards associated with it;
    e) Confirm that co-ordination have been made about the work at the VSCC meeting.
    f) Be 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. The SRM shall retain a copy of the permit-to-work.
11. For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the permit-to-work in the "Display" and "Trade Foreman/ Supevisor" copies.
12. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
13. He could then start the hot work.
14. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.

Note:

a) Validity of Permit:

Location	Maximum Validity Period
E/Rms, P/Rms, Cargo Oil Tanks, F.O. Tanks	Maximum up to 7 days
Main Deck, Stores Cargo Holds, Accommodation Area	Maximum up to 14 days
DB Tanks, Cofferdams, Duct Keels, Ballast Tanks and Other Similar Compartments	Case by Case Basis (Maximum up to 14 days)
Designated Hot Work Areas	Maximum up to 30 days

b) The permit is invalidated should combustible substances be introduced in the hot work area or should any of the following incompatible works be carried out in the same area:
   (i) Dismantling of valves and pipelines;
   (ii) Ballasting and deballastion;
   (iii) Testing of valves/ pipes/ heating coils;
   (iv) Painting;
   (v) Chemical cleaning;
   (vi) Sludge cleaning;
   (vii) Transferring of oil; and
   (viii) Bunkering by barge.

In these cases, all hot work shall cease and safety personnel informed.

General Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permit-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit copy marked "Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

2. Permit for Painting

	Confined		Open			
S/No. Others	The process shall not start 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			
	Time:	Hrs				
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 before the start 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 space to be painted.
- ☐ Coordination 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.
- ☐ Coordination 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 hazards associated with it.
5. I confirm that I have coordinated 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.

Procedure for Obtaining Approval of Permit for Painting

1. The Trade Foreman/ Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The Trade Foreman/ Supervisor shall be familiar with the work schedule, nature of the work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. He shall raise five copies of the permit-to-work application.
4. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/ completion date and time, type of paint and method of application. He shall indicate in the box provided at the top of the permit whether the application is for open or confined space painting.
5. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor/ Safety Assistant.
6. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done and risks and hazards involved with respect to the work to be done; and
   b) Make a physical inspection of site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
7. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
8. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
9. On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to work to be carried out and risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
10. With the approved hazardous substances storage checklist, the Trade Foreman/ Supervisor can arrange to bring up the paint drums to the vessel.
11. For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the "Display" and "Trade Foreman/ Supervisor" copies.
12. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked 'Display' at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
13. He could then start the painting work.
14. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel. For confined spaces painting, ventilation shall be maintained during the curing period.
15. The Safety Assessor/ Safety Assistant shall notify the SRM once the area has been certified gas free.

Note

i) This permit is also applicable for spray painting of open spaces. Open spaces include the hull, main deck and superstructure of vessels.
ii) For spray painting of open spaces, hot work shall not be allowed within 3 metres if the area is to be painted.

General Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy marked "Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

3. Permit for Grit Blasting in Confined Spaces

	Confined		Open

S/No.
Others

The process shall not start 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		
	Time:	Hrs			
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 before the start of the work process and shall be responsible for maintaining them during the entire process.

- Provision of adequate lighting.
- Blasters equipped with air-fed protective hoods.

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 coordinated 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

*Delete where not applicable.

See overleaf for explanatory notes.

Procedure for Obtaining Approval of Permit for Grit Blasting in Confined Spaces

1. The Trade Foreman/ Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The Trade Foreman/ Supervisor shall be familiar with the work schedule, the nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. The Trade Foreman/ Supervisor shall take the relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/completion date and time.
6. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor/ Safety Assistant.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done and risks and hazards Involved in respect of the work to be done; and
   b) Make a physical inspection of site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
11. For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the "Display" and "Trade Foreman/ Supervisor"copies.
12. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked 'Display' at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
13. He could then start the painting work.
14. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Trade Foreman/ Supervisor'"and hand over the copy to the Safety Personnel.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

4. Permit for Ballasting/ Deballasting

	Confined		Open		
S/No. Others	The process shall not start 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		
	Time:	Hrs			
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 before the start of the work process and shall be responsible for maintaining them during the entire process.

1. By Master/ Chief Officer

I have highlighted the work at the Vessel Safety Coordination Committee (VSCC) meeting and it has been coordinated. Further, I agree to take the following safety precautions:

☐ Clear all persons from the tanks involved.
☐ Isolate pipelines/ valves leading to the other tanks.
☐ Ensure that there is no hot work in all confined spaces within the ballast system during ballasting/ deballasting.
☐ Ensure that the mooring system is attended to.

1. By Master/ Chief Officer

I have highlighted the work at the Vessel Safety Co-ordination Committee(VSCC) meeting and it has been coordinated. Further, I agree to take the following safety precautions:

☐ Clear all persons from the tanks involved.
☐ Ensure from Master/ Chief Officer the pipelines/ valves leading to the other tanks are isolated.
☑ Please tick the applicable requirements in the appropriate boxes

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

Note 1: Master/ Chief shall raise the permit if the ship's system are to be used.
Trade Foreman/ Supervisor shall raise the permit if the shore lines are to be used.
Note 2: The necessary safety measures shall be compiled with before the applications is handed over to the Safety Assessor/ Safety Assistant for his 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 coordinated 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 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: _____ Signature: _____ Date: ____/____/____ Time: _____ Hrs

Note: For ballasting/ deballasting using ship's system, no hot work shall be carried out in all confined spaces within the ballast system during ballasting/ deballasting operation.

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.

Procedure for Obtaining Approval of Permit for Ballasting/ Deballasting

1. The Trade Foreman/ Supervisor shall highlight at the Vessel Safety Co-Ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The person-in-charge shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. He shall take the relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, tanks involved, start/ completion date and time and method of filling/ transfer.
6. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor/ Safety Assistant.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done and risks and hazards involved with respect to the work to be done; and
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carded out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage III of the application for the permit-to-work.
11. The applicant shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
12. He could then start the painting work.
13. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Master/ Chief Officer; Trade Foreman/ Supervisor" shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

5. Permit for Dismantling/ Testing of Pipes/ Valves and Heating Coils

	Confined		Open		
S/No.	The process shall not start until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.				
Others					
Vessel's Name:			Location of Work:		
Commencement:	Date: / /		Completion		
	Time: Hrs				
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 before the start of the work process and shall be responsible for maintaining them during the entire process.

a) Confined Space (All Pipes and Valves)

- ☐ Prominent display of appropriate signboards at the paint storage area and the space to be painted.
- ☐ Supply of sufficient forced ventilation.
- ☐ Provision of adequate flame proof lights with cables in good condition.
- ☐ No hot work in the above location/ all confined spaces.
- ☐ Valves of confined spaces in ballast or containing oil isolated/ rendered inoperative.
- ☐ Use of containers/ plastic bags for collecting oily water/ oil.
- ☐ Proper blanking/ isolation of pipelines leading to other compartments.

Open Space (Oil, Gas, Chemical Pipes and Valves)

- ☐ Prominent display of appropriate signboards at the vicinity of work.
- ☐ No hot work within a radius of 3 metres of the area and condoning off area with red and white tape.
- ☐ Use of containers/ plastic bags for collecting oily water/ oil.

☑ Please tick the applicable requirements in the appropriate boxes.

b) Precautions while working with system containing steam

- ☐ The steam system isolated / depressurised as necessary
- ☐ The steam system rendered inoperative by lock out / tag out
- ☐ Provision of adequate lighting and ventilation (for confined spaces)

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 hazards associated with it.
5. I confirm that I have coordinated 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.

Procedure for Obtaining Approval of Permit for Dismantling/ Testing Pipes/ Valves and Heating Coils

1. The Trade Foreman/ Supervisor shall highlight at the Vessel Safety Co-Ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The person-in-charge shall be familiar with the work schedule, the nature of the work to be carried out and risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.
3. The Trade Foreman/ Supervisor shall take relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/ completion date and time, type of work. He shall indicate in the box provided at the top of the permit whether the dismantling/ testing is for oil/ gas/ chemical pipes/ valves or system containing steam. In addition, the applicant has to indicate in the box provided at the top of the permit whether the work is going to be carried out in the open or confined space.
6. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor/ Safety Assistant.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done, and risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
11. For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the "Display" and "Trade Foreman/ Supervisor" copies.
12. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
13. He can then commence the painting work.
14. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.
15. The Safety Assessor/ Safety Assistant shall notify the SRM when the location is certified gas free.

Note

a) This permit is required for the following:
   i) All pipelines and valves in confined spaces;
   ii) Oil gas and chemical pipelines and valves in open spaces;
   iii) Dismantling of pipelines/ valves in the fuel oil purifier room and main fuel oil system connected to the main engine generator and boiler;
   iv) System that contains steam.

b) This permit is not required for dismantling sea valves.

c) Dismantled pipelines leading to other compartments must be blanked off with metal blanks before "hot work" can be permitted in a compartment.

d) In open spaces, hot work should not be allowed within a radius of 3 metres of the area where dismantling is in progress.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from subcontractors for approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Master/ Chief Officer; Trade Foreman/ Supervisor" shall be handed over to the Safety Personnel.

g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foremen/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

6. Permit for Radiography Work

	Confined		Open
S/No. Others	The process shall not start 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		
	Time:	Hrs			
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 before the start of the work process and shall be responsible for maintaining them during the entire process:

- Clear all persons from the tanks involved.
- Prominent display of warning signboards at all possible accesses to the radiography area.
- Install of blinking lights (applicable for night work only).
- Standby of radiography.
- Barricade of affected area.

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 hazards associated with it.
5. I confirm that I have coordinated 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

Procedure for Obtaining Approval of Permit for Radiography Work

1. The Trade Foreman/ Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The person-in-charge shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. The Trade Foreman/ Supervisor shall take the relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/ completion date and time, type of work. He shall indicate in the box provided at the top of the permit whether the work is going to be carried out in the open or confined space.
6. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor/ Safety Assistant.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done and risks and hazards involved with respect to the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the Inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
11. For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the "Display" and "Trade Foreman/ Supervisor" copies.
12. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
13. He could then commence the painting work.
14. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Master/ Chief Officer; Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

7. Permit for Repair/ Maintenance Work of Hydraulic System

	Confined		Open

S/No.
Others

The process shall not start 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		
	Time:	Hrs			
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 before the start of the work process and shall be responsible for maintaining them during the entire process.

☐ Power supply isolated and tagged.
☐ Valves for the system closed/ lashed/ tagged.
☐ No hot work in the affected area.
☐ Display of warning signboards.

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 IB: Application by Trade Foreman/ Supervisor

I agree to the following safety precautions:
☐ Power supply isolated and tagged.
☐ Valves for the system closed/ lashed/ tagged.
☐ No hot work in the affected area.

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 coordinated 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

Procedure for Obtaining Approval of Permit for Repair/ Maintenance Work of Hydraulic System

1. The Trade Foreman/ Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The person-in-charge shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. The Trade Foreman/ Supervisor shall take the relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/ completion date and time, type of work. He shall indicate in the box provided at the top of the permit whether the work is going to be carried out in the open or confined space.
6. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor/ Safety Assistant.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done, and risks and hazards involved with respect to the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall:
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
11. For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the "Display" and "Trade Foreman/ Supervisor" copies.
12. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
13. He could then start the painting work.
14. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.

Note

This permit shall be obtained for the following works:

1. Any repair/ maintenance of winches, windglass, cranes, derricks, steering gear, actuators, hatch covers, ramps, doors, hydraulic, pumps, motors or any other mechanism operated by using hydraulic system.
2. Any repair/ maintenance on power pack/ control panel.

This permit is not applicable for dismantling/ testing of hydraulic pipelines/ valves and testing/ operation of the hydraulic system after repair of maintenance work.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Master/ Chief Officer; Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foremen/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

8. Permit for Bunkering by Barge

	Confined		Open
S/No.	The process shall not start until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.		
Others			

Vessel's Name:			Location of Work:		
Commencement:	Date:	/ /	Completion		
	Time:	Hrs			
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 before the start of the work process and shall be responsible for maintaining them during the entire process.

- ☐ Brief the bunker barge master on the safety rules and regulations.
- ☐ Detail ship staff to standby during operation.
- ☐ Clean any oil spills arising from the operation.
- ☐ Stop all hot work on the vessel.
- ☐ Isolate the fuel oil system from the other tanks.

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 coordinated 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

Procedure for Obtaining Approval of Permit for Bunkering by Barge

1. The Master/ Chief Engineer shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The Master/ Chief Engineer shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. The Master/ Chief Engineer shall take the relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, tanks taking the fuel, start/ completion date and time, type of fuel and quantity of fuel.
6. He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor/ Safety Assistant.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done, and risks and hazards involved with respect to the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall:
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
11. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Master/ Chief Engineer" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
12. He could then start the painting work.
13. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Master/ Chief Engineer" and hand over the copy to the Safety Personnel.

Note

Maritime and Port Authority of Singapore Regulation with regard to taking bunker, diesel, lube oil or any type of oil by barge shall strictly be adhered to.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked "Master/ Chief Officer; Trade Foreman/ Supervisor" shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

9. Permit for Transferring Oil

	Confined		Open

S/No.

Others

The process shall not start 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		
	Time:	Hrs			
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 before the start of the work process and shall be responsible for maintaining them during the entire process.

- ☐ Ensure no hot work at the affected area.
- ☐ Detail a person to standby during the operation.
- ☐ Clean any oil spills, arising from the operation.
- ☐ Ensure that all fittings are tightly secured.

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 IB: Application by Trade Foreman/ Supervisor

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.

- ☐ Ensure no hot work at the affected area.
- ☐ Detail a person to standby during the operation.
- ☐ Clean any oil spills, arising from the operation.
- ☐ Isolate the fuel system from the other tanks*.

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 coordinated 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

Procedure for Obtaining Approval of Permit for Transferring Oil

1. The person-in-charge shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. He shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. He shall take the relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/ completion date and time, quantity, method of transfer.
6. If the yard is performing the job, the Trade Foreman/ Supervisor shall fill up and sign Stage IA In all five copies. He then has to get the confirmation from the Master/ Chief Engineer who has to acknowledge that the valve is isolated as in Stage IB.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done, and risks and hazards involved with respect to the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
11. For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the permit-to-work in the "Display" and "Master/ Chief Engineer" copies.
12. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Master/ Chief Engineer" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
13. He could then start the work.
14. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Master/ Chief Engineer"; "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.

Note

i) This permit is required for transferring any type of oil on board of a vessel.

ii) The method of transfer could be:
   a) From one tank to another tank using ship's pumping system.
   b) From a road tanker to the vessel's tanks or vice versa.
   c) From a tank to a container or one tank to another tank using pneumatic pump.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from subcontractors for approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked "Master/ Chief Office; Trade Foremen/ Supervisor" of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Office; Trade Foremen/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

10. Permit for Entry into Confined Spaces

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

Procedure for Obtaining Approval of Entry into Confined Spaces

1. The person-in-charge shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2. The Trade Foreman/ Supervisor shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
3. The Trade Foreman/ Supervisor shall take the relevant safety measures.
4. He shall raise five copies of the permit-to-work application.
5. He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/ completion date and time, quantity, method of transfer.
6. If the yard is performing the job, the Trade Foreman/ Supervisor shall fill up and sign Stage IA in all five copies. He then has to get the confirmation from the Master/ Chief Engineer who has to acknowledge that the valve is isolated as in Stage IB.
7. On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done, and risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
8. The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
9. If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
10. On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
11. The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked Trade Foreman/ Supervisor and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
12. He could then start the work.
13. Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Master/ Chief Engineer"; "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.

Note

i) The first person who intends to enter the space shall be required to raise the permit. No permits are required for subsequent entry.
ii) In the event the first applicant has completed his work in the space and decides to return the permit, he shall highlight his intention at the VSCC Meeting, the SRM shall decide who should be the next applicant for entry permit.
iii) The following areas do not require the entry permit:
   a) Engine rooms; and
   b) Open cargo holds.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Master/ Chief Officer; Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

11. Permit for Chemical Cleaning/ Flushing/ Pickling Boiler/ Heat Exchanger/ Pipe System

	Confined		Open		
S/No.	The process shall not start until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.				
Others					
Vessel's Name:			Location of Work:		
Commencement:	Date:	/ /	Completion		
	Time:	Hrs			
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 under mentioned safety measures before the start of the work process and shall be responsible for maintaining them during the entire process:

- Prominent display of appropriate signboards at all accesses to the work area.
- No hot work in the *engine room/ boiler room/ _____(specify).
- Use of adequate flame-proof lights.
- Use of appropriate personal protective equipment by all workers engaged in the chemical work.
- Leak-proof circulation system.
- Presence of chemical cleaners during the process.
- Use of receptacles to contain trade effluents (discharge of effluents into sea is prohibited).
- 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 coordinated 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

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

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

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

Procedure for Obtaining Approval of Permit for Chemical Cleaning/ Flushing/ Pickling Boiler/ Heat Exchanger/ Pipe System

1) The Master/ Chief Engineer shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2) Once highlighted at the meeting, the Trade Foreman/ Supervisor can make arrangements to do the preparatory work by bringing up on board the vessel the necessary equipment. Subsequently the unit code could be filled with water and leak tested.
3) Trade Foreman/ Supervisor shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
4) Trade Foreman/ Supervisor shall take the relevant safety measures.
5) He shall raise five copies of the permit-to-work application.
6) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, start/ completion date and time, type of work and characteristics of the chemicals to be used.
7) He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor/ Safety Assistant.
8) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, nature of work to be done, and risks and hazards involved with respect to the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
9) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
10) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
11) On receipt of the endorsed application from the Safety Assessor, the SRM shall:
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
12) For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the "Display" and "Trade Foreman/ Supervisor" copies.
13) With the approved permit, the Trade Foreman/ Supervisor could arrange to lift up chemicals on board and keep it in an area approved by the SRM.
14) The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
15) He could then start work.
16) Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Master/ Chief Engineer"; "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.
17) The Safety Assessor/ Safety Assistant shall notify the SRM when the location is certified gas free.

Note

Copies of the material safety data sheets (MSDS) of the chemicals to be used shall be submitted together with the permit-to-work application to the safety personnel and the SRM by the Trade Foreman/ Supervisor. Any changes in chemicals other than those stated in the permit-to-work application shall render the permit as invalid. The Trade Foreman/ Supervisor shall submit a fresh application if he intends using chemicals not mentioned in the permit.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Master/ Chief Officer; Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

12. Permit for Chemical Cleaning of Generators / Motors

	Confined		Open		
S/No.	The process shall not start until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel				
Others					
Vessel's Name:			Location of Work:		
Commencement:	Date:	/ /	Completion		
	Time:	Hrs			
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 under mentioned safety measures before the start 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 measure.

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 coordinated 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: Notification of Completion of Work by Trade Foreman/ Supervisor

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

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

Procedure for Obtaining Approval of Permit for Chemical Cleaning of Generator/ Motors

1) The Master/ Chief Engineer shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.
2) Once highlighted at the meeting, the Trade Foreman/ Supervisor can make arrangements to do the preparatory work by bringing up on board the vessel the necessary equipment. Subsequently the unit code could be filled with water and leak tested.
3) Trade Foreman/ Supervisor shall be familiar with the work schedule, nature of work to be carried out and risks and hazards involved with respect to the work to be done before submitting his permit-to-work application.
4) Trade Foreman / Supervisor shall take the relevant safety measures.
5) He shall raise 5 copies of the permit-to-work application.
6) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, commencement / completion date and time, type of work and characteristics of the chemicals to be used.
7) He shall fill up and sign Stage I in all five copies of the permit-to-work application and personally submit all five copies to the Safety Assessor/ Safety Assistant.
8) On receipt of the application, the Safety Assessor shall:
    a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved with respect to the work to be done;
    b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.
9) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.
10) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.
11) On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.
12) For tender jobs, the Trade Foreman/ Supervisor shall brief the Sub-contractor Foreman/ Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman/ Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the "Display" and "Trade Foreman/ Supervisor" copies.
13) With the approved permit, the Trade Foreman/ Supervisor could arrange to lift up chemicals on board and keep it in an area approved by the SRM.
14) The Trade Foreman/ Supervisor shall display the copy of the permit-to-work marked "Display" at the vicinity of the work area together with the sketch. He retains the copy marked "Trade Foreman/ Supervisor" and hands over two copies marked "Safety" to the Safety Assessor and the other copy marked "SRM" to the SRM.
15) He could then start the work.
16) Upon completion of the hot work, the Trade Foreman/ Supervisor shall sign Stage IV in the copy marked "Master/ Chief Engineer" ; "Trade Foreman/ Supervisor" and hand over the copy to the Safety Personnel.
17) The Safety Assessor/ Safety Assistant shall notify the SRM when the location is certified gas free.

Note

Copies of the material safety data sheets (MSDS) of the chemicals to be used shall be submitted together with the permit-to-work application to the safety personnel and SRM by the Trade Foreman/ Supervisor. Any changes in chemicals other than those stated in the permit-to-work application shall render the permit as invalid. The Trade Foreman/ Supervisor shall submit a fresh application if he intends to use chemicals not mentioned in the permit.

Special Requirements

a) The work shall not start until the permit has been duly completed and signed by the respective personnel.
b) It shall be the duty of the Trade Foreman/ Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.
c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.
d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.
e) Request from sub-contractors for approval of a permit shall not be entertained by the SRM.
f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the permit's copy mark "Master/ Chief Officer; Trade Foreman/ Supervisor" of the permit shall be handed over to the Safety Personnel.
g) The Trade Foreman/ Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked "Master/ Chief Officer; Trade Foreman/ Supervisor" is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.
h) It is the responsibility of the Trade Foreman/ Supervisor to remove the display copy once the job has been completed or when the permit has expired.

Annex E-5:

ASMI Safety Checklists

Reference:

Guidelines on Safety Management System for the Shipbuilding and Ship-repairing Industries, developed jointly by the Occupational Safety and Health Division, Ministry of Manpower, and the Safety Committee, Association of Singapore Marine Industries.

Safety Checklist for Rigger (Slinging, Signaling and Lifting)

Location	Yes	No
1. Before lifting the Load,		
1.1 Are you appointed as a rigger to carry out rigging and signalling activities in your yard?	☐	☐
1.2 Have you successfully undergone 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; and	☐	☐
• 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 lines are 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 Are workers standing or working below the suspended load have been cleared?	☐	☐
3. When lowering the Load,		
3.1 Have you ensured that the resting place for the load 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.		

Safety Checklist for Rigger (Slinging, Signaling and Lifting)

Location	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 work, have you checked the work area and affected areas in the adjacent compartments for any smothering smoke, and so on?	☐	☐
Note Do not start work unless the above questions are answered Yes. If in doubt, please check with your supervisor.		

Safety Checklist for Pipe Fitters

Location	Yes	No
1. Personal Protective Equipment (PPE)		
1.1 Are you fully equipped with 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 Heights		
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 starting 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 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 or 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.		

Safety Checklist for Welding, Burning and Cutting

Location	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 manifolds, gas regulators, hoses and torches in good condition?	☐	☐
• Are the short-length/ extension hose properly connected according to colour coding?	☐	☐
• Are the hosts, joints and valves free from leakage?	☐	☐
• Are the gas hoses properly arranged or suspended?	☐	☐
• Are the approved flash-back arrestor fitted to the gas outlet and inlet of the cutting torch?	☐	☐
• Are the gas torch and gas hoses provided with valid inspection tags?	☐	☐
2. During work,		
2.1 Is a "spark-gun" provided for the lighting of gas torch?	☐	☐
2.2 Are the gas regulators set to correct pressure (for gas cylinders only)?	☐	☐
2.3 Is the gas torch shut off before moving around?	☐	☐
3. After work,		
3.1 Is the gas turned off?	☐	☐
3.2 Is the supply valve securely closed?	☐	☐
3.3 Are the torches and gas hoses disconnected from supply and removed out of the tanks?	☐	☐
3.4 Have you checked the work area before leaving?	☐	☐
Note:		
Do not start work unless the above questions are answered Yes. If in doubt, please check with your supervisor.		

Safety Checklist Arc Welding

Location	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 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.		

Annex E-6:

Safety Signs and Colour Coding

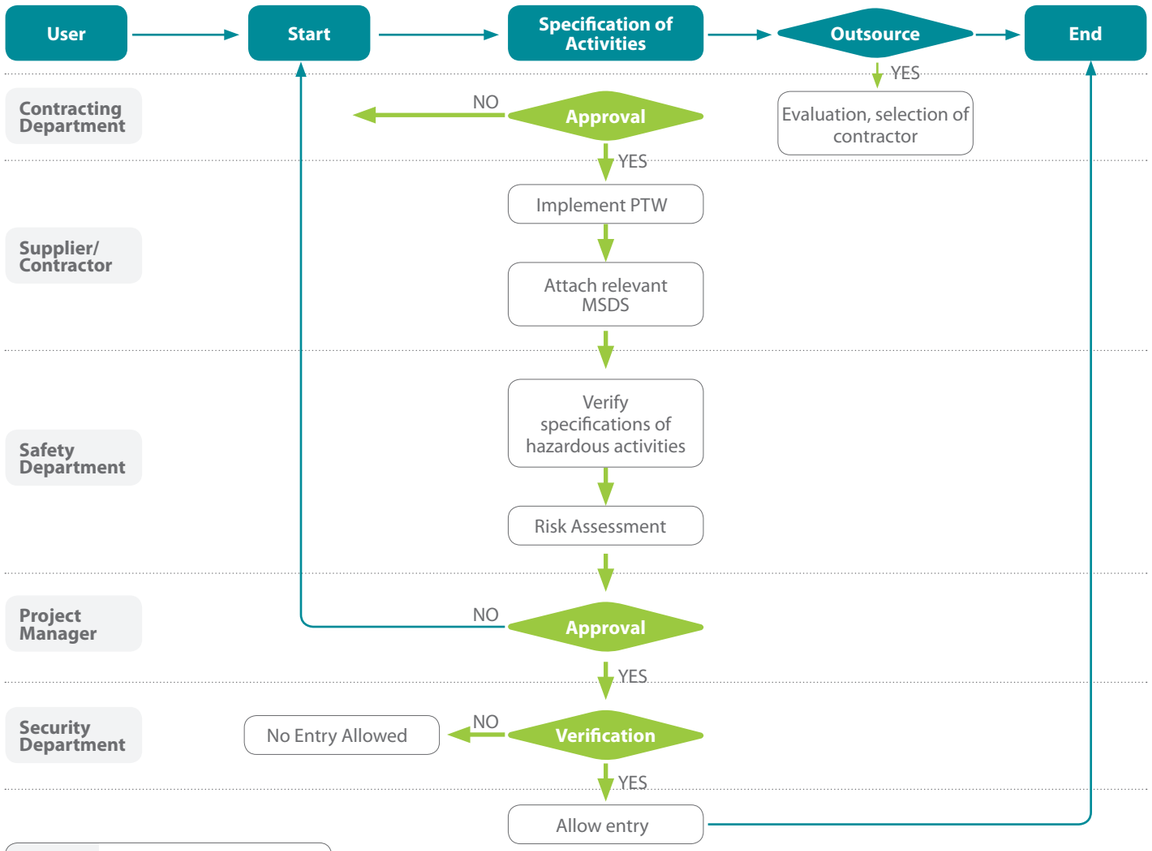
Symbol	Meaning	Comments On Use
Warning 	Hand protection must be worn.	
Mandatory 	Head protection must be worn.	• To indicate that safety helmet must be worn. • Should be permanently fixed at all acesss to the operational areas. • Permanent feature.
Mandatory 	Eye protection must be worn.	
	Face shield must be worn.	
Prohibition 	Fire, open light and smoking prohibited.	• To be used in cases where smoking or open flames can cause danger or fire or explosion.
Mandatory 	Foot protection must be worn.	
Mandatory 	Hearing protection must be worn.	• To indicate noisy area. • Should be placed in noisy areas. • When the noise level exceeds 85dbA. • To warn workers to wear ear plugs/ ear muffs to prevent noise-induced deafness.
Warning 	Safety harness/ belt must be worn.	

Symbol	Meaning	Comments On Use
Prohibition 	Smoking prohibited.	• To be used in cases where smoking can cause danger of fire and harm to health.
Mandatory 	• Thoroughfare prohibited for pedestrians. • Entry prohibited or No Entry beyond this sign.	• Place at the access of tanks and confined spaces: means "No Entry".
Warning 	Caution, explosion risk.	• To be used to indicate possible existence of an explosive atmosphere, flammable gas or explosives.
Warning 	Caution, overhead load.	• Should be installed at all access to cranage areas. • Should be a permanent feature. • A warning to all personal approaching or working in the vicinity of possible falling hazard. • Avoid working under suspended load.
Warning 	Caution, toxic hazard.	• Should be installed at the electroplating areas and acid storage areas. • Areas where chemicals are stored both on board ships and in workshops. • Should be permanently fixed. • Must obtain permission before entering area. • A warning against toxic and pisonous fumes. • Adequate ventilation must be provided.
Warning 	Caution, risk of ionising radiations.	• To be used in area where there is a rush of radioactive exposure. • In area where there is radiation hazard. • Do not pass beyond the sign or go into the fenced off area. • Entry prohibited.
Warning 	Caution, risk of fire.	• To indicate presence of highly flammable materials and high temperature. • Should be installed where paints, solvents and flammable liquids are stored/ kept. • Flash point of substance is below 150 F or 66 C. • A warning against potential fire and explosion hazard.

Symbol	Meaning	Comments On Use
Warning 	Caution, risk of electrical shock.	• Should be installed at all voltage substations, transformers, live wires. • A warning against electrical hazards from high voltages. • Only authorised persons of the Electrical Department are allowed to work or go near such hazards and with the expressed permission from an Electrical Engineer. • This sign must be installed by the Electricians.
Warning 	Caution, risk of corrosion.	• Corrosive materials.
Warning 	Respiratory protection must be worn.	• To indicate that appropriate respirators must be worn. • Against specific work processes such as chemical. cleanings, spray paintings, and so on.
Mandatory	Fire fighting equipment.	• Should be placed at fire extinguisher points. • To indicate location of extinguisher. • The extinguisher should be used in case of fire. It is recommended that chemical be used because of its speed and efficiency in extinguisher all types of fire.
Warning 	Emergency escape.	• To be used to indicate the direction to an exit which can be used in the event of an emergency. • Indicate the escape route. • Should be placed in the boiler room, engine room, duct keel and on passenger vessels and complicated routes on board ships.
Warning + Prohibition 	Fixed CO, fire fighting system.	• Be installed against the CO, cylinder. • When vessels enter for repairs. • A warning against tempering with any controls or work on any controls or entry into the cylinder room. • The system must be isolated and rendered inoperative.
Fire, Openlight and Smoking Prohibited + Approved Entry Permit 	Safe for entry but not safe for hot work.	• For entry into confined spaces for work other than hot work. • Appropriate permits for the work/ entry must be obtained. • Appropriate permits for the work/ entry must still be displayed with this sign. • Indicate "Safe for Entry but not Safe for Hot Work".
Approved Entry Permit + Approved Hot Permit 	For approved hot work, ensure that Valid Entry Permit and Valid Hot Work Permit are displayed at entrances of confined spaces.	• For entry and hot work in confined space. • Valid permits for hot work and entry.

Annex E-7:

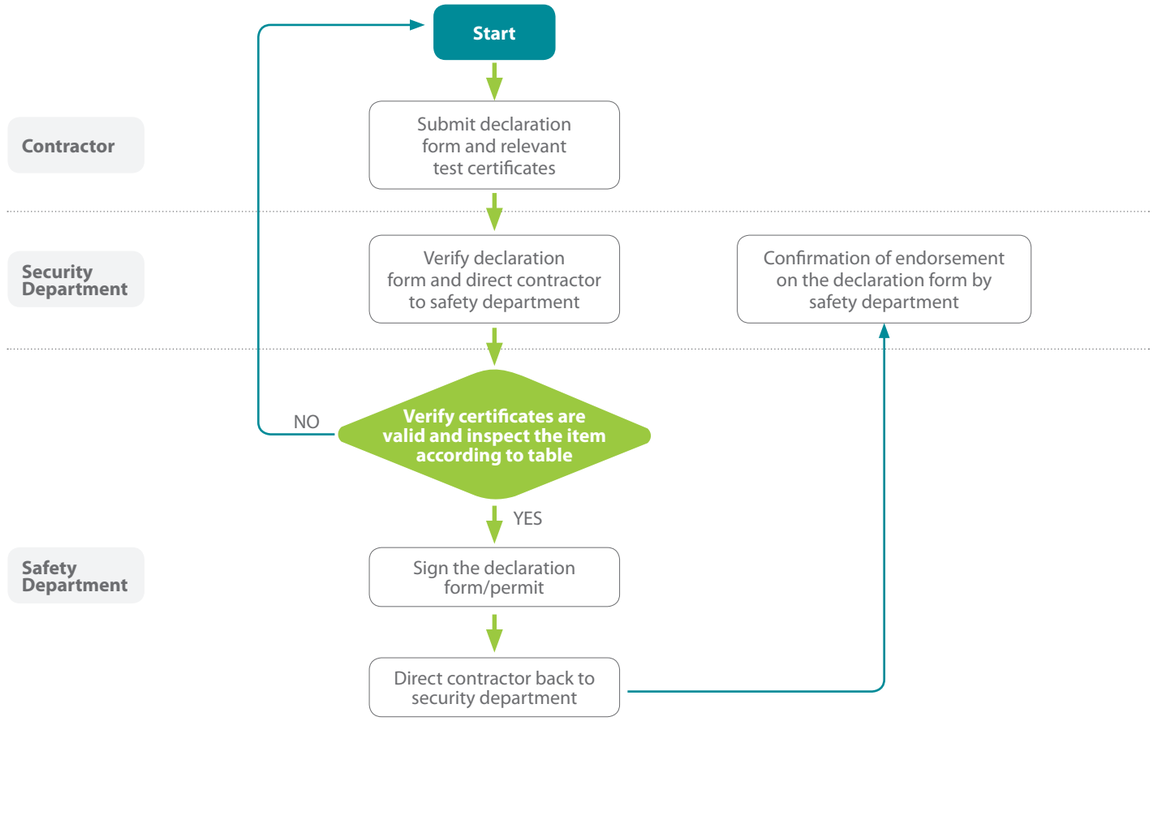
Control Flow Chart for Outsource Service of Hazardous Activities



Legend PTW: Permit-to-Work
MSDS: Safety Data Sheet

Annex E-8:

Contractor's Machinery and Equipment Control Flow Chart



Annex E-9:

Control and Inspection of Contractors' Plant and Equipment at Entry to Yard's Premises

SN	Type of Plant and Equipment	Form/ Permit to be Filled Up	Copy of Certificates to be Attached	Items to be Verified by Safety Department	Inspection/ Service by User (while using inyard)
1	Mobile Crane	Declaration of: • Lifting machine • Lifting equipment • Pressure vessel	• Crane operator's certificate • Lifting machine test certificate endorsed by Approved Person	• Verify certificates • Inspect mobile crane to ensure Test Certificate Registration Number, Safe Working Load (SWL), Date of Test, are clearly marked on boom	
2	Hydro-jetting gun	Hydro-jetting gun entry permit	N.A.	• Inspect hydro-jetting gun to ensure that it is equipped with trigger mechanism	
3	Lifting equipment and pressure vessels	Declaration of: • Lifting machine • Lifting equipment • Pressure vessel	• Test certificates of lifting machine/ lifting equipment/ Pressure vessel	• Verify certificates • Verify the equipment's satisfactory condition • Verify all lifting equipment or pressure vessel have Test Certificate Registration Number, Date of Test, Safe Working Load (SWL) or Safe Working Pressure, indicated clearly on them	
4	Contractor's forklift and rental forklift	Inspection of forklift by safety department	• Service report for forklift. • Valid forklift operator certificate	• Verify forklift by completing Part 2 of checklist.To endorse Part 3 of checklist (refer to Appendix L)	Monthly service must be done by service technician and service reports to be submitted to Safety Department once every 30 days.
5	Self-propelled platform (cherry picker)	Inspection of self-propelled platform by safety department	• Quarterly maintenance service • Report of equipment issued by rental company • Valid lifting platform test certificate		

Annex E-10:

List of Common Hazardous Materials

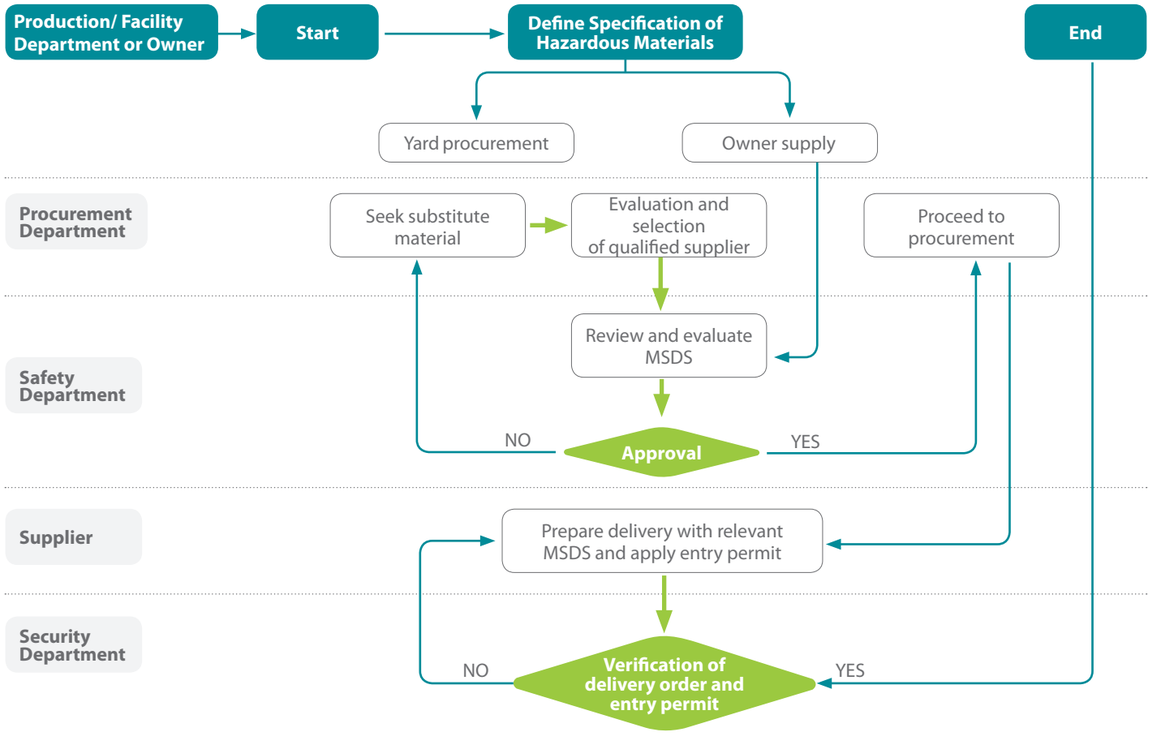
Category of Chemicals	Purpose of Use	Nature of Hazards
Acids (Hydrochloric, Phosphoric, etc)	For etching, cleaning, scaling, and so on, of exotic steel materials such as aluminium, stainless steel, and so on	• Explosive • Corrosive • Severe skin dermatitis
Marine paints/ Solvents	For steel surface preservation and corrosion control	• Explosive • Skin irritation
Cleaning/ Degreasing agents	Cleaning of electrical contacts, machinery parts, and so on	• Explosive • Skin irritation/ dermatitis
Radioactive substances	For purpose of industrial radiography work on weld joints / seams, and so on	• Genetic mutation • Carcinogenic

Note

1. The purpose of this list is to provide an overview of common chemicals or substances used in a shipyard operation.
2. Reference should be made to the Safety Data Sheet (SDS) to determine the hazardous nature of each chemical or substance.

Annex E-11:

Hazardous Materials Control Flow Chart



Legend SDS: Safety Data Sheet

Annex E-12:

Forklift Inspection Checklist

Part 1: Forklift Information (to be completed by the applicant)			
Name of Company:		Forklift Serial No.:	
Safe Working Load:		Forklift ID No.:	
Serviced by:		Date of Service:	
Submitted by:		Signature & Date	

Part 2: Inspection by Safety Department

Place a tick [✓] in the boxes provided if the checks are satisfactory and a cross [✓] if the checks are unsatisfactory.

No.	Item	Yes		Remarks
1	Check hydraulic system is functioning properly.			
2	Check brake system is working effectively.			
3	Check steering system is working properly.			
4	Check horn is working effectively.			
5	Check reverse warning buzzer is working properly.			
6	Check two revolving lights are functioning properly.			
7	Check side signal lights are working properly.			
8	Check side mirrors are provided and not broken.			
9	Check rear view mirror is available and not broken.			
10	Check service report is valid and signed.			
11	Check forklift operator certificate is valid.			Applicable to external contractor

Note: Reject forklift if a cross (✓) is indicated in any of the boxes in item 1 to 10.

Part 3: Verification by Safety Department

This is to confirm that the above forklift has been inspected and found satisfactory by the Safety Department, and is allowed to be used in the yard's premises.

Inspected by:		Signature:	
Designation:		Date & Time:	

Annex F-1:

Sample of SCDF Fire Emergency Plan

1. **Objective**
   - 1.1 Purpose
   - 1.2 Fire Safety Committee
   - 1.3 Fire Alarm

2. **Action to be taken in event of an outbreak of fire**
   - 2.1 Informant
   - 2.2 All staff
   - 2.3 FSM/ Coordinator/ Assistant Co-ordinator
   - 2.4 Fire Warden/ Assistant Fire Warden
   - 2.5 Chief Security Officer/ Assistant Chief Security Officer
   - 2.6 Specialist Personnel
   - 2.7 Fire Fighting Team
   - 2.8 Telephone Operator

3. **Fire Occuring Outside Office Hours**

4. **Duties and Responsibilties**
   - 4.1 FSM/ Coordinator/ Assistant Co-ordinator
   - 4.2 Fire Warden/ Assistant Fire Warden
   - 4.3 Chief Security Officer/ Assistant Chief Security Officer
   - 4.4 Fire Fighting Team/ Security Personnel
   - 4.5 Specialist Personnel
   - 4.6 Telephone Operator
   - 4.7 Persons Responsible for Isolation and Activation of Fire Alarm

5. **External Emergency Support**

6. **Fire Evacuations Drills**

7. **Classifications of Emergencies (if any)**

8. **General**

9. **Appendices**

Appendix I	Name List and Contact Numbers of Fire Safety Committee
Appendix II	Name List and Contact Numbers of Key Personnel
Appendix III	Site Plan of Assembly Point
Appendix IV	Typical Floor Plan (include Location of Hose Reels, Extinguishers and First Aid Boxes)
Appendix V	Evacuation Drill Record Sheet
Appendix VI	Floor Register
Appendix VII	List of Hazards Stored/ Used in the Premises
Appendix VIII	Emergency Response Facilities
Appendix IX	Procedures to Mitigate Spillages of Hazardous Materials

Fire Emergency Plan Guidelines for Industrial Premises

1. **Objective**

1.1 The purpose of the Fire Emergency Plan is:

a) To ensure the safeguard of human lives in the event of fire.
b) To establish a systematic and orderly evacuation plan.
c) To ensure prompt raising of fire alarm and marshalling of first aid fire fighting efforts.
d) To establish responsibilities of individuals involved in handling emergencies.

1.2 Fire Safety Committee

A Fire Safety Committee shall be formed in the building for achieving the above objective. It shall comprise the following persons :

a) A senior executive
b) Fire safety manager/ coordinator as secretary
c) Chief Security Officer
d) Fire Wardens
e) Specialist personnel

1.3 Signal for Fire Alarm

The alarm signal for fire is a continuous ringing note resounding from the electrically operated bells on every storey of the building. The fire alarm signal can be raised by :

a) Break glass alarm system;
b) Automatic heat and smoke detector system; and
c) Automatic sprinkler system.

2. **Action to be Taken in the Event of an Outbreak of Fire**

2.1 Informant

The person who discovers the fire shall immediately:

a) Raise the alarm by activating the nearest fire alarm "Break Glass" call point.
b) Attempt to extinguish any incipient fire with available fire fighting equipment and without personal risk.

2.2 All staff

a) Upon hearing the fire alarm, all staff shall lock important files, cash, shut down machinery, and so on and evacuate immediately guided by their respective Fire Wardens.
b) When evacuating, do not panic but quickly walk down the staircase at the nearest exit and proceed to the assembly point. Do not use lifts.
c) The assembly point is located at See Appendix II (Site Plan).
d) All staff shall not re-enter the building unless instructed otherwise by the Civil Defence Officer in attendance.

2.3 FSM/ Co-ordinator/ Assistant Coordinator

In the event of fire:

a) Ensure that the Singapore Civil Defence Force (SCDF) has been notified of the fire.
b) Proceed to fire alarm main panel and ensure that the fire fighting team has been mobilised to respond to the alarm.
c) Proceed to the assembly point and obtain floor evacuation status reports from the fire wardens (As in the format recommended in Appendix V).
d) Await arrival of the responding crew from the Singapore Civil Defence Force at the main entrance of the building and report to the officer-in-charge the status of the evacuation.
e) (Abatement of any hazards.)

2.4 Fire Warden/ Assistant Fire Warden

On hearing the fire alarm :

a) Alert everyone on his storey to evacuate in an orderly manner using the nearest exit.
b) Check all offices, stores, toilets, and so on to ensure that no one is left behind.
c) Ensure that the disabled, children, pregnant women, and so on if present in their storey, are given particular attention during evacuation.
d) Leave the building after ascertaining that all occupants of the floor have complied with his order.

e) On reaching the assembly area, conduct a roll call of the staff present and report to the coordinator in person of the evacuation status.

f) (Abatement of any hazards.)

2.5 Chief Security Officer / Assistant Chief Security Officer

a) The chief security officer shall ensure that security personnel are deployed at the ground floor staircase exits to guide guests/ visitors to the designated assembly area when the fire alarm is activated.

b) Ensure that all main entrances and exits to/ and from the building are adequately manned to prohibit unauthorised entry and also to intensify patrolling in the vicinity of the building.

c) Ensure that a security personnel directs the SCDF officer on his arrival to the FCC.

d) Ensure that security personnel are detailed to direct traffic to facilitate movement of evacuees at points where they cross roads to reach assembly point.

2.6 Specialist Personnel

a) Upon hearing the fire alarm, switch off necessary equipment, contain fire hazardous materials used in area of work.

b) Report to FSM that his area is clear and potential hazards contained.

c) Meet up with SCDF personnel to provide advice in areas related to his speciality.

d) Render assistance to SCDF personnel in mitigating fire.

2.7 Fire Fighting Team

a) Upon hearing the fire alarm, members of the fire fighting team shall ascertain the location of fire from the main fire alarm panel and proceed to that location.

b) The fire fighting team shall attempt to extinguish or control the fire without taking personal risk, before the arrival of the SCDF.

c) The fire fighting team shall comprise one Team Leader/ Assistant Team Leader and four team members.

2.8 Telephone Operator

On hearing the fire alarm, the Telephone Operator shall immediately notify the SCDF (Tel no : 995) of the activation of the fire alarm and state the following:

a) Location of the building; and

b) Telephone number.

The caller shall not replace the telephone set until the address has been repeated by the operator of the SCDF.

3. Fire Occuring Outside Office Hours

a) In the event of an outbreak of fire after normal working hours, confirm with the SCDF and notify the following persons:

i) Coordinator

ii) Assistant Coordinator

b) The fire fighting team shall proceed to fight the fire from a safe distance with the available fire fighting equipment and attempt to extinguish or control the fire without taking personal risk.

4. Duties and Responsibilties

4.1 FSM/ Coordinator/ Assistant Coordinator

a) Represent the management of the building with respect to all fire safety matters.

b) Has the full responsibility for:

i) Establishment of a Fire Safety Committee;

ii) Training of the employees; and

iii) Preparation, drafting and putting into force the Fire Emergency Plan.

c) Ensures that the approved Fire Emergency Plan is abided by all staff of the building.

d) Ensures that exits, fire prevention and fire fighting systems are in good order through regular inspections.

e) Records date and time of each Evacuation Drill conducted on a Form as per attached Appendix IV. (This form must be kept in the office of the Coordinator for verification purposes by SCDF).

f) Appoints one person as Coordinator during his absence from the building.

g) Responsible for the formation and training of a fire fighting team within the building from among responsible employees who are physically fit to perform this function.

h) Ensures that exit doors are kept closed and unlocked during business hours and that hallways, corridors, lobbies and staircases are kept free from obstruction at all times.

4.2 Fire Warden/ Assistant Fire Warden

a) Acquaint any new employees with the Fire Emergency Plans and means of escape of the building.

b) Be familiar with the Fire Emergency Plan and means of escape of the building.

c) Be familiar with the operation of the fire alarm system, use of first aid and fire fighting equipment.

d) Liaise and coordinate with each other.

4.3 Chief Security Officer/ Assistant Chief Security Officer

a) Be familiar with the Fire Emergency Plan and means of escape from the building.

b) Ensures that the security personnel are well-versed with their roles as described in the Fire Emergency Plan.

4.4 Fire Fighting Team/ Security Personnel

a) To know fully the location and operation of the Fire Alarm System.

b) Be familiar with the Fire Emergency Plan, location of staircases, exits and emergency exits.

c) Be familiar with the location and use of first aid and fire fighting equipment.

d) Be familiar with basic fire fighting procedures.

4.5 Specialist Personnel

a) To know how materials/ machines used in his scope of work can be a source of fire.

b) To know necessary steps to contain spread of fire if his work area is affected.

c) To know the specialist department and companies to contact to provide information and advice on mitigating a fire.

4.6 Telephone Operator

a) To know the fire emergency plan and telephone number of SCDF and other essential emergency telephone numbers.

4.7 Persons Responsible for Isolation and Activation of Fire Alarm

a) To know fully the Fire Emergency Plan, location and operation of the Fire Alarm System.

5. External Emergency Support

Emergency support from nearby companies (if any).

6. Fire Evacuations Drills

a) Fire evacuation drills shall be conducted twice a year.

b) All personnel in the building shall participate in the drill.

7. Classifications of Emergencies (if any)

a) Alert 1 -

b) Alert 2 -

c) Alert 3 -

8. General

Remember, it is in your interest to know:

1) How to report a fire and sound the alarm without delay.

2) What to do in the event of a fire.

3) Location of nearby fire extinguishers and hose reels and learn the proper way to use them.

4) Means of escape in case of fire and how to keep staircases, landings and other escape routes clear of obstruction at all times.

9. Appendices

Appendix I	Name List and Contact Numbers of Fire Safety Committee
Appendix II	Name List and Contact Numbers of Key Personnel
Appendix III	Site Plan of Assembly Point
Appendix IV	Typical Floor Plan (include Location of Hose Reels, Extinguishers and First Aid Boxes)
Appendix V	Evacuation Drill Record Sheet
Appendix VI	Floor Register

Appendix VII List of Hazards Stored/ Used in the Premises
Appendix VIII Emergency Response Facilities
Appendix IX Procedures to Mitigate Spillages of Hazardous Materials
*Specimen attached

Appendix II:

Name of Key Personnel

S/No	Name	Appointment	Contact No.

Appendix V:

Evacuation Drill Record Sheet

I, the FSM/ Coordinator of the Fire Drill conducted for _____
(Name of Premises/ Building), hereby certify that all facts shown herein below are true and correct and that the said Fire Drill was conducted in accordance to the Fire Emergency Plan as required by Fire Safety Bureau (FSB).

Date of Drill	Activation Time	Unit No. or Floor Level	No. of Participants	Time Taken to Evacuate	Name & Signature of FSM/ Coordinator

"Fire" Floor (if applicable): _____

Appendix VI:

Floor Register

Fire Warden: _____

Unit: _____ No. Floor Level: _____

Unit No.	Name of Occupants/ Visitors	Evacuation Status	
		Present	Absent

Appendix VII:

List of Hazards Stored/ Used in the Premises

Unit No.	Hazardous Materials	Personnel-in-Charge	Method of Mitigation

Appendix VIII:

Emergency Response Facilities

S/No.	Type	Location	Remarks

Appendix IX:

Procedures to Mitigate Spillages of Hazardous Material

Toxic/ Hazardous Materials	Action to be Taken During Spillages	Personnel Responsible

Annex G-1:

Workplace Safety and Health (Noise) Regulations
Regulation 7(1)
Noise Monitoring Report

Part A. Details of Competent Person

Name: _____ NRIC No.:_____

Part B. Details of Workplace Monitored

Name of Workplace: _____

Workplace Number: _____

Address: _____

Tel No.: _____ Fax No.: _____

Date and Time of Monitoring: _____

Part C. Workplace Representative(s)

Name: _____ Designation: _____ Tel No.: _____

Name: _____ Designation: _____ Tel No.: _____

Name: _____ Designation: _____ Tel No.: _____

Part D. Details of Instrumentation

Instrument	Brand	Model	Serial No.	Type	Date of Last Calibration

Calibrator Used (Brand/Model/Serial No.) _____

Part E. Certification

Attached to this report is a copy of the following certificates and documents:

- Certificate of the competent person (after completing the relevant training courses);
- Certificate of primary calibration (as per manufacturer's recommendations); and
- Printouts of field calibration (before and after monitoring).

Part F. Noise Map & Machine Noise Levels

Attached to this report is a copy of the following:

- Layout plan clearly highlighting areas or machines with sound pressure levels above 85 dB(A) ; and
- A separate table collating the noise levels emitted by individual machine at the workplace and an indication of the number of hours the machine operates on a normal working day.

Part G. Results Table for Personal Monitoring

A Results Table for the dosimetry conducted for workers from different SEGs is attached, and workers who are exposed to excessive noise are clearly highlighted and identified.

Part H. Recommendations for Implementation of Hearing Conservation Programme

The monitored workplace is assessed for the implementation of a HCP and the findings are included in this report. Any shortfalls in the implementation are highlighted and the occupier is briefed on how to implement the various elements.

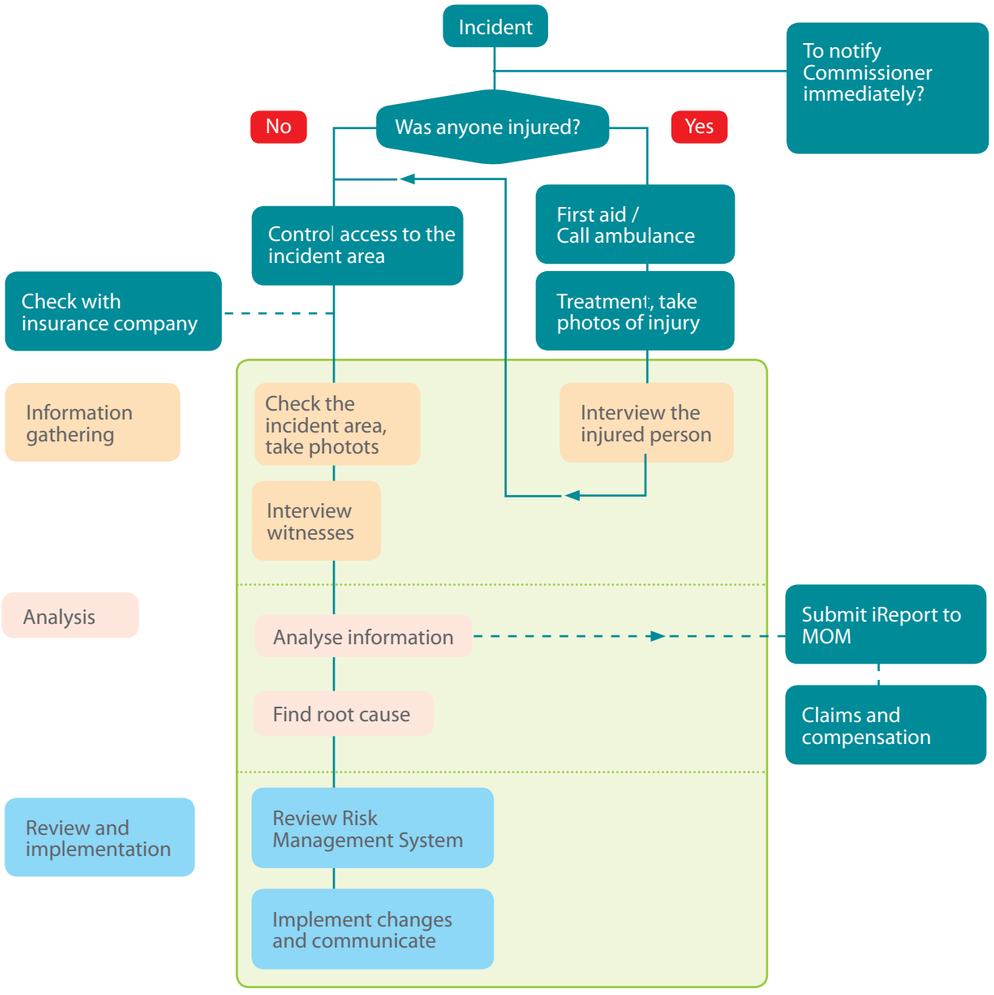
Second Schedule— Continued

Part E. Exposure Assessment

Machine/ Equipment	Process/ Activity	No. of Persons Exposed	Job Description of Persons Exposed	LAeq, T dB(A)	Time Measurement (minutes)	Duration of (Hours and Exposure per Day	Type

ANNEX G-2:

The incident investigation process.



Annex H-1:

Occupational Health Inspection Audit

Date: _____ Auditors(s): _____

Factory: _____

Address: _____

No. of workers: _____

Contact person(s): _____

Designation: _____ Tel No: _____

Checklist:

		Remarks
1. Chemical Hazard Control	A	NA
2. Industrial Ventilation	A	NA
3. Industrial Hygiene Monitoring	A	NA
4. Confined Space Work	A	NA
5. Contract Work	A	NA
6. Hearing Conservation	A	NA
7. Medical Surveillance	A	NA
8. Respiratory Protection	A	NA
9. First Aid Facilities	A	NA

A: Applicable
NA: Not Applicable

1. Chemical Hazard Control

A plant which uses chemicals must have elements in its control programme designated to ensure safety in the use of chemicals and that adequate safety and health information is available to chemical users.

Person I/C: _____ Job Title: _____

		Remarks	
a)	Is there a chemical procedure approval procedure?	Y*	N
b)	Is there an inventory of the chemicals used?	Y*	N
c)	Number of chemicals used:		
	Number of chemicals with material safety data sheets?	Y*	
d)	Is there a proper chemical storage and staging area?	Y*	N
e)	Are all chemical containers labelled?	Y*	N
f)	Are there any written procedures on the use of chemicals?	Y*	N
g)	Are there any engineering control measure?	Y*	N
h)	Are workers informed of the hazards involved and precautions to take?	Y*	N
i)	Are suitable personal protective appliances provided and used?	Y*	N
j)	Are there any emergency procedures?	Y*	N

*To check relevant records and documents.

Findings and Recommendations:

2. System and Occupational Health

Exhaust ventilation systems are installed to remove airborne contaminants from the workplace. In order for these engineering controls to be effective, they must be properly designed, installed and maintained.

Person I/C: _____ Job Title: _____

		Remarks
a)	Is there an inventory (engineering designs and specifications) of all exhaust systems?	Y* N
b)	Are designs for new or revised local exhaust ventilation systems vetted by technical staff?	Y* N
c)	Are local exhaust ventilation systems tested and maintained regularly?	Y* N
d)	Are the test results and maintenance records properly documented?	Y* N
e)	Has the person performing vetting, testing and maintenance received appropriate training?	Y* N

*To check relevant records and documents.

Findings and Recommendations:

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3. Industrial Hygiene Monitoring

Evaluation of workplace conditions to ensure that airborne contaminants are controlled to prevent potentially harmful chemical concentrations, and that actual exposure levels are documented, are essential parts of an industrial hygiene monitoring programme.

Person I/C: _____ Job Title: _____

		Remarks
a)	Is there a documented sampling or monitoring programme?	Y* N
b)	Are appropriate instruments and equipment used for hygiene monitoring?	Y* N
c)	Are these instruments and equipment calibrated before use?	Y* N
d)	Are the sampling strategies correct?	Y* N
e)	Is the person performing the monitoring suitably trained?	Y* N
f)	Are the monitoring results available for inspection and maintained for at least 5 years?	Y* N

*To check relevant records and documents.

Findings and Recommendations:

Annex H-2:

Checklist for the Review of Shipyard Safety Management System

This checklist may be used for audit to the key requirement in the MOM's Safety and Health Management System Elements as listed in the Second Schedule to WSH (General Provisions) Regulations 2006.

(To be completed by Review Team Leader.)

Please answer all questions by placing a tick (✓) in the relevant boxes. Put in the remarks if necessary.

	Item	Yes	No	Remarks
1	**General**			
1.1	Has the shipyard implemented a safety management system for the purpose of ensuring the safety and protecting the health of all workers in the yard in accordance with Regulation 4 of the WSH (Shipbuilding and Ship-repairing) Regulations 2008?			
2	**Safety Policy**			
2.1	Has the shipyard included its commitment to the safety policy?			
2.2	Is the policy communicated to all of the organisations?			
2.3	Is the policy implemented and maintained at all levels of the organisation?			
2.4	Are there provisions for the periodical review and amendment of the safety policy when necessary?			
3	**Safe Work Practices**			
3.1	Have the procedures been established and maintained to ensure that the safe work practices are followed?			
3.2	Are the procedures documented as work procedures?			
3.3	Has a listing of all statutory requirements with regards to safe work been established and maintained?			
3.4	Are there provisions for the updating of the list of Statutory Requirements?			
3.5	Do the work procedures or instructions conform to the Statutory Requirements in terms of contents, format and authorisation?			
3.6	Are there any mechanisms to effectively communicate decisions and actions proposed by the safety committees to those persons responsible for implementing them or monitoring their implementation?			
4	**Incident Investigation and Analysis**			
4.1	Are procedures established to ensure that safety incidents are identified, recorded, investigated, and analysed with the objective of recommending specific action to prevent recurrence?			
4.2	Are procedures established for implementing corrective action or recommendations arising from incident investigation and analysis?			
4.3	Has a mechanism been set up to ensure that all personnel, including contract workers, have the avenue to report safety incidents?			
5	**In-house Safety Rules and Regulations**			
5.1	Are there in-house safety rules and regulations to give clear instructions to personnel in the following (where applicable):			
i)	Safe operation of plant machinery and equipment			
ii)	Maintenance of plant, machinery and equipment			
iii)	The safe handling of material			
iv)	The reporting of hazards and incidents			

	Item	Yes	No	Remarks
v)	The supply and use of personal protective equipment			
vi)	The cleanliness of the workplace			
5.2	Are the safety rules and regulations adequate in accounting for the provisions of the Statutory Requirements?			
5.3	Are the safety rules and regulations adequately documented and communicated to all appropriate levels of the organisation?			
6	**Safety Promotion**			
6.1	Are there promotional programmes that demonstrate the shipyard's commitment in advancing the culture of safety in the workplace and reinforcing the concept that safety and production are inseparable?			
6.2	Are there procedures to evaluate safety performance of contractors?			
7	**Safety Inspections**			
7.1	Are there procedures to carry out internal safety inspections?			
7.2	Are the personnel carrying out the inspections competent and fully conversant with the statutory requirements, relevant procedures for safe work practices, rules and regulations?			
7.3	Are there provisions to ensure that the relevant findings of the inspections are brought to the attention of the Ship Repair Manager, WSH Officer and the personnel responsible for taking any corrective action?			
7.4	Has the corrective action been taken immediately?			
7.5	Are the inspections carried out frequently enough to ensure a high level of compliance with the provisions of the Safety Management System?			
7.6	Are the statutory inspections carried out in with the relevant regulations under the Factories Act and its subsidiaries?			
8	**Maintenance Regime**			
8.1	Are there procedures to ensure that plant machinery and equipment used in the shipyard are properly maintained and, where appropriate, fitted with personnel protection devices and equipment that are in good order?			
8.2	Is there a preventive maintenance programme for inspections to be conducted at appropriate intervals; defects and material deficiencies to be identified and reported; and appropriate corrective action to be taken?			
8.3	Are maintenance and testing carried out as required by law and integrated into the shipyard's preventive maintenance programme?			
8.4	Does the shipyard designate appropriate areas for storage of the chemical/ material and are such areas secured against unauthorised access?			
8.5	Are there provisions to ensure that personnel involved with the storage, handling and use of hazardous chemical/ material are competent and fully aware of the relevant safeguards and measures?			
8.6	Are there provisions to ensure that hazardous chemical/ material are returned to the designated storage areas when not in use?			
9	**Emergency Preparedness**			
9.1	Are there procedures to identify, describe and respond to emergency situations within the shipyard?			
9.2	Are there emergency procedures documented and communicated to all level of personnel (including contract workers) so as to enable the shipyard to respond quickly to emergency situations?			

	Item	Yes	No	Remarks
10	**Occupational Health Programmes**			
10.1	Does the shipyard implement and maintain an effective Hearing Conservative Programme (HCP) and Respiratory Protection Programme (RPP) for workers experiencing excessive noise and air contaminants?			
10.2	Does your HCP include the following:			
i)	Engineering and administrative control measures to reduce noise levels and regular monitoring of noise level?			
ii)	Suitable hearing, protectors are selected, provided, and maintained and their usage are under supervision?			
iii)	All exposed workers are required to undergo pre-employment and annual audiometric examinations?			
iv)	Sufficient and appropriate training and education are given to worker?			

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