SUSS
SINGAPORE UNIVERSITY
OF SOCIAL SCIENCES

# HFSY217
# Emergency Preparedness and Response Planning

**School of Science and Technology**

Study Guide

# Course Development Team


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# Table of Contents

## Course Guide



## Study Unit 1: Introduction to Emergency Management



## Study Unit 2: Organising for Emergency Preparedness

## Study Unit 3: Establishing Emergency Preparedness



## Study Unit 4: Managing the Emergency Incident

## Study Unit 5: Implementing the Incident Management Process



## Study Unit 6: Maintaining Emergency Preparedness

# List of Figures

# Course Guide

## Emergency Preparedness and Response Planning

# 1. Welcome

Welcome to your study of HFSY217 Emergency Preparedness and Response Planning, a 5 credit unit (CU) course.

This Study Guide is divided into two sections – the Course Guide and Study Units.

The Course Guide provides a structure for the entire course. As the phrase implies, the Course Guide aims to guide you through the learning experience. In other words, it may be seen as a roadmap through which you are introduced to the different topics within the broader subject. This Guide has been prepared to help you understand the aim[s] and learning outcomes of the course. In addition, it explains how the various materials and resources are organised and how they may be used, how your learning will be assessed, and how to get help if you need it.

## 2. Course Description and Aims

An effective response to an emergency or a disaster does not just happen. Many agencies have a part to play dealing with an emergency and its aftermath. The effectiveness of the total response will depend on how well government agencies, emergencies services, and the utility operators have harmonized their preparations, trained their personnel, and tested their arrangement and emergency procedures.

This course aims to equip students with the essential knowledge on how to go about preparing their workplaces to deal with emergencies and disasters effectively. The course covers the fundamentals in emergency planning; focusing the required efforts on emergency preparedness, emergency response and emergency recovery based on internationally recognised systems and guidelines. The students will appreciate the different strategic, tactical and operational roles undertaken by various agencies or individuals within and outside their organisation and how to implement an effective command and control capability. The course also covers post-emergency recovery and business continuity planning. This course includes a site study visit to Jurong Island Industry, visiting a chemical process plant and a fire station. Site study visit is subjected to premises' approval and availability.

# 3. Learning Outcomes

**Knowledge & Understanding (Theory Component)**

Upon successful completion of this course, students will be able to:

1. Describe the fundamentals of emergency management and its methodologies.
2. Discuss the concepts, elements and activities of an effective emergency management, response and recovery programme.
3. Illustrate the elements and activities of an effective emergency management, response and recovery programme.
4. Analyse the training and development requirements during resources & capacity building.

**Key Skills (Practical Component)**

Upon successful completion of this course, students will be able to:

1. Examine the varied degree of planning required based on the hazards present at their workplaces.
2. Apply principles of emergency management, response and recovery to plan for and lead in the workplace emergency planning efforts.

# 4. Learning Materials

The following is a list of the required learning materials to complete this course.

**Required Textbook(s)**

SLP (2014). *Emergency Response Planning Guide*. Society of Loss Prevention

**Other Recommended Study Material(s)**

The following learning materials are required in order to complete the learning activities:

Other Recommended Textbook(s)

Principles of Emergency Planning and Management David Alexander Oxford University Press, USA, 2002

Emergency Planning Ronald W Perry and Michael K Lidell Wiley, 2nd edition, 2006

Reference Books

Industrial Emergency Preparedness Robert B Kelly Wiley, 1989 ISBN: 0-422-20483-3

Guidelines for Technical Planning for Onsite Emergencies Centre for Chemical Process Safety American Institute of Chemical Engineers CCPS, 1995 ISBN: 0-8169-0653-X

Business Continuity Management: Building An Effective Incident Management Plan Michael Blyth Wiley, 2009

Codes and Standards

NFPA1600: Standard for Emergency/Disaster Management NFPA, 2016 National Fire Protection Association

**Additional Information/Appendices**

This course will provide students with a broad perspective of comprehensive emergency management, enabling the student to undertake emergency planner's role,

with the essential working knowledge of how to put in place an effective incident management system for the organization to manage and control emergencies arising from their workplaces, covering:

Emergency Operations Management

Concepts in Operation Management; Operation Management Process; Pre-Operation Phase; Execution of Operations; Post Operation Phase

Incident Command System

Command Organization and Structure; ICS Modus Operandi; Command Modes; Unified and Area Command; Command Roles and Functions

Emergency Leadership

Emergency Risk Management and Decision Making; Command Presence

Mutual Aid and Joint Operations

Issues relating to Mutual Aid; Roles of the Authorities and Industries; Multi-Agency Coordination; Joint Operation Procedures; Resource Management; Communication and Interoperability

Crisis Organization and Management

Crisis Organization and Structure; Functions of Crisis Management Team; Emergency Operation Center; Crisis Communications and Media Management

Response Functions and Priorities

Strategies and Tactics for various emergency incident types

Onsite and Offsite Management

Scene Organization and Management; Damage Assessment; Business Continuity; Employee Assistance; Incident Investigation; Strategic Recovery Issues; Incident Termination

# 5. Assessment Overview

The overall assessment weighting for this course is as follows:

| Assessment | Description | Weight Allocation |
|---|---|---|
| **Assignment 1** | Online Quiz | 10% |
| **Assignment 2** | Site Visit Tutor Marked Assignment | 20% |
| **End-of-Course Assessment** | End of Course Assignment (ECA) | 70% |
| **TOTAL** | | 100% |

SUSS's assessment strategy consists of two components, **Overall Continuous Assessment** (OCAS) and **Overall Examinable Component** (OES) that make up the overall course assessment score. The OCAS to OES are weighted 30:70.

**For this course, HFSY 217 Emergency Preparedness and Response Planning:**

**(a) OCAS:** Assignment 1 comprises an Online Quiz (Multiple Choice Questions) weighted at 50%, Assignment 2 comprises a Site Study TMA Report weighted at 50%, collectively amounting to 100% of the OCAS.

**(b) OES:** The End of Course Assignment is 100% of this component.

To be sure of a pass result you need to achieve scores of 40% in each component. Your overall rank score is the weighted average of both components.

# 6. Course Schedule

To help monitor your study progress, you should pay special attention to your Course Schedule. It contains study unit related activities including Assignments, Self-assessments, and Examinations. Please refer to the Course Timetable in the Student Portal for the updated Course Schedule.

***Note:*** You should always make it a point to check the Student Portal for any announcements and latest updates.

Study Unit 1

# Introduction to Emergency Management

# Learning Outcomes

At the end of this unit, you are expected to:

- Define what is emergency management
- Explain the phases of emergency management
- Understand the objectives and activities of each phase
- Understand the local legal requirements
- Understand the supplement of industry standards and code of practices
- Understand the importance of preparedness
- Understand organisation perspectives to preparedness
- Consider appropriate approaches for planning
- List the elements of an effective emergency management programme

# Overview

This is the first unit for the course HFSY217: Emergency Preparedness & Response Planning. This unit aims to provide an overview of emergency management, the legal requirements, and how organisations approach and achieve emergency preparedness.

**Chapter 1: Overview of Emergency Management,** aims to provide an overview of emergency management and its related terminologies.

**Chapter 2: Legislation & Industry Standards,** aims to provide the legislative overview of the law and various related industry code of good practice.

**Chapter 3: Organisations and Emergency Preparedness,** aims to provide how organisations perceive emergency preparedness and the various driving forces that drive the organisation towards emergency planning.

# Chapter 1: Overview of Emergency Management

## 1.1 Introduction

Despite the best efforts to safely manage hazardous chemicals, incidents may still happen and these might escalate into catastrophes. Hence, facilities management must prepare to respond effectively to minimise possible injuries and property damage to:

- Minimise impact;
- Reduce loss;
- Ensure business continuity;
- Recover as soon as possible; and
- Limit liability.

What constitute an emergency/disaster? An **emergency incident** is any situation which threatens life, property, operations, or the environment; that requires emergency response for rescue, fire suppression, emergency medical care, special operations, law enforcement, and other forms of hazard control and mitigation. An emergency is any unplanned event that can cause deaths or significant injuries to employees, customers or the public, or that can shut down your business, disrupt operations, cause physical or environmental damage, or threaten the facility's financial standing or public image. **Emergency Management** is defined as the on-going process to prevent, mitigate, prepare for, respond to, and recover from an incident that threatens life, property, operations, or the environment; comprising 4 main phases as shown below:

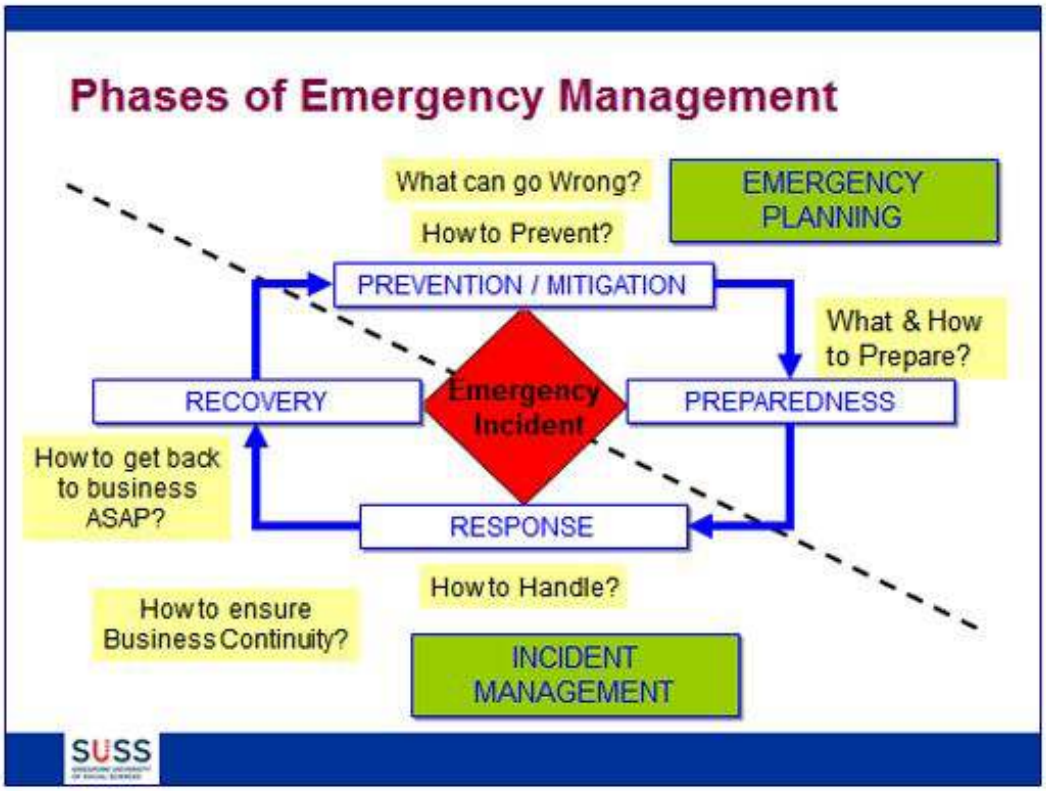


**Figure 1.1** The 4 Phases of Emergency Management

(Source: NFPA 1600: Standard on Emergency Management (2013))

In a nut shell, organisations began by looking at all the business activities that they are required to carry out as part of their on-going business operation. And in the process, ask "What can go wrong?" that may pose a threat to life safety and property damage. Having identified the potential risk-events that may take place, next ask "How to prevent them?" and build in the control measures to prevent and/or mitigate the impact if the undesired occurrence actually happens.

At the back of the mind, the organisations also need to note that the risk-event may not be totally mitigated by the control measures and eventually outburst as a hazardous or catastrophic incident, thereby requiring emergency response actions from the in-house company emergency response team (CERT) and even external assisting from the

community emergency services; thereby needing these organisations to establish their own response capability and build the organisations' emergency preparedness.

Given any workplace/facility, there is always a likelihood of accident that may result in injury, loss of life, property damage, etc. Even a case of flu-outbreak can result in an emergency pandemic scenario within your workplace; threatening the community at large. Emergency scenarios can be classified into natural or man-made situations, such as:

- Flood, Earthquake, Typhoon, or
- Fire, Explosion, Toxic Chemical leak.

## 1.2 Emergency Planning

Emergency Planning is the stage whereby organisations began to build their knowledge base of the risks and threats associated with their business activities; this is followed by analysing the potential scenarios and determining the type of resources and level of competency to handle the risk-events when they materialise; preparing the personnel to be able to respond to and manage the incident impacts. This stage comprises 2 phases of activities as follows:

- In phase 1: Prevention/Mitigation, the organisation focuses on the recognition, evaluation, assessment, and control of hazard through the safety and health management system, comprising risk assessment, risk control measures, etc. Looking at what can go wrong and preventing an accident through routine safety checks, inspections, audits as well as work activity reviews.
- In phase 2: Preparedness, the organisation focuses on what possible potential accident scenarios that may take place and look at how to go about establishing the Emergency Response Plan (ERP); building up capability such as the Company Emergency Response Team (CERT), Evacuation Warden Team (EWT) and Incident Management Team (IMT). Table-top exercises and deployment drills are being practised to gear up the personnel in their emergency roles.

Emergency planning is not conducted in the confines of offices. Planners must understand the perceptions and thinking behind the people/population they intend to protect in order to devise an effective emergency plan. Accurate human responses in emergency/disaster have been studied extensively and patterned behaviours documented. Hence, emergency planners need to take into consideration such human responses when designing protective actions.

## 1.3 Incident Management

Incident Management is the stage whereby the organisation began to respond to an emergency incident when it happens; from tackling the direct consequences such as rescue, fire-fighting, first aid treatment, and chemical spill control, to managing issues such as media communication, employee wellbeing, environmental pollution, etc. When the emergency is over, it is followed by recovery activities to repair, replace, or rebuild the infrastructure to normalcy. This stage comprises 2 phases of activities as follows:

- In phase 3: Response, the organisation focuses on the supervision and handling of the evacuation or in-place protection measure, monitoring of the incident through the communication with the EWT and CERT, supporting the IMT in decision making and issues resolutions to handle and manage the incident impacts.
- In phase 4: Recovery, the organisation focuses on salvaging the partially damaged properties and equipment, repairing and replacing the essential machineries, rebuilding of affected infrastructure, reinstating the safety protection systems, resumption of critical business operation as part of the organisation's business continuity and the recovery efforts, bringing the organisation back to normalcy.

**Read**

NFPA 1600 (2013): Standards for Disaster/Emergency Management & Business Continuity, National Fire Protection Association

# Chapter 2: Legislations & Industry Standards

## 2.1 Local Legislations on Emergency Preparedness

The Singapore Statutes require that responsible business operator provides safe and secured work environment and condition for its workforce. Amongst the requirements to ensure responsible product quality and acceptable service level, the laws require business owners and operators to implement various management systems, such as the quality management system (QMS), workplace safety and health management system (WSHMS), Environment Management Systems (EMS), etc. This includes the key element of the company's state of emergency preparedness; the ability of the organisation to prevent, mitigate, prepare for, respond to, and recover from an incident that threatens life safety to its employees, public and the properties.

In Singapore, the requirement to build the state of emergency preparedness and response planning is covered by various laws, such as the Fire Safety Act (FSA), Workplace Safety and Health Act (WSHA), Environmental Protection and Management Act (EPMA), Environmental Public Health Act (EPHA) and their subsidiary legislation. This is supplemented by other laws such as the Building Control Act, Strata Title Act, Civil Defence Act, Hazardous Waste (Control of Export, Import and Transit) Act, etc.

## 2.2 Fire Safety Act & Regulations

The enactment of the Fire Safety Act (FSA) and its legislative regulations aim to bring about higher standard of fire safety provisions and measures in Singapore's buildings and workplaces. Under this law, proposed buildings and structures must be designed to comply with the current fire codes and operating the premises must adhere to responsible fire safety management practices; these will ensure that all fire protection systems are maintained and functional during fire emergency, that all occupants are able to safely egress the building or structure in good reasonable time, and that the building owner establish in-house emergency response capability to respond to and intervene with the

emergency at hand prior to the arrival of the community emergency services. The relevant regulations related to emergency preparedness and response planning are:

- Fire Safety (Emergency Response Plan) Regulations
- Fire Safety (Company Emergency Response Team) Regulations
- Fire Safety (Fire Certificate) (Designated Buildings) Order
- Fire Safety (Occupier/Owner of Industrial Premises to Appoint FSM) Notification
- Fire Safety (Premises Requiring Emergency Response Plan) Notification
- Fire Safety (Premises Requiring FSM & CERT) Notification

**Read**

Fire Safety Act and Subsidiary Legislation at https://sso.agc.gov.sg/Act/FSA1993

## 2.3 Workplace Safety and Health Act & Regulations

The Workplace Safety & Health Act (WSHA) and its legislative regulations aim to bring about high standard of safety and health provisions and measures in Singapore's workplaces. Under this law, responsible employers are to provide a safe work place for all his workers. All workers are obligated to adhere to the organisation's safe work procedures to ensure safety and health of oneself and people working nearby. The WSHA requires stakeholders to take reasonably practicable measures to ensure the safety and health of persons at the workplace by (1) Reduce risk at the source by requiring all stakeholders to remove or minimise the risk they create, (2) Encourage industries to adopt greater ownership of safety and health outcomes, and (3) Impose higher penalties for poor safety management and outcomes.

The key features of the law are (1) It places responsibilities on stakeholders who have it within their control to ensure safety at the workplace, (2) It focuses on workplace safety and health systems and outcomes, rather than merely on compliance, (3) It facilitates

effective enforcement through the issuance of remedial orders, and (4) It imposes higher penalties for non-compliance and risky behaviour.

The legal requirements of WSHA cover (1) All workplaces, unless exempted, (2) Responsibilities of stakeholders (Employer & Employees), (3) Hazardous substances, and (4) Machinery and equipment and the relevant regulations related to emergency preparedness and response planning are:

- Workplace Safety & Health (General Provisions) Regulations
- Workplace Safety & Health (First Aid) Regulations
- Workplace Safety & Health (Major Hazard Installations) Regulations
- Workplace Safety & Health (Risk Management) Regulations
- Workplace Safety & Health (SHMS and Auditing) Regulations
- Workplace Safety & Health (WSH Committee) Regulations

**Read**

Workplace Safety & Health Act and Subsidiary Legislation at https://sso.agc.gov.sg/Act/WSHA2006

## 2.4 Industry Standards and Approved Code of Practices

responsible employer, Industry Standards and Code of Practices are developed by the industry groups to provide guidance and adoption of recommended good practices. These Standards or Code of Practices are called Approved Code of Practice (ACOP) by the authorities and they are legal binding when referred to by the legislations. Some of the key ACOP related to emergency preparedness are:

- Singapore Standard, SS 506: Occupational Safety & Health (OSH) Management Systems – Requirements

- Singapore Standard, SS 510: Code of Practice on Safety in Welding and Cutting (and other operations involving the use of heat)
- Singapore Standard, SS 548: Code of Practice for Selection, Use and Maintenance of Respiratory Protective Devices
- Singapore Standard, SS 586: Part 3 (former CP 98): Specification for Hazard Communication for Hazardous Chemicals & Dangerous Goods – Preparation of Safety Data Sheet
- National Fire Protection Association, NFPA 1600: Standards for Disaster/ Emergency Management and Business Continuity
- Singapore Civil Defence Force, General Guidelines for Emergency Response Plan
- Singapore Civil Defence Force, National CERT Standard
- Ministry of Manpower, Code of Practice for Risk Management

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

# Chapter 3: Organisations & Emergency Preparedness

## 3.1 Driving Forces for Emergency Preparedness

All organisations are set up with the purpose to achieve their intended organisational objectives. Business or commercial organisations are essentially driven by the profit and financial gain through their business activities, while non-profit organisations (governmental or non-governmental) are driven by their obligations and objectives to serve the public. In doing so, they provide employment opportunities and to ensure responsible employment; the laws require that these organisations provide a safe and conducive workplace and basic welfare and well-being for the workers. Hence, organisations from setup and through the years of operation would have established the organisation core management system to address issues such as corporate governance (financial system and management accountabilities), work processes, job procedures, workplace culture, safety and health, welfare and wellbeing, etc., such as:

- Enterprise risk management system;
- Financial accounting and management system;
- Employee relations and welfare management systems;
- Asset protection and management system;
- Emergency management system;
- Safety and health management system; and
- Business continuity management system; etc.

All these management systems aim to put in place protocol of processes and procedures to address and manage workplace issues. Some of these are put in place due to external driving factors such as government regulations, public safety concern; while other factors are internally driven such as corporate reputation, corporate social responsibility through the organisations' own on-going enhancement processes to improve operational efficiency, namely:

- Risk Management
- Loss Prevention
- Business Continuity
- Employees' Safety & Health
- Cost Saving
- Management Responsibilities
- Corporate Accountability

Many organisations tend to see the need for emergency preparedness as an external driving factor, hoping to achieve this through mere compliance. However, the need for emergency preparedness is unique to one organisation's business activities and mere compliance may not be sufficient to build the state of readiness required to handle the gravity of incidents in one's workplace. In addition, emergency preparedness and response planning is not a standalone capability but need to tap on the existence of other management systems such as detection and warning systems, automatic suppression systems, process control systems, etc. in order to effectively manage an emergency incident.

Many organisations, including individuals, are also very sceptical over emergency preparedness especially given the number of catastrophic incidents that have taken place, and are still taking place, despite the immense effort put into emergency preparedness. Organisations need to recognise that although numerous lessons learnt have been surfaced through these past incident case studies, their implementation does not provide a blanket accident-proof work environment for all as every organisation is unique in its own business environment and the competency of the people employed.

Henceforth, it is important for prospective emergency planner to be able to advise organisations not to lose faith easily and to reinforce the need for emergency preparedness as an integral part of risk management and loss prevention. It is pertinent that organisations understand the importance of emergency preparedness and take proactive roles in ensuring a comprehensive emergency management programme for their

workplace; be well prepared to respond effectively to minimise possible injuries and property damage so that when the risk-event actually happens, effective emergency response action can assist the organisation to:

- Minimise impact;
- Reduce loss;
- Ensure business continuity;
- Recover as soon as possible; and
- Limit liability.

Failure to put in place an effective system to prevent, mitigate, prepare for, respond to, and recover from an incident that threatens life, property, operations, or the environment can be costly to the organisation in terms of:

- Loss of life, injury;
- Disruption to business;
- Damage to process equipment, property;
- Production loss and opportunity cost;
- Restoration cost;
- Compensation; and
- Loss of critical data or systems, etc.

Before developing an approach to emergency planning, it is important that planner recognises and understands the fundamental difference in foci when the planning takes on a long-term timescale approach versus short-term reactions to incidents. Whenever possible, the planning team should consider and weigh the importance of long-term planning to mitigate the hazards, and methodical preparation for the next emergency, whilst concurrent short-term planning to reduce the impact and its associated consequences if the incident were to occur tomorrow is looked into.

## 3.2 Elements of an Effective Emergency Management Programme

Base on NFPA 1600: Standard for Disaster/Emergency Management and Business Continuity, an effective emergency/business continuity management programme is a series of planned activities, supported and funded by senior management, that implements the organisation's mission, vision, strategic goals and objectives to preventing, mitigating, preparing for, responding to, and recovering from an emergency incident that threatens life, property, operations, or the environment. The elements of an emergency management programme are:

- Policy & Directions
- Law & Authorities
- Risk Assessment
- Incident Prevention
- Mitigation
- Resource Management & Logistics
- Mutual Aid / Assistance
- Emergency Planning
- Incident Management
- Communication & Warning
- Operational Procedures
- Facilities
- Training
- Exercise, Evaluation & Corrective Actions
- Crisis Communication & Public Information
- Finance & Administration
- Business Continuity

**Read**

NFPA 1600 (2013): Standards for Disaster/Emergency Management & Business Continuity, National Fire Protection Association

# Summary

Having completed Study Unit 1: Introduction to Emergency Management, you would have acquired a good overview of what emergency management entails and an understanding of how the four phases of emergency management are interrelated and the key objectives in each phase during the emergency planning and incident management stages respectively. This unit has also provided you the legal requirements of Singapore Statutes in emergency preparedness and response planning and how the laws are supplemented by industry standards and code of good practices relating to emergency preparedness. This would provide you, as prospective emergency planner, the underlying and essential driving forces that compel organisations to adhere to and comply with the emergency preparedness requirements. Compliance will ensure minimal level of preparedness of organisations in terms of management commitment, resource allocation, and competency building to effectively managing a risk-event incident when it happens.

# Formative Assessment

1. CERT in emergency planning refers to _____.
    a. Community emergency response team
    b. County emergency response team
    c. Company emergency response team
    d. Company emergency recovery team

2. The requirement to develop a company emergency response plan (ERP) is stipulated under the _____.
    a. Fire Safety (Company Emergency Response Team) Regulations
    b. Fire Safety (Fire Certificate) (Designated Buildings) Order
    c. Workplace Safety & Health (First Aid) Regulations
    d. Fire Safety (Emergency Response Plan) Regulations

3. Which of the following is the approved code of practice to implement risk management under the Workplace Safety and Health Act?
    a. Code of Practice for WSH Risk Management
    b. Code of Practice for bulk liquid oxygen storage installations on user premise
    c. National Fire Protection Association, NFPA 1600: Standards for Disaster/ Emergency Management and Business Continuity
    d. Singapore Civil Defence Force, National CERT Standard

4. Which of the following is an external driving force that imposes on the organization to commit in and conduct effective emergency planning?
    a. Business continuity
    b. Corporate image and brand name reputation
    c. Government regulations
    d. Cost saving

5. Which of the following is an element of an effective emergency management programme?
    a. Business development
    b. Warehouse automation
    c. Marketing management
    d. Incident management

# Solutions or Suggested Answers

## Formative Assessment

1. CERT in emergency planning refers to _____.

    a. Community emergency response team

    Incorrect. This is for the community in general; term is used by grassroot organization. Refer to Study Unit 1, Chapter 1.

    b. County emergency response team

    Incorrect. This is a term used by overseas countries that has provinces, prefectures or county. Refer to Study Unit 1, Chapter 1.

    c. Company emergency response team

    **Correct! This is the company's in-house emergency response capability. Refer to Study Unit 1, Chapter 1.**

    d. Company emergency recovery team

    Incorrect. This term describe the company's recovery team overseeing aftermath disaster recovery. Refer to Study Unit 1, Chapter 1.

2. The requirement to develop a company emergency response plan (ERP) is stipulated under the _____.

    a. Fire Safety (Company Emergency Response Team) Regulations

    Incorrect. This is one of the regulations under the Fire Safety Act that requires company to establish their in-house company emergency response team (CERT). Refer to Study Unit 1, Chapter 2.

    b. Fire Safety (Fire Certificate) (Designated Buildings) Order

Incorrect. This is one of legislative order of the Fire Safety Act that requires designated building to undergo fire certificate inspection. Refer to Study Unit 1, Chapter 2.

c. Workplace Safety & Health (First Aid) Regulations
Incorrect. This is one of the regulations under the Workplace Safety and Health Act (WSHA) requiring company to provide first aid provision for their employees. Refer to Study Unit 1, Chapter 1.

d. Fire Safety (Emergency Response Plan) Regulations
**Correct! This is one of the regulations under the Fire Safety Act (FSA). Refer to Study Unit 1, Chapter 2.**

3. Which of the following is the approved code of practice to implement risk management under the Workplace Safety and Health Act?

a. Code of Practice for WSH Risk Management
**Correct! This is the approved code of practice issued by the Singapore Workplace Safety & Health Council (WSHC) and the Ministry of Manpower (MOM). Refer to Study Unit 1, Chapter 2.**

b. Code of Practice for bulk liquid oxygen storage installations on user premise
Incorrect. This is not the relevant code of practice for WSH risk management. Refer to Study Unit 1, Chapter 1.

c. National Fire Protection Association, NFPA 1600: Standards for Disaster/ Emergency Management and Business Continuity
Incorrect. This is a United States code of practice used only as reference in Singapore's context. Refer to Study Unit 1, Chapter 2.

d. Singapore Civil Defence Force, National CERT Standard
Incorrect. This is the approved standard to establish an in-house company emergency response team. Refer to Study Unit 1, Chapter 2.

4. Which of the following is an external driving force that imposes on the organization to commit in and conduct effective emergency planning?

    a. Business continuity

    Incorrect. This is an internal driving force. Refer to Study Unit 1, Chapter 3.

    b. Corporate image and brand name reputation

    Incorrect. This is an internal driving force. Refer to Study Unit 1, Chapter 3.

    c. Government regulations

    **Correct! Relevant government regulations impose on organization to ensure due diligent are being carried out as the company make profit from their business activities. Refer to Study Unit 1, Chapter 3.**

    d. Cost saving

    Incorrect. This is an internal driving force. Study Unit 1, Chapter 3.

5. Which of the following is an element of an effective emergency management programme?

    a. Business development

    Incorrect. This is not a relevant element in an emergency management programme. Refer to Study Unit 1, Chapter 3.

    b. Warehouse automation

    Incorrect. This is not a relevant element in an emergency management programme. Refer to Study Unit 1, Chapter 3.

    c. Marketing management

    Incorrect. This is not a relevant element in an emergency management programme. Refer to Study Unit 1, Chapter 3.

    d. Incident management

**Correct! This is one of the key elements within a good emergency management programme. Refer to Study Unit 1, Chapter 3.**

References

CCPS (1995). *Guidelines for Technical Planning for Onsite Emergencies*, Center for Chemical Process Safety, New York: American Institute of Chemical Engineers.

*Fire Safety Act 2000* (Singapore) Chapter 109A (Singapore).

*Fire Safety (Emergency Response Plan) Regulations 2008* (Singapore), Rg 4 (Singapore).

*Fire Safety (Company Emergency Response Team) Regulations 2013* (Singapore), S.540 (Singapore).

NFPA (2013). *NFPA 1600: Standard for Emergency/Disaster Management and Business Continuity*, Washington: National Fire Protection Association.

SLP (2014). *Emergency Response Planning Guide, 3rd Edition*, Society of Loss Prevention in Process Industries, Singapore: SLP.

*Workplace Safety and Health Act 2009* (Singapore) Chapter 354A (Singapore).

*Workplace Safety and Health (First Aid) Regulations 2007* (Singapore), Rg 4 (Singapore).

*Workplace Safety and Health (General Provision) Regulations 2007* (Singapore), Rg 1 (Singapore).

*Workplace Safety and Health (Major Hazard Installations) Regulations 2017* (Singapore), S.202 (Singapore).

*Workplace Safety and Health (Risk Management) Regulations 2007* (Singapore), Rg 8 (Singapore).

Study Unit 2

# Organising for Emergency Preparedness

# Learning Outcomes

At the end of this unit, you are expected to:

- Understand the emergency planning organisation
- Explain the roles and functions of the emergency planning team
- Understand the establishment of the emergency action teams
- Explain the roles and functions of respective emergency action teams and appointments
- Understand the planning parameters and ERP formulation requirements
- Explain the required ERP procedures
- Understand the local legal requirements for company emergency response team (CERT)
- Explain the roles and functions of CERT appointment holders
- Understand the roles and functions of the incident management team (IMT)
- Explain the joint operation procedure
- Understand the establishment of emergency control points, facilities and equipment
- Explain the establishment of critical emergency support facilities
- Understand how an organisation can go about organising for emergency preparedness

# Overview

Study Unit 2 of HFSY217: Emergency Preparedness & Response Planning aims to provide an overview of how organisations can go about organising for emergency preparedness, looking at the organisational structure of emergency planning functions with respect to existing safety committee, establishment of emergency action teams, putting in place critical emergency support systems and facilities to support the emergency response efforts.

**Chapter 1: Emergency Structure and Functions,** aims to provide an organisation framework and structure to building an organisation's state of emergency preparedness, forming the emergency planning team, formulating the emergency response plan, establishing the company emergency response team, and putting in place an incident management system.

**Chapter 2: Emergency Control Points, Support Facilities, Equipment and Systems,** aims to provide an overview of the emergency control points necessary for effective emergency management. Providing insights into the setup requirements of key emergency support facilities such as the Emergency Control Centre (ECC) and establishment of Emergency Support Equipment and Systems to support and sustain the emergency management efforts.

# Chapter 1: Emergency Structures & Functions

## 1.1 Introduction

Every organisation has its own unique way of organising itself to achieve optimum operational efficiency. Generally, an organisational structure will define how organisational or business activities are carried out within an organisation; such as specific task allocation at operation level, coordination and supervision at supervisory level, and decision-making and policy implementation at management and directorate levels. These structured allocations of responsibilities for different functions and processes to different functional entities can take the form of branch, department, division, project team, steering committee, workgroup, etc. Hence, an organisation can be structured in many different ways, depending on its objectives. The structure of an organisation will determine the modes in which it operates and performs.

In general, every organisation has a Workplace Safety and Health (WSH) Committee to lead and spearhead the organisation's effort to provide for a safe and secure work environment for its workforce. This committee is usually chaired by a management representative (management level) supported by the appointed safety manager and safety team (WSH Department) as the secretariat to the WSH Committee. The WSH Committee would have a representative from every functional entity within the organisation to address and look into safety and health matters for the entire organisation as follows:

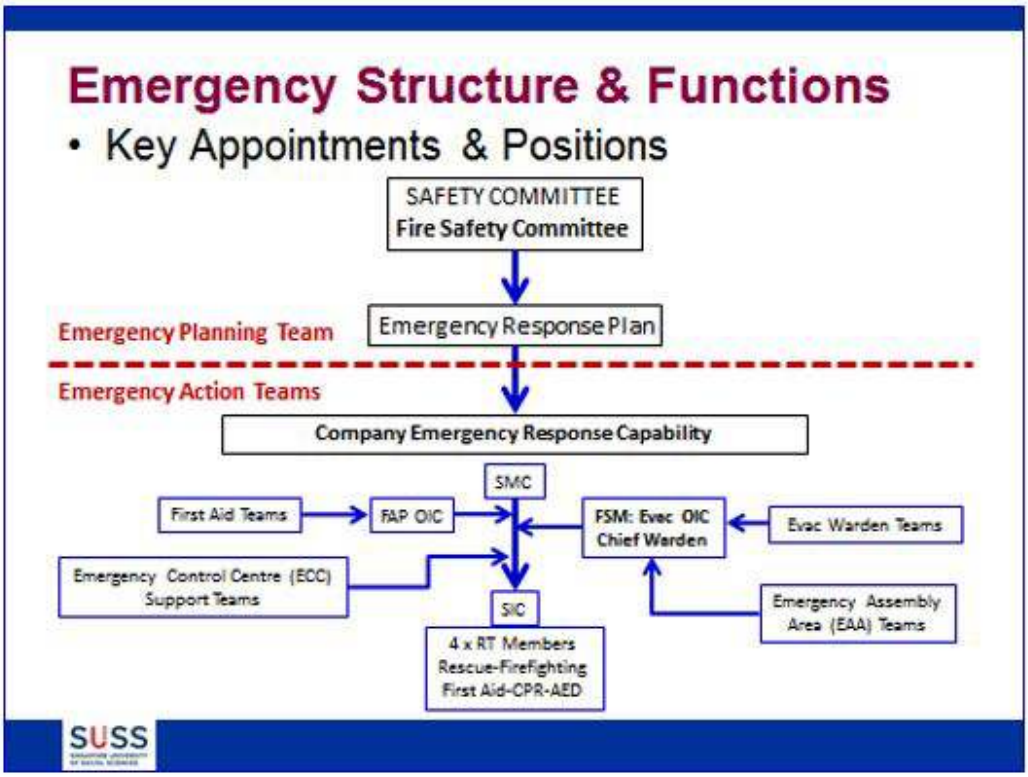


**Figure 2.1** Emergency Structure & Functions

(Source: Fire Safety (Company Emergency Response Team) Regulations (2013))

The role of emergency planning is usually tasked to WSH Committee, and principally supported by the WSH Department; given that WSH personnel have the related training and experience to integrate safety and emergency response. This will ensure a smooth and prompt transition from a day-to-day safe operation mode to an emergency response state when the need arises.

To formulate the emergency response plan, the WSH Committee may establish an emergency planning team or workgroup to coordinate the various emergency action plans such as respective department evacuation procedures, centralised intervention procedure, headcount and personnel accounting procedures, incident escalation and management procedure, etc.

Hence, during the emergency planning process, WSH personnel are expected to facilitate the meetings and discussion, as well as to advise on appropriate emergency actions pre-planning. However, during the emergency response phase WSH personnel are generally not involved in the fire-fighting, spill control, etc. WSH support remains pivotal to the overall safety of the emergency operations, thus planners need to make provision that WSH support during emergency response complements the emergency response personnel.

Emergency planning in today's context usually takes on a comprehensive all-hazards approach. This will require the planner to be familiar with the various methods of characterising the events, estimating the consequences, and depicting the mitigating factors quantitatively, spatially, and conceptually. Hence, planning needs to be based on firm foundation of analysis and research. Essentially, planning considerations need to be backed by a comprehensive and detailed study of the resources to be protected vis-à-vis resources available.

The role of an emergency planner today has much in common with workplace/urban planner, requiring a person to be broadly-trained to read map, building plans, site layout on top of his/her day-to-day work procedures. These can range from general workplace skill sets, to technical know-how in equipment, to technological inclination in geographical information systems.

This means that planners need to have a broad spectrum of training and experience so that one can consider the appropriate approaches for emergency planning, using cartographic/analytical methods to identify hazard/problem-prone areas, characterise the scenarios at hand, estimate the potential impact and response resources, etc.; eventually leading the organisation to a state of readiness/preparedness.

**Read**

Workplace Safety & Health (Workplace Safety & Health Committees) Regulations 2008 at https://sso.agc.gov.sg/SL/WSHA1920-S355-2008

## 1.2 Emergency Planning Team

The Emergency Planning Team (EPT) should comprise representatives from all functional entities within the organisation, representing the entire occupancy of the workplace. In general, the EPT is usually established from amongst members of the WSH Committee.

However, depending on the uniqueness of the organisation, it may be appointed directly by the organisation's top or senior management and reports directly to the appointing authority. The emergency planning team will:

- Identify and determine all emergency roles and functions
- Develop an Emergency Responsibility Matrix
- Select department and individuals to undertake these assignments
- De-conflict for roles if they are impractical
- Develop an emergency organisation chart
- Establish a line of succession for all primary emergency position

Generally, the EPT comprises the chairperson (management representative), with the secretariat support by the WSH Team. The EPT members are representatives of all the functional entities. Collectively, the composition of the EPT should represent and cover the entire occupancy of the designated workplace, formulating the company emergency response plan (ERP) for 3 key groups of personnel:

- People that need to evacuate for safety (evacuees, evacuation-wardens, headcount personnel);

- People that need to respond to intervene the emergency (company emergency response team, first aid team); and
- People that need to manage the incident and issues at hand, including supporting the authority emergency services to bring the incident under control (company's incident management team).

To support the formulation of ERP, the respective EPT member acts as the department's coordinator to consolidate and submit to the EPT:

- respective department's first-person action procedure;
- first aid providers appointment and training;
- evacuation-wardens appointment and training;
- evacuation procedure; and
- headcount and personnel accounting procedure, etc.

The EPT also needs to look at the establishment of the company emergency response team (CERT), comprising personnel from relevant departments for immediate activation (within 1 minute) and deployment to the incident scene (within 5 minutes) to carry out immediate intervention of the emergency incident, such as an incipient fire, a chemical spill, or a medical emergency that requires fire-fighting, spill control or first aid-CPR intervention. To support the ERP formulation, the EPT needs to establish the:

- centralised CERT intervention procedure;
- centralised first aid team (FAT) response procedure;
- centralised traffic warden team (TWT) response procedure;
- centralised emergency assembly area team (EAAT) management procedure; and
- centralised headcount and personnel accounting procedure.

In consultation with the executive management, the EPT will need to form and train the organisation's incident management team (IMT), comprising the site main controller

(SMC) and key emergency support group (ESG) to be gathered at the company's emergency control centre (ECC) or emergency operation centre (EOC); supporting the Emergency Action Teams. This will include the establishment of:

- centralised ECC/EOC activation and management procedure;
- centralised ESG operating procedure; and
- centralised Organisation-Authority joint operation procedure.

To further emergency planning to corporate level, the EPT may have to liaise with the corporate level planning team on the incident escalation procedure when the state of affairs of the emergency incident elevates to a crisis level, requiring the support of corporate level, crisis management team (CMT). This will require the EPT to have visibility of the corporate crisis management plan (CMP) and its CMT organisational procedures, etc.

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

## 1.3 Emergency Action Teams

The emergency action teams are essentially formed from amongst personnel from the shop floor and supervisory level. These personnel are most suitable because of their direct knowledge of the workflow and associate hazards they will be responding to or directly related to the emergency functions they are assigned to perform.

When the alarm is raised, or emergency activation via other communication means, emergency actions may need to be carried out concurrently and simultaneously by the following emergency action teams:

- Company Emergency Response Team (CERT), comprising the Site Main Controller (SMC), Site Incident Controller (SIC), and four response team members (RT-Members) that are trained to respond towards the emergency incident scene, providing on-scene intervention such as rescue, fire-fighting, and spill control, etc.;
- Evacuation Warden Team (EWT), comprising evacuation-wardens that are strategically positioned to ensure smooth and efficient evacuation of personnel from designated floor/premise;
- Traffic Warden Team (TWT), comprising traffic-wardens that are strategically positioned to ensure safe marshalling of vehicular movement as part of evacuation management;
- First Aid Team (FAT), comprising duty first aid providers that are designated to set up and man the first aid post (FAP) near to the EAA;
- Emergency Assembly Area Team (EAAT), comprising designated personnel to set up and manage the EAA;
- Personnel Accounting Team (PAT), comprising designated department headcount officers to carry out personnel accounting of respective departments, reporting to designated Headcount Representative at HR-level or the appointed Fire Safety Manager (FSM); and
- Incident Management Team (IMT), comprising the organisation's senior management to take accountability, support and manage the emergency incident at hand.

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

### 1.3.1 Company Emergency Response Team

The Company Emergency Response Team (CERT) is a group of in-house first responders identified by the organisation to be competently trained to prevent any emergency incident from escalating into a major disaster. The primary objective of CERT is to intervene, mitigate and control an emergency situation during the initial stages prior to the arrival of the SCDF and to ensure operational synergy between the CERT and SCDF in joint operation.

The CERT must be capable of containing an incipient threat, by swiftly intervening and mitigating an emergency situation according to established procedures transcribed inside the company's Emergency Response Plan (ERP) during an emergency. All organisations or licensed ride-operators shall maintain a minimum CERT configuration of at least 6 members (comprising 1 SMC, 1 SIC and 4 RT members) or more to sufficiently handle the worst credible scenario effectively. The final CERT configuration set up by the company shall be subjected to SCDF's approval through the CERT Audit.

The CERT could comprise security guards, safety staff, technical staff, operations staff as well as any other employees within the premise. The team should be familiar with the organisation's ERP and adequately trained to provide initial response to the scenarios described in the ERP.

The CERT is divided into 3 different roles - Site Main Controller (SMC), Site Incident Controller (SIC) and Response Team (RT). All company or licensed ride-operators shall establish this basic 6-man CERT structure:

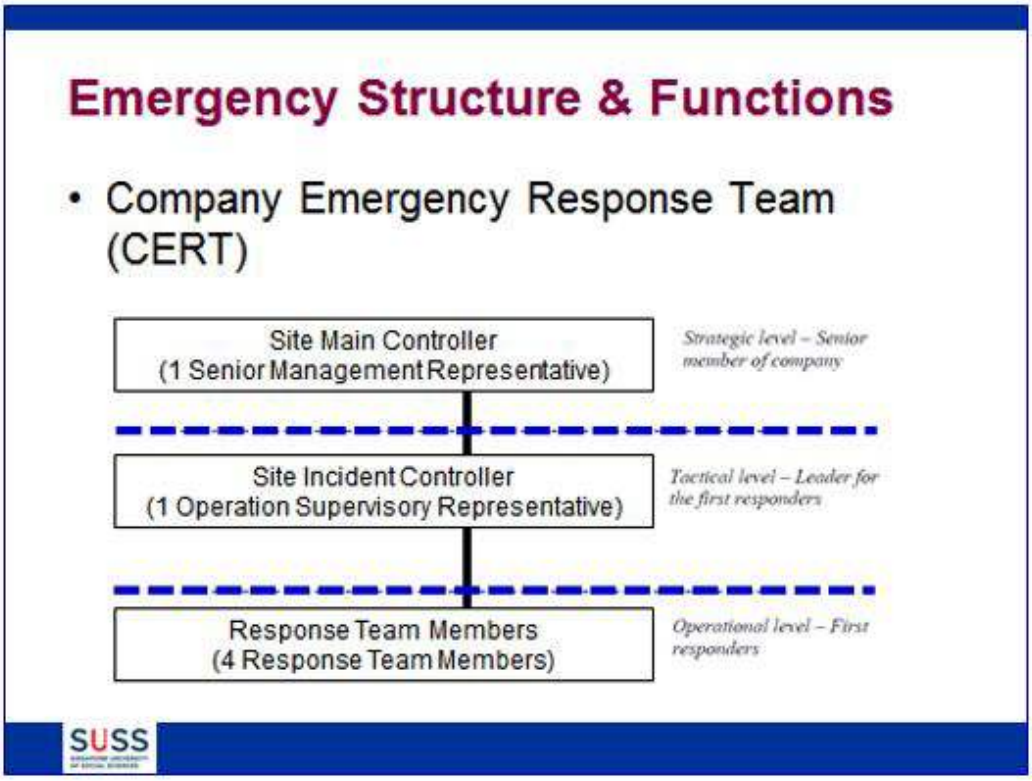


**Figure 2.2** CERT Structure

(Source: SCDF National CERT Standard (2016))

The SMC is a senior management member of the organisation's management. He is the overall person-in-charge of emergency response operations in the company and deals with senior government officials from SCDF, Singapore Police Force (SPF), etc. The SIC is the leader of the CERT, in charge of the incident response. The RT consists of personnel trained in basic emergency response actions such as fire-fighting, rescue mitigation and other supporting activities such as security, evacuation, first aid, etc. as follows:

- Site Main Controller (SMC): Assumes the overall authority and responsibility in managing the emergency situation and liaising with officers from government agencies such as SCDF, SPF, NEA, etc. The SMC will be the representative to link up with the Incident Commander/Incident Manager (SCDF) to assist in the incident management.

- Site Incident Controller (SIC): Assumes command and control of the emergency response incident scene and co-ordinates the activities of all emergency responders, providing support to SCDF for mitigation of the emergency situation.
- Response Team (RT): Conducts basic emergency response actions such as fire-fighting, rescue and HazMat mitigation under the command of the SIC. Assists in emergency notification and public protective actions, accounting for personnel outside the hazard zone or implementing In-Place Protection (IPP) within the workplace.

Under the SCDF National CERT Standard, every CERT members, upon activation, should gather at the CERT Assembly Point with the necessary response equipment within 1 minute and reach the incident scene within 5 minutes. The SIC should respond straight to the incident scene upon activation and perform the following activities:

- Verify the incident;
- Conduct site assessment; and
- Determine the extent of the emergency.

In the midst of rescue/fire-fighting and mitigation operations, the SIC should assume the role of an Incident Commander. After determining the control zones for the incident scene, the SIC should set up the incident forward command post (FCP) in the safe zone and await the arrival of SCDF's Ground Commander. From this position, the SIC should command and direct the RT, oversee their safety and maintain constant communication with them.

**Read**

SCDF Guidelines for Company Emergency Response Team (2017)

### 1.3.2 Incident Management Team & Joint Operation Management

The Emergency Management Team (EMT) or Incident Management Team (IMT) is to be chaired and led by the appointed SMC (Management Representative at Senior Level) comprising the Emergency Support Group (ESG) from all functional entities such as the organisation's Human Resource & Administration, Finance & Procurement, Logistics and Warehousing, Facility Management and Engineering, Operations or Production, Environment, Health, Safety and Security, Corporate Communications and Media Relations, Legal and Compliance, Enterprise Risk Management, Sales & Marketing, Clientele and Customer Relations, etc.

The key function of the EMT or IMT is to be accountable for and manage the emergency incident at hand, carry out forward-planning functions, provide support-options, facilitate decision-making at the ECC/EOC. The incident management team will:

- Take command of the on-site situation
- Deploy the necessary resources to support the on-scene operation
- Carry out forward planning in the event of possible escalation
- Liaise with related government agencies and the community
- Deal with the media and next-of-kin management

When the authority emergency services, such as the Singapore Civil Defence Force or Singapore Police Force, arrive at site, the CERT and IMT are expected to carry out joint-operation to manage the emergency incident. At the initial stage, the SIC is expected to brief and update SCDF's Ground Commander of the situation at hand, working at the operational-and-tactical level. The SMC is expected to work hand-in-hand with the SCDF's Incident Commander, working at the tactical-and-strategic level as follows:

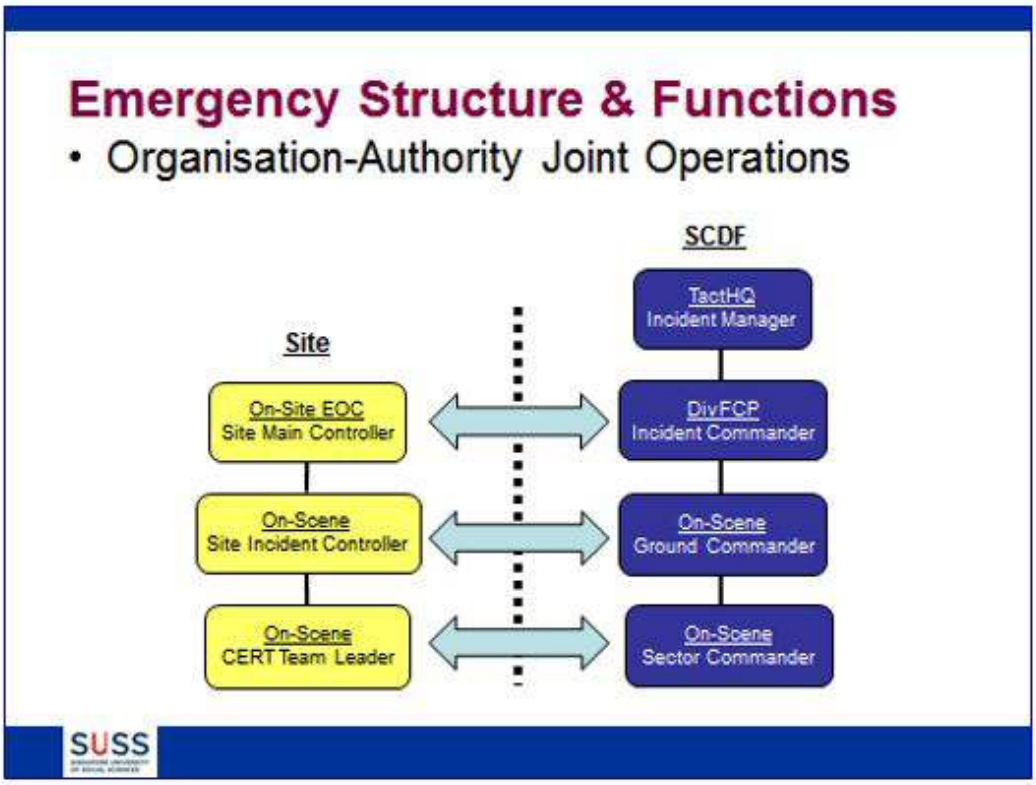


**Figure 2.3** Organisation-Authority Joint Operations

(Source: SCDF General Guidelines for Emergency Response Plan (2013))

**Read**

Fire Safety (Company Emergency Response Team) Regulations 2013 at https://sso.agc.gov.sg/SL/FSA1993-S540-2013

# Chapter 2: Emergency Control Points, Support Facilities, Equipment & Systems

## 2.1 Emergency Control Points

To allow for effective emergency incident management, the EPT has to consider putting in place various emergency control points to facilitate workflow, evacuation management, intervention control, and issue resolution. Emergency Control Points are designated locations within, or in close proximity to the building/premise where emergency action teams will rendezvous and establish control capability for the purpose of:

- Conducting Evacuation or In-Place Protection
    - Evacuation-Warden Point (EWP)
    - Traffic Warden Point (TWP)
    - In-Place Protection (IPP) Room
    - Emergency Assembly Area (EAA)
    - First Aid Point (FAP)
    - Ambulance Point (AP)
    - People-with-Disability (PWD) Holding Area
- Conducting Intervention or On-scene Control Zones
    - Hot, Warm, Cold Zones (HZ, WZ, CZ)
    - Outer Cordon Entry/Exit Control Point
    - Inner Cordon Entry/Exit Control Point
    - Rendezvous Point (RV)
    - Staging Point (SP) or Hot Zone Entry/Exit Control Point
    - Decontamination Point (Decon)
    - Field/Forward Command Post (FCP)
    - Medical Triage Point (Triage)
    - Body Holding Area (BHA)

- Conducting Incident Management
  - Fire Command Centre (FCC)
  - Emergency Control Centre (ECC) or Emergency Operation Centre (EOC)
  - Incident Command Post (ICP) or Incident Headquarters (IHQ)
  - Resource Point (RP)
  - Incident Information Centre (IIC)
  - Media Centre (Media)
  - Rehabilitation Point (REHAB)
  - Vehicle Marshalling Area (VMA)
  - Civil Resource Marshalling Area (CRMA)
  - Crisis Management Centre (CMC)
  - Disaster Site Medical Command (DSMC)
  - Evacuation Refuge Centre (ERC)

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

### 2.1.1 Emergency Support Facilities

To provide essential support for effective emergency incident management that requires more elaborate setup or infrastructure, the EPT has to consider putting in place various emergency facilities to support emergency response workflow, evacuation, intervention, and issue management during incident management. Emergency Facilities are specially designated control points (usually requiring more elaborate setup), locations, venues, or

amenities within, or in close proximity to the building/premise that supports the actions of the emergency action teams and incident management team, such as:

- Fire Command Centre (FCC)
- Emergency Control Centre (ECC) or Emergency Operation Centre (EOC);
- Incident Command Post (ICP) or Incident Headquarters (IHQ)
- Incident Information Centre (IIC)
- Media Centre (Media)
- Crisis Management Centre (CMC)
- Safe Havens or IPP Rooms

#### 2.1.1.1 Emergency Control Centre

The Emergency Control Centre (ECC) or Emergency Operation Centre (EOC) is a special room that is equipped for managing emergencies. It is separate from and some distance away from the Process Control Room. This separation is done for safety and security reasons. The ECC will become the central communication point as soon as it is activated. Unless separate arrangements are made, all external telephone calls and other electronic communications will be directed to this room. The telephone operator (if one is on duty) or some other designated person, e.g. a plant security officer will be so directed. Only persons with designated responsibilities at the ECC, e.g. Site Main Controller and the incident historian will report to this room. The ECC will contain:

- Communication equipment – telephones which are directly connected to the public telephone system; telephones which are connected to the in-house system (PABX); fax machines; PC with e-mail link to remote data sources; 2-way radios; and microphone for Public Address System. Unless separate arrangements are made, a TV and radio receiver should be provided here.
- Data – site plans; maps of surrounding area; piping and instrumentation diagrams (P&ID); site drainage plans; safety data sheet (SDS); meteorological information/

wind direction; telephone lists containing information on emergency personnel, experts, e.g. industrial hygienists, senior managers and regulatory authorities.

- Stationery – photocopier; white boards, flip charts, paper, marker pens and other writing instruments.
- A secure power supply should be provided to the ECC;
- Depending on the risk assessment, consideration should be given to providing a secure ventilation system to the ECC, e.g. provision of an activated carbon filter for the air inlet for the air conditioning system, and a back-up/duplicate ECC at another safe location.
- The welfare/personal needs of the team in the ECC should also be considered. For example, a pantry and toilets for men and women should be available nearby.

#### 2.1.1.2 Safe Havens or In-Place Protection Rooms

The purpose of safe havens or in-place protection rooms is to provide protection against thermal radiation from flammable vapour clouds and to have a reduced vapour concentration indoors from toxic vapour clouds. Seeking a safe haven should have priority over trying to escape through the gas cloud. Sometimes, depending upon the consequential analysis and hazard analysis, a safe haven normally used as a control room is designed to withstand a blast overpressure as a result of a vapour cloud explosion.

Most buildings (and even vehicles) can serve as safe havens for protection against toxic gas clouds provided that the duration of the cloud is not too great and that the interchanging of air with the outside can be prevented. Safe havens shall be places where personnel can remain indoors and be protected. It is an alternative to evacuation and people in safe havens are generally not required to be rescued immediately. Buildings used for safe havens should have the following features:

- Means to close air intakes and ventilation systems (activation by gas sensor if safe haven is close to potential source of releases);
- Equipped with breathing apparatus;

- Designed for occupation expected over a period of time;
- Sealed windows; and
- Self-closing doors.

Permanent havens should be equipped with air locks, with air intakes from widely separated areas fitted with filters of adequate contaminant removal capacity. It should be noted that the protection of the public at large in the warm zone shall be the responsibility of the Singapore Police Force (SPF).

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

## 2.2 Emergency Support Equipment & Systems

Emergency Support Equipment provides critical functions in support of the emergency management efforts. This can include equipment for communications, emergency water supply, and emergency power generation, etc.

### 2.2.1 Emergency Communication Equipment & Systems

Emergency communication equipment/systems which would normally be needed to support emergency response operations are:

- Telephones: The Telephone Alert System provides information to the entire site. This may take the form of a designated telephone, installed in designated places such as the main operations/ plant control room or a subsidiary control room, which will ring the moment any of these designated phones is lifted up from another location. The designated dispatcher activates plant or home call lists. These lists are to be regularly updated and verified. All emergency calls to the SCDF shall

be through 995. Special or high-risk industries are required to be connected to SCDF through an alarm monitoring company, a third party company, which monitors the progress of an alarm and informs SCDF of a real emergency.

- Radios: A plant should have a main 2-way radio (walkie talkie) control station that is used for normal as well as emergency communications. It is important that personnel are instructed to minimise the use of the radios during emergencies, i.e. use the radios for communication regarding the emergency only. All shift personnel will be equipped with portable 2-way radios. These are used for communication between the field and the plant control room. Sufficient spare portable radio sets must be available for use during emergencies. These are issued to the SCDF commander and other emergency services.
- Emergency Communication Van: It is recommended, but not essential, that such a van be provided. It will be dispatched to the scene of an incident. The van should be equipped with 2-way radios and telephones.
- Emergency Alarm System: A plant wide alarm system is required. The alarm is usually steam or electrically powered. Generally, coded sounds are produced to indicate the type of alarm, e.g. a fire alarm will sound differently from a gas leak alarm.
- Public Address System or Emergency Voice Communication System: A plant wide public address system is recommended. The loud speakers should be installed at strategic locations in work places. Depending on the size of the plant, the Emergency Alarm and Public Address may be combined.

All these emergency communication equipment and systems must be regularly maintained and tested to ensure that they are in good functional condition.

### 2.2.2 Meteorological Equipment and Systems

Meteorological equipment and systems help emergency planner to evaluate weather conditions for use in dispersion models and tracking of meteorological trends. During

emergency response, weather information from meteorological stations can also be used to determine evacuation route and assist the SMC, SIC and SCDF Commanders in critical decision-making especially during a chemical release incident.

A meteorological station, consisting of windsock and anemometer should be constructed of stainless steel parts or other corrosion-resistant materials. The station should be located in an area away from other structures or obstructions that would interfere with its operation. More than one weather station should be considered for a large complex.

The stations should have continuous data loggers for the retrieval of information and analysis of information. Readout should be provided at both the plant control room and the emergency control room. The meteorological station should preferably be provided with emergency backup power supply.

### 2.2.3 Emergency Power Supply & Generation Systems

Emergency power supply system (EPSS) aims to provide emergency power to maintain the facility's critical systems during a power outage or emergency. Every critical facility and emergency management system should have an emergency power supply system (EPSS) for sustained functionality. Examples of critical systems are HVAC, process control, communication systems, and alarm system. Emergency power can be generated by a battery pack, an internal combustion engine attached to a generator, or a separate feed of energy from another electrical source. Combustion engines connected to generators are considered emergency power supplies, whereas battery packs are considered stored energy systems. Emergency planners should be familiar with the requirements of emergency power supply under the Singapore Fire Code requiring building/premise owner to have:

- Uninterrupted power supply
- Fuel storage requirement
- Minimum load and testing requirement
- Location of EPSS

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

# Summary

Study Unit 2: Organising for Emergency Preparedness would have provided you with good overview of how organisations can structure themselves to build the company's state of emergency preparedness, forming the emergency planning team, formulating the emergency response plan, establishing the company emergency response team, and formation of the incident management team. This setup will need the support of critical Emergency Support Facilities, Equipment and Systems for effective emergency management; with insights on how to set up key emergency support facilities such as the Emergency Control Centre (ECC) and establishment of Emergency Support Equipment and Systems to support and sustain the emergency management efforts.

## Formative Assessment

1. Which of the following is a function of the company's Emergency Planning Team (EPT)?
    a. Manage the emergency incident at hand
    b. Plan for business continuity
    c. Conduct emergency training
    d. Develop an emergency responsibility matrix

2. _____ comprises of evacuation-wardens that are strategically positioned to ensure smooth and efficient evacuation of personnel from designated floor/premise.
    a. Evacuation warden team (EWT)
    b. Traffic warden team (TWT)
    c. First aid team (FAT)
    d. Emergency assembly area team (EAAT)

3. _____ assumes the overall authority and responsibility in managing the emergency situation and liaising with officers from government agencies such as SCDF, SPF, NEA, etc.
    a. Fire-fighting team (FFT)
    b. Site main controller (SMC)
    c. Site incident controller (SIC)
    d. Response team (RT)

4. Which of the following is one of On-scene intervention control zones?
    a. Media centre
    b. Crisis management centre
    c. Emergency operation centre

d. Hot, Warm, cold Zones

5. Which of the following is an emergency support system?
    a. Emergency power supply and generation systems
    b. Media centre
    c. Crisis management centre
    d. Emergency operation centre

# Solutions or Suggested Answers

## Formative Assessment

1. Which of the following is a function of the company's Emergency Planning Team (EPT)?

    a. Manage the emergency incident at hand

    Incorrect. This is to be carried out by the established incident management team (IMT). Refer to Study Unit 2, Chapter 1.

    b. Plan for business continuity

    Incorrect. Business continuity planning needs a separate set of skills and knowledge. Refer to Study Unit 2, Chapter 1.

    c. Conduct emergency training

    Incorrect. The EPT may not have the expertise to conduct the training themselves. Refer to Study Unit 2, Chapter 1.

    d. Develop an emergency responsibility matrix

    **Correct! This will help the EPT to de-conflict any overlapping roles/duties that require one person to be at two separate location at any one time. Refer to Study Unit 2, Chapter 1.**

2. _____ comprises of evacuation-wardens that are strategically positioned to ensure smooth and efficient evacuation of personnel from designated floor/premise.

    a. Evacuation warden team (EWT)

    **Correct! Refer to Study Unit 2, Chapter 1.**

    b. Traffic warden team (TWT)

Incorrect. TWT comprises of traffic-wardens that are strategically positioned to ensure safe marshaling of vehicular movement as part of evacuation management. Refer to Study Unit 2, Chapter 1.

c. First aid team (FAT)
Incorrect. FAT comprises of duty first aid providers that are designated to set up and man the first aid post (FAP) near to the Emergency Assembly Area (EAA). Refer to Study Unit 2, Chapter 1.

d. Emergency assembly area team (EAAT)
Incorrect. EAAT comprises of designated personnel to set up and manage the emergency assembly area (EAA). Refer to Study Unit 2, Chapter 1.

3. _____ assumes the overall authority and responsibility in managing the emergency situation and liaising with officers from government agencies such as SCDF, SPF, NEA, etc.

a. Fire-fighting team (FFT)
Incorrect. The FFT is part of the company emergency response team (CERT). Refer to Study Unit 2, Chapter 1.

b. Site main controller (SMC)
**Correct! The SMC will be the representative to link up with the Incident Commander/Incident Manager (SCDF) to assist in the incident management. Refer to Study Unit 2, Chapter 1.**

c. Site incident controller (SIC)
Incorrect. The SIC is in-charge of the incident scene and co-ordinates the activities of all emergency responders, providing support to SCDF for mitigation of the emergency situation on-scene. Refer to Study Unit 2, Chapter 1.

d. Response team (RT)

Incorrect. This is part of the company emergency response team (CERT). Refer to Study Unit 2, Chapter 1.

4. Which of the following is one of On-scene intervention control zones?

   a. Media centre

      Incorrect. This is one of emergency support facilities. Refer to Study Unit 2, Chapter 2.

   b. Crisis management centre

      Incorrect. This is one of emergency support facilities. Refer to Study Unit 2, Chapter 2.

   c. Emergency operation centre

      Incorrect. This is one of emergency support facilities. Refer to Study Unit 2, Chapter 2.

   d. Hot, Warm, cold Zones

      **Correct! Refer to Study Unit 2, Chapter 2.**

5. Which of the following is an emergency support system?

   a. Emergency power supply and generation systems

      **Correct! Refer to Study Unit 2, Chapter 2.**

   b. Media centre

      Incorrect. This is one of emergency support facilities. Refer to Study Unit 2, Chapter 2.

   c. Crisis management centre

      Incorrect. This is one of emergency support facilities. Refer to Study Unit 2, Chapter 2.

   d. Emergency operation centre

Incorrect. This is one of emergency support facilities. Refer to Study Unit 2, Chapter 2.

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*Workplace Safety and Health (General Provision) Regulations 2007* (Singapore), Rg 1 (Singapore).

Study Unit 3

# Establishing Emergency Preparedness

# Learning Outcomes

At the end of this unit, you are expected to:

- Understand the steps in the emergency planning stage
- Explain the focus of the emergency planning stage
- Understand the prevention-mitigation approaches
- Explain the REACH approach
- Understand the purpose of WSH Management System in Prevention-Mitigation Phase
- Explain the focus of hazard identification and risk assessment for scenario planning
- Understand the purpose of SWP and SWMS in Prevention-Mitigation Phase
- Explain the functions of SWMS/SWMP
- Understand the steps in Prevention-Mitigation Phase
- Explain the REACH-Work Review-Emergency Action Planning approach
- Understand the preparedness approaches
- Explain the focus of scenario planning in Preparedness Phase
- Explain the focus of resource and capability planning in Preparedness Phase
- Explain the focus of determining plan type, role assignment, and response approaches
- Explain the focus of emergency plan development, dissemination and implementation

# Overview

Study Unit 3 of HFSY217: Establishing Emergency Preparedness aims to provide basic understanding of the emergency planning stage, comprising the (1) Prevention-Mitigation Phase and (2) Preparedness Phase; illustrating how organisations go about their daily functions of safety and health management, safety inspection, work process risk assessment, to build a safe work environment in the Prevention-Mitigation Phase; and how organisation uses scenario planning to determine the type of capability to build in terms of the resources at hand during the Preparedness Phase.

**Chapter 1: Prevention & Mitigation Phase,** aims to provide a good understanding of the elements and activities of an effective workplace prevention-mitigation programme vis-à-vis WSH framework, workplace safety and health programme, and the various approaches in hazard identification and risk assessment.

**Chapter 2: Preparedness Phase,** aims to provide a good understanding of how organisation should use the hazard-scenarios identified in the hazard identification and risk assessment as the basis of scenario-planning and capability building; determining their response approaches, translating them into respective ERP procedures and final compilation of the ERP.

# Chapter 1: Prevention & Mitigation Phase

## 1.1 Introduction

In emergency planning, there are two key questions emergency planners need to answer:

- What can go wrong?
- How can we tackle the impact effectively?

To answer these two questions, organisation will needs to review its business activities to identify potential hazards, risk and incident scenarios that will likely to happen; and assess, develop and build its own capabilities and competency to prepare its organisation response teams to be able to handle the impacts – in a nut shell, this is emergency prepared and response planning, an integral process in risk management and loss prevention in the following steps:

- Identify Hazard and Assess Risk
- Assess Capabilities and Resources
- Review Work Procedures and Emergency Plans
- Define Plan Objectives and Scope
- Choose Appropriate Type of Plan
- Determine Responsibilities
- Determine Response Approaches
- Develop/Write/Edit the Emergency Plan

All the above steps aim to lead to a state of organisational readiness to overcome an emergency incident, through the establishment of:

- Emergency Structures: Crisis Management Team, Incident Management Team, EOC Support Teams, Company Emergency Response Team (CERT), Disaster Recovery Team (DRT), Business Continuity Team (BCT), etc.

- Emergency Systems: Emergency Plans, Incident Management System, Incident Command System, Prevention Systems, Detection Systems, Mitigation Systems, Protection Systems, etc.
- Emergency Resources: Support Facilities, Support Equipment, Supplies, Competent Personnel, etc.
- Emergency Capabilities: Strategies, Tactics, Knowledge, Skills, Attitude

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

## 1.2 Prevention-Mitigation Approaches

Prevention begins with the identification of hazards and subsequent risk assessment. Hazard identification and risk assessment will subsequently determine the scope and extent of emergency planning to be undertaken. The ***REACH*** approach is the cornerstone of any hazard-risk management programme as follows:

- **R**ecognition/Identification of Hazard;
- **E**valuation of the Hazard;
- **A**ssess its associated Risk; and
- **C**ontrol of **H**azard through engineered or administrative methods.

The above is akin to what safety practitioners do day-in, day-out: Hazard-Risk Management; a programme to ensure all potential hazards at workplace are identified, evaluated, assessed and controlled at bay to achieve occupational safety.

Occupational safety should be achieved through sound organisation practices, and the fundamentals of Hazard-Risk Management underpin this in the overall Prevention-Mitigation Approaches. Recognising that all forms of work will involve some degrees of risk, hence it is important that EVERYONE within the organisation, from top management to individual workers, understands the responsibilities each beholds. This can be achieved through a well-structured WSH framework nationally, supported by each workplace's WSH Programme.

### 1.2.1 Safety & Health Management System

At the national level, the WSH Framework aims to cultivate good safety habits in all individuals, so as to create a strong safety culture at the workplace. The new framework is guided by the following principles:

- Reducing risks at the source by requiring all stakeholders to eliminate or minimise the risks they create;
- Instilling greater ownership of safety and health outcomes within the industries; and
- Preventing accidents through higher penalties for compromises in safety management.

Complementing this framework is the robust workplace safety and health management system (WSHMS) established by each individual workplace. Essentially, all settings/ processes at work can be designed for inherent safety; prevention and mitigation approaches then serve as a cornerstone for an effective WSH programme. Some of the elements in an effective WSHMS are:

- Safety Policy, Safe Work Practices
- Safety Training, Group Meetings
- Incident Investigation and Analysis
- In-House Safety Rules and Regulation
- Safety Promotion

- Contractors Evaluation, Selection and Control
- Safety Inspection, Maintenance Regime, Hazard Analysis
- Control of Movement and Use of Hazardous Chemicals
- Emergency Preparedness, Occupational Health Programme
- Documentation Control and Records

**Read**

Workplace Safety and Health (Safety and Health Management System & Auditing) Regulations 2009 at https://sso.agc.gov.sg/SL/WSHA2006-S607-2009

### 1.2.2 Hazard Identification and Risk Assessment

As the planner, it is important that you recognise that if one does not see or identify the presence of a problem or hazard, its potential risk, harm and impact cannot be assessed. Hence, its associated risk will remain unknown and the vulnerability of the people exposed to it remains a mystery.

An effective risk management programme for workplace hazard identification and risk assessment (HIRA) help to identify people, property, and resources that are at risk of injury, damage, or loss from hazardous incidents or natural hazards. This information is important to help determine and prioritise the precautionary measures that can make the workforce more disaster-resistant.

There are various hazard identification techniques and risk assessment methods that can assist emergency planner to make informed decisions and sound judgements. Some of these techniques are qualitative in nature, while others can be quantitative, such as Hazards and Operability Study (HAZOP), Failure Mode and Effects Analysis (FMEA), Fault Tree Analysis (FTA), Event Tree Analysis (ETA), and Cause-Consequence Analysis

(Bow-tie), etc. As an emergency planner, it is important that you understand the strengths and weaknesses of each technique so that you can select the appropriate techniques.

Effective HIRA will enable the risk assessment teams to identify potential hazard, hazard-scenarios, assess associated risk, and estimate the impact of the risk-event. The identified hazard-scenario can then serve as the basis for scenario planning in the preparedness phase.

Having identified the hazard and associated risk, the risk assessment teams can then go forward to evaluate the risk-impact and put in place control measures to keep the risk-event from happening. These control measures can be engineered for administrative methods to control the hazard when incorporated into the safe work method statement for safe work activities.

**Read**

Workplace Safety and Health (Risk Management) Regulations 2007 at https://sso.agc.gov.sg/SL/WSHA1920-RG8

### 1.2.3 Organisational Safe Work Practices & Procedures

From the WSMS, organisation WSH Policies are usually translated in workplace rules and regulations, work processes or work practices at management-level or supervisory-level. Hence, organisation's Safe Work Practices (SWP) are documented guidelines and methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes. SWP are usually referred to at the management/corporate-level. They are usually established and implemented as work-system such as:

- Permit-to-Work System
    - Work at Height above 3m
    - Confined Space Work

    - Hot-work, Spray-painting Work
- Workplace Safety & Health Management System
    - Safety Meetings, Safety Training, Personal Protective Equipment
    - Emergency Preparedness
    - Machine & Equipment Safety Programme
    - Maintenance Regime of Machine/Equipment
    - Maintenance Regime of Safety Critical Equipment
    - Hazard Reporting, Incident Reporting

These SWP are then translated into detailed procedures commonly known as Safe Work Method Statement (SWMS) or Procedures (SWMP) at task-level. Hence, Safe Work Method Statement (SWMS) or Procedures (SWMP) are documented step-by-step specific description of how to perform a task safely from beginning to end. The uniqueness of SWMS/SWMP is the detailing of associated hazard and required control measures to be taken in the step-by-step procedure when carrying out the work-task. To reflect real life in the workplace, workers who actually do the job must be involved in developing the SWMS/SWMP to reduce the risk by minimising potential exposure. SWMS/SWMP are usually referred to at work-level or task-level. They are usually established and implemented as task-procedure such as:

- Work at height procedure on Mobile Elevated Work Platform/Scaffold
- Hot-work welding procedure at designated work location
- Spray-painting work procedure in the Spray-paint Booth
- Equipment operating procedure in the workshop
- Forklift operating procedure in Warehouse Environment

These SWMS/SWMP must be clearly documented and make available at workplaces to ensure consistency and compliance. Appropriate training must be provided to ensure that workers understand the SWMS/SWMP and the nature of the works one is tasked to do, such as works in confined space, work at place liable to fall more than 3m, work at/near

place with hazard of drowning, poisoning, chemical burns or asphyxiation. The scope of safe work method statement must include:

- Provision of suitable PPE,
- Safety precautions to be taken during work,
- Actions in event of emergency.

**Read**

Workplace Safety & Health Act and Subsidiary Legislation at https://sso.agc.gov.sg/Act/WSHA2006

### 1.2.4 Review of Work Processes & Emergency Action Plans

When hazards are identified, risk assessed and control measures are out in place. It is also time to review the current work processes/procedures to see if there exists any opportunity to improve the workflow. This review would have taken the identified hazard and risk into consideration and by changing the sequence of work process or changing the type of chemicals used may result in significant lowering of the hazard exposure. At the same time, the emergency action plans should be reviewed to address the revised work processes, if any. Henceforth, the steps in the Prevention-Mitigation Approaches can be built on the ***REACH*** approach as follows:

- **R**ecognition/Identification of Hazard;
- **E**valuation of the Hazard;
- **A**ssess its associated Risk;
- **C**ontrol of **H**azard through engineered or administrative methods
- Review Current Work Practices/Processes/Procedures
- Review Existing Emergency Action Plans

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

# Chapter 2: Preparedness Phase

## 2.1 Introduction

In the preparedness phase, one of the tangible results is the compilation of an emergency plan. Emergency planners need to recognise that there are various types of emergency plans, and their appropriateness is site specific to meet the necessary requirements (regulatory or corporate). The emergency planning team (EPT) shall determine the appropriate plan type for its facility or workplace; namely: Contingency Plan, Emergency Response Plan, Comprehensive Emergency Management Plan, and/or a Mutual Aid Plan.

One of the common pitfalls resulted is that each organisation comes up with different emergency plans for different purposes (fulfilling regulatory requirements, or meeting corporate level practices); but there is a risk of duplicating functions and activities, and the least any planner wants are confusion and chaos. Integration between plans enables more resource sharing, but can over-complicate liaison between working groups, possibly resulting in duplication in the command structure. Whatever strategy is adopted, it is essential that personnel in all plans have a clear idea of the situation.

It must be crystal clear to emergency planners that it is not the plan but the planning process that matters. The eventual plan compiled is only a document of proof that planning has been carried out; but the true value in the planning process is the involvement of key personnel in the planning process and everyone is familiar with the established response procedure during emergency incident. Hence, the ultimate desired outcome in the preparedness phase is achieving the state of readiness through the planning process, training activities, exercises and drills that familiarise all on the planned response procedure.

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

## 2.2 Preparedness Approaches

Preparedness begins with the identification of credible scenarios and subsequent consequence assessment. Scenario identification and consequence assessment will subsequently determine the scope and extent of planning and resource requirements. The steps to achieve the desired state of readiness in the preparedness phase are as follows:

- Identification of Credible Incidents
- Assess Resources & Capabilities
    - Support Facilities, Equipment & Systems
    - Response Equipment & Supplies
    - Personnel Training Requirements
- Determine Plan Objectives, Scope & Plan Type
- Determine Roles & Responsibilities
- Determine Response Approaches
- Develop the Emergency Plan

Note that given any workplace or facility, there is always a likelihood of accident that may result in injury, loss of life, property damage, etc. This may arise from business activities, building or infrastructure conditions, or purely a human action or non-action. Even a case of flu-outbreak in an emergency pandemic scenario within one workplace can eventually threaten the community at large. Henceforth, it is important that the EPT recognises the need to comprehensively cover and consider all possible potential scenarios associated

with the organisation's setting. Generally, emergency scenarios can be classified into natural or man-made situations, such as:

- Natural: Flood, Earthquake, Typhoon, or
- Man-Made: Fire, Explosion, Toxic Chemical leak.

It is during this stage that the emergency planning team (EPT) appointed starts to play a more active and leading role to facilitate the planning process, starting by aligning each and every planning team member's understanding in the scenario identification and consequence assessment process.

### 2.2.1 Scenario Identification and Consequence Assessment

Scenario identification begins with the hazard survey of the facility and/or activities, starting from description of the facility and its operations so that the following can be attained:

- A general characterisation of the facility and its operations (e.g. office building, laboratory, warehouse);
- The normal occupancy, including the number of people in other than ground floor work locations;
- Any special designations, such as hazardous waste site; treatment, storage, or disposal facility;
- Whether hazardous materials (other than standard office products and cleaning supplies) are used or stored in the facility;
- Whether hazardous wastes are generated in the facility.

This can then be followed by the identification and documentation of the emergency conditions that may occur at each facility for which some level of planning and preparedness may be required. Hazardous materials below the screening thresholds or not specifically addressed as part of the hazardous materials programme should be considered when identifying generic emergency conditions. Work activity risk assessment

results should be reviewed to sieve out hazard-scenarios. As a minimum, the following generic emergency conditions should be considered:

- Structure fires;
- Natural phenomena impacts (wind, flood, lightning);
- Environmental releases (of oil or other pollutants that degrade the environment);
- Hazard scenarios from risk assessment;
- Hazardous material releases;
- Workplace accidents/mass casualty events (explosion, release of toxic fumes, high energy system failure);
- Hazards external to the facility/site (e.g. hazardous materials in nearby facilities, transportation accidents, accidents involving utilities, etc.)

The potential impacts of the emergency conditions identified in the previous step are then qualitatively described and assessed. Consideration should be given to "cascade effects," where the emergency condition can result in plausible disruption of response capabilities.

The potential impacts of the emergency conditions can also be assessed and described quantitatively, if required, using computer modelling technology. With computer technology, assessing consequences and impacts became more straight-forward and its result more dynamic. Computer consequence assessment enables emergency planner to characterise the incident based on modelling thermodynamic, mass balance, and energy transfer behaviour such as concentration distributions, overpressures, heat fluxes. Impact assessment characterises the incident based on the consequence critical effect levels at a distance that produce specific impact on humans, the environment, and properties with the following results:

- Potential Impact Zones;
- Plume Impact Zone; and
- Vulnerability Impact Zone.

Scenario planning is not about predictions, but understanding the driving forces and uncertainties behind each different scenario outcome. The main benefit lies in the development of strategies that are robust enough to withstand the different scenarios and making the risks transparent.

Large numbers of potential incident scenarios can be identified through proper process hazard analysis. Depending on the nature of work processes and the associated hazards, different focus, prioritisation and selection of incident scenarios need to be considered. However, defining credible incident scenarios remain a great challenge, especially in the chemical process industries, which often involve multiple events; immediate events/causes, contributing events/causes, and eventually leading to the final consequences.

Note that it is not possible to identify all possible causes, immediate events and final consequences of potential incident scenarios, but planners need to be able to categorise incident scenarios as a basis to their planning assumptions and considerations, such as:

- Localised incident: localised effect zone, limited to a single plant area such as pump fire, small toxic release
- Major incident: medium effect zone, limited to site boundaries, e.g. major fire, small explosion
- Catastrophic incident: large effect zone, off-site effects on the surrounding community, e.g. major explosion, large toxic release

Catastrophic incidents are further divided into two categories:

- Worst Possible Incident: the highest consequence incident identified that is physically possible regardless of likelihood
- Worst Credible Incident: the highest consequence incident identified that is considered plausible or reasonably believable

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

### 2.2.2 Resource and Capability Assessment

With the identified credible scenarios and potential consequence being assessed, the emergency planning team then goes on to do a preliminary assessment of existing in-house capability and resources available; appease and seek management guidance and support to prioritise the preparedness building roadmap to deal with these scenarios. Some of these scenario impacts are beyond the means of any organisation alone and will definitely need the authority emergency services to handle, while other medium to smaller scales incidents can be well managed within the basic emergency preparedness capability of the in-house response teams.

#### 2.2.2.1 Support Facilities, Equipment & Systems

With the overall emergency management picture in mind, the emergency planning team can begin by looking at setting up and designating the required emergency control points into the plan. These include setting aside reserve venues and building up the required emergency support facilities, emergency support equipment, and emergency support systems as discussed in an earlier study unit.

#### 2.2.2.2 Response Equipment & Supplies

To enable the appointed company emergency response team to "run-in" to the hazard zones, usually designated as Hot Zone due to the threat of fire, chemical spill, etc., the personnel need to be protected sufficiently to carry out their emergency intervention

actions, such as spill control, manually shutting valves, physical performing rescue of fellow colleagues in the Hot Zone. In doing so, the CERT personnel need to be protected with emergency response personal protective equipment (ER-PPE) such as chemical protective clothing (CPC) or fire resistant clothing (FRC).

The emergency planning team needs to consider the appropriate types of CPC and FRC to be procured for the CERT so that appropriate protection is provided at the appropriate level. These considerations can be made with reference to published industry standards and guidelines such as:

- Guidelines for the selection of chemical protective clothing, 3rd ed., American Conference of Governmental Industrial Hygienists, 1987;
- SS 548: Code of Practice for Selection, Use and Maintenance of Respiratory Protective Devices (Former CP 74);
- SS 568: Code of Practice for Confined Spaces (Former CP 84);
- US 29 CFR Part1910.120, US Government Printing Office, Washington, DC, 1993;
- NFPA 1991: Vapour-protective ensembles for hazardous materials emergencies;
- NFPA 1992: Liquid splash-protective ensembles and clothing for hazardous materials emergencies

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

#### 2.2.2.2.1 Protection for Chemical Hazards

When planning for the protection of the response personnel against chemical hazards, the following information is to be considered:

- The types of chemical substances present, the measured or anticipated exposure concentration and the recommended protection levels;
- The potential for exposure through inhalation of airborne contaminants, splashes of liquids, or direct contact with solid materials;
- Knowledge of the chemicals and their properties such as toxicity, route of entry and permissible exposure limits;
- The characteristics of the workplace.

Atmospheric concentration and the permissible exposure limit of a chemical allow the calculation of the minimum protection factor required of the respirator to provide an effective protection. In situations where the type of chemical, concentration and possibilities of contact are not known, the level of protection should be selected according to professional experience or accorded the highest level of possible protection. For practical reasons, equipment for chemical emergency response is divided into four levels according to the degree of protection afforded:

- Level A: Protective devices having Level A protection must be worn if the maximum level of respiratory, skin and eye protection is needed. It is employed when high concentrations of substances (such as exceeding IDLH or ERPG-3 level) are present or expected and the substances can severely affect the skin. A situation meeting the following criteria warrants use of Level A protection:
    - The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system;
    - Substances with a high degree of hazard to the skin are known or suspected to be present and skin contact is possible;
    - Operations are conducted in confined, poorly ventilated areas and the absence of substances requiring Level A protection has not been established;
    - Direct readings on field instruments indicate high levels of unidentified vapours and gases in the air.

- Level B: Level B protection is used if maximum protection to respiratory system is needed but a lesser level of skin protection is acceptable. Situations meeting the following criteria can use Level B protection:
    - The type and atmospheric concentration of toxic substances indicate the need for high level of respiratory protection but the effects to the eyes and skin are mild such as the following situations:
        - Concentrations exceeding the IDLH or ERPG-3 limits, but the substance or concentration in the air does not represent a severe skin hazard.
        - Atmosphere does not meet the selection criteria permitting the use of air-purifying respirators.
    - The atmosphere contains less than 19.5% oxygen.
    - It is highly unlikely that emergency response/handling will generate high concentrations of vapours, gases or particulates, or splashes of material that will affect the skin.
    - Atmospheric concentrations of identified vapours or gases are indicated by direct readings on field instruments, but the vapours and gases present are not suspected of containing high levels of chemicals toxic to skin.
- Level C: Level C protection is used when the criteria for using air purifying respirators are met and substances that affect the skin are not present. Situations meeting any of the following criteria can use Level C protection:
    - Atmospheric oxygen concentration is greater than 19.5% by volume;
    - Measured air concentrations of identified substances are below the cartridge's Maximum Use Concentration or within its service limit;
    - Atmospheric contaminant concentrations do not exceed IDLH levels;
    - Air-purifying respirators with sufficient protection are available;
    - Atmospheric concentrations, liquid splashes, or other direct contact will not adversely affect any body area left unprotected;
    - Job functions do not need a supplied-air respirator.

- Continuous direct readings by field instruments are in low concentration ranges.

- Level D: Level D protection is used if no respiratory and skin hazards are expected to be present. Level D protection consists of a work uniform and optional head, foot and eye protection from mechanical hazards. It provides minimal protection against chemical hazards. Situations meeting Level D protection are:
  - No chemical contaminants are present, or chemical contaminants are present below the permissible levels, such as the Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists, or ERPG-1;
  - Emergency response precludes splashes, immersion, or potential for unexpected inhalations of any chemicals.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

#### 2.2.2.2.2 Protection for Thermal Hazards

Personal protection for thermal (fire) hazard when responding to a fire incident depends on the nature of the fire:

- Structural fire - Bunker or turnout gear for routine fire-fighting. This may include bunker or turnout gear with aluminised flame resistant garment coat, pants with fire-fighting helmet, fire resistant gloves, and fire-fighting boots;
- Chemical fire - One/two-piece aluminised flame resistant garment with chemical-protective undergarment with chemical protective under-suit, hood, chemical resistant gloves, chemical resistant boot covers;

- Entering and working in high temperature area - Proximity suits or entering suits with or without chemical-protective undergarment with suitable over-suit and under-suit.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

#### 2.2.2.2.3 Supplies for Fire Extinguishing Media

Similarly, the emergency planning team needs to consider stocking up fire-fighting water and/or other fire extinguishing media such as fire-fighting foam, carbon dioxide supply, dry powders or wet chemicals stock which are required in large quantity during a prolong emergency operation:

- **Fire water requirement**: This is determined by calculating the sum of the water consuming, fixed or portable fire-fighting equipment that may be used to extinguish fires and cool adjacent exposures, or disperse the vapour cloud on a unit until the source of fuel or gas is shut off and the unit is depressurised. If the units are close together, the sum of the fire water demand of the process unit and its adjacent facilities will be necessary. The overall fire water requirements need to be broken down to specifically water requirements for foaming, for protecting adjacent exposures and hose lines, etc. Secondary source water supply needs to be considered, such as open source from the nearby river or sea. In addition to fire-fighting, this emergency water supply may also be of good assistance in the dispersion and absorption of flammable and/or toxic gas clouds;
- **Fire-fighting foams requirement**: This is also to be determined by the calculation of the foam-water proportioning to generate the finished-foam for eventual

application on the surface of flammable liquid fires. Foams are used on oils and flammable liquids to produce a blanket or film over the burning liquid surface and to seal volatile combustible vapours from accessing the air. There are various types of fire-fighting foam concentrate which can be used as a 1%, 3% or 6% proportioning:

- Protein
- Fluoro-protein
- Synthetic (AFFF)
- Alcohol-Resistant
- Film forming Fluoro-protein (FFFP)

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

### 2.2.2.3 Personnel Training Requirements

As discussed in earlier study units, the emergency planning team needs to consider and plan for 3 key groups of personnel:

- People that need to evacuate for safety (evacuees, evacuation-wardens, headcount personnel);
- People that need to respond to intervene the emergency (company emergency response team, first aid team); and
- People that need to manage the incident and issues at hand, including supporting the authority emergency services to bring the incident under control (company's incident management team).

The emergency planning team therefore needs to put in place and set out the recommended training and drill requirements for all personnel to be able to act according to the formulated emergency response plan. This is important because all personnel concerned must have proper training and drills in order to discharge their duties effectively, or to the very least able to remain calm and follow the emergency instruction given.

The various NFPA Standards for responders training will give emergency planners a good guide as to what level of training the assigned personnel will need to be trained in order for them to carry out their emergency duties effectively. In addition, local government authorities may impose specific training courses for your employees/management (such as the requirements under the SCDF's National CERT Standard) to attend as part of licensing requirements. Generally, emergency training can be grouped into the following levels:

- Awareness Level for all employees;
- First Responder Level for selected employees;
- Operations Level for company emergency response teams;
- Specialist Level for technical/support personnel;
- Incident Command Level for assigned SIC, SMC, CERT Leaders;
- Incident Management Level for EOC/Emergency Management Team;
- Crisis Management Level for corporate management/support personnel.

Essential training on the emergency response procedure should be provided for everyone working at the site from management to men and women on the floor. Training should address all hazards and response duties outlined in the Emergency Response Plan. Some key training requirements are as follows:

- Informing employees of the hazards of the materials and processes to which they may be exposed;

- Informing contractors of the emergency response procedures and any potential fire, explosion, safety, health and other hazards;
- Providing emergency response training to employees and contractors upon initial employment. Refresher training should be conducted annually thereafter;
- Providing specific training to emergency response teams such as fire-fighting and first aid training.

Safety and Health Practitioners are usually appointed to coordinate the training programme, supply ideas and inspiration, and enlist the support of management, supervision and employees. Programmes should involve management, employees and contractors. Safety and Health Practitioners should work with the Singapore Civil Defence Force (SCDF) and other government agencies in organising both internal and external training such as:

- Internal Training
    - General training for employees and contractors. The training should cover the following:
        - Types of emergency, e.g. gas leak, fire and chemical spill
        - Emergency Response Procedures
        - Emergency signals
        - Public Address System
        - Reporting an emergency, e.g. raising an alarm
        - Procedures after Normal Office Hours
        - Use of Personal Protective Equipment
        - Use of Breathing Apparatus
        - Use of Fire Extinguishers
        - Evacuation Routes and Assembly Point
    - Specific Training for Company Emergency Response Team (CERT). The training should cover the following:
        - Understanding of Fire Protection Systems in the Company

        - Emergency Response Procedures
        - Fire Fighting Strategies
        - Practical Training on
            - Use of different types of fire extinguishers
            - Use of fire hose reels
            - Use of hose lines and nozzles
            - Use of breathing apparatus
            - Evacuation Procedure
    - Specific Training for company's First Aid Team (FAT). The training should cover the following:
        - Emergency Response Procedures
        - First Aid Techniques such as
            - Cardiopulmonary Resuscitation
            - Use of Resuscitator
            - Dressings and Bandages
            - Rescue tactics
            - Handling and Transportation of Casualties
- External Training
    - Safety and Health Practitioners should consult the SCDF regarding specialised training for the CERT. Training courses in the following areas are offered by SSG Approved Training Organisations and the SCDF Civil Defence Academy:
        - 1-Day Undertake Incident Management Process
        - 1-Day Responding to Fire Emergency in Building
        - 2-Day Responding to Fire and Chemical Incident in Workplace
        - 3-Day Responding to Fire and Chemical Emergency in Workplace
        - Breathing Apparatus (BA) Course
            - BA set -- construction and procedures

- Search and rescue procedures in confined spaces
- Guidelines for safe use of BA
- Movement in an open industrial facility
- Search and rescue in an open industrial facility
- BA procedure assessment
- Movement in darkness and with obstacles
- Use of BA airline
- BA confidence training

- Fire-Fighting Course
  - Use of BA
  - Fire protection systems in industrial buildings
  - Forcible entry
  - Rescue techniques
  - Hot fire-fighting using extinguishers, hose reels, hoses and nozzles
- Hazardous Materials (HazMat) Response Course
  - Use of protective equipment
    - Chemical suits
    - Breathing apparatus
  - Use of various mitigation equipment
    - Detectors
    - Plugging/sealing equipment
    - Transfer pump
    - Absorbent and overpacking drums
  - Tactics and operations
    - Composition of emergency response teams
    - Roles and responsibilities
    - Ground practice

- Decontamination
    - Types of decontamination
    - Use of facilities

▪ HAZMAT Incident Management Course

- Nature of Hazmat incident and incident management
- Incident Command System
- Key issues in incidents involving hazardous materials
- Joint operations with SCDF
- Planning exercise

The best person to plan and organise in-house training is still the company's own emergency planner, who knows the required competency levels of its emergency personnel. Note that some of these required knowledge and know-how are housed within the company's personnel who have the technical/specialist qualification but lacking in emergency dimension. Hence, planners must understand that there is no need to send everyone to external training. The train-the-trainer approach could be both a cost saving, and an in-house expert-resource building approach.

Once in-house training is completed, planners will want to conduct an internal drill/ exercise to validate the training effectiveness. This can be component-based drill or scenario-based exercise. Thereafter, planners may need to demonstrate the established capability to the management, so as to report the level of preparedness you had put in place for the company. A joint exercise to validate the workflow and communication links with the neighbouring facility and/or local fire department would be ideal. Most fire departments have a community emergency contingency plan, when approached to observe/partake in joint exercises are always welcomed. Just pick up the phone and call them.

On top of structured training to build the competency of personnel, emergency planning team also needs to plan for component drills, combined drills, table-top exercises, and

eventual full deployment exercises to confirm learning and validate the effectiveness of the emergency response plan. Such drills and exercises should:

- Be held at least once every six months;
- Cover all working shifts and test its effectiveness during the confusion of shift change;
- Be conducted without warning at least once a year;
- Simulate fire conditions and casualty transportation;
- Involve external agencies, e.g. SCDF whenever appropriate; and
- Include mutual aid groups in drills and table-top exercises.

Training translates plan into actual capabilities. Every employee must know what to do in an emergency; all members of the company emergency response team and management staff must know what their roles and responsibilities are and how to execute them.

In the event of an emergency, the incident manager will have a handful of issues to be handled. Managing media relation is one top to-do list. Emergency planners must recognise and appreciate the importance of media relations before, during and after an emergency. Many planning failed to address the before and after portion, thinking that media relations only need to be well-managed during an emergency. Things to consider are:

- Immediate factual press statement;
- Arrangement to house and meet journalist;
- Schedule of press conferences for regular media update;
- Working with government agencies for joint statements, etc.

Although there are no mandatory training required for emergency media management, many corporate communications/public relations have begun to recognise the importance to engage and build rapport with the media well ahead during peacetime events. However, there are local mandatory training requirements for emergency

preparedness, such as compulsory CERT-Company Emergency Response Team courses that people with emergency roles need to attend. These requirements are built into the premise/business licensing requirements when company sets up its businesses in Singapore.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

### 2.2.3 Determine Plan Objectives, Scope & Plan Type

The emergency planning team (EPT) must appreciate the complexity of writing an emergency plan. Firstly, the EPT needs to understand the purposes of each different type of emergency plans, and then work towards developing a workable plan. The EPT should aim to put the emergency plan on paper in an orderly manner, where its contents are concise, and simple to read and easily understood. The actual writing should be limited to one or two people for consistency in style and format and reviewed for technical merit. The EPT also needs to determine the type of plan appropriate for the site. There are various types of emergency plans:

- Contingency Plan
- Response Plan
- Comprehensive Emergency Management Plan
- Mutual Aid Plan/Agreement

**A contingency plan** addresses specific incidents such as hazardous material spill, fire, bomb threats, and natural disasters, generally covers response phase and rarely covers prevention programme or recovery activities following an incident:

- Advantage: highly focused on hazard
- Disadvantages: difficult to maintain if many contingency plans exist, and inconsistent in response and management from contingency to contingency

**A response plan** describes the immediate, specific response to an emergency; addresses the general actions to be taken regardless of the hazard, such as notification, communications, and evacuation; detailed with clear responsibilities and actions for mitigating the problem at hand:

- Advantage: allows for effective response for most hazards.
- Disadvantage: does not address preparedness or recovery activities.

**A comprehensive emergency management plan** consolidates all responsibilities, duties and procedures associated with preventing, preparing for, responding to, and recovering from potential emergencies:

- Advantages: very comprehensive, deals with all phases of emergency management, incorporates the best elements of response and contingency, and single source for information.
- Disadvantage: can be unwieldy and overwhelming if not well organised.

Finally, the compiled emergency plan should be presented to the emergency management group for approval and adoption, following which would be the instruction to implement the plan.

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

### 2.2.4 Determine Roles & Responsibilities

The emergency planning team (EPT) has the responsibility to ensure that all emergency roles and tasks are identified and assigned. Assigned personnel are then sent for appropriate training, and drilled to carry out the roles and tasks as planned. Hence, it is important that EPT sees the implication to document this sequence of actions during the planning phase.

To organise an effective emergency response, the EPT must know how many people are available to respond to emergency (during day-time, after office-hour, even over the weekend). The EPT needs to evaluate and assess the competence of each individual in the assigned emergency roles, one's fitness and medical status to carry out those tasks.

One good practice is for the EPT to develop a responsibility matrix for the workplace. This Emergency Responsibility Matrix documented as part of emergency planning will reflect planning considerations, management decision, and establish accountability when the system comes under scrutiny.

Essentially, organising for emergency response involves assigning people with emergency response roles and management responsibilities. Roles must be evaluated in accordance with site organisational structure and available resources.

Under the National CERT Standard, emergency response appointments within the company emergency response team are:

- Overall in-charge, Site Main Controller (SMC)
- Site Incident Controller (SIC)
- Fire-fighting, HAZMAT response team members (RT-Members)

### 2.2.5 Determine Response Approaches

One of the key objectives in emergency planning is to determine the strategy and concept of emergency operations. The overall strategy will steer the way how the organisation and people will react and respond in an emergency. This strategy will decide the effective use of internal and external resources, the build-up of internal response capability.

Commonly asked is "What is the best strategy and concept of operation for my facility?" - a question that can only be answered by the corporate planning team; taking into considerations the associated hazards associated at the workplace, the effects on its employees, and the impact to nearby community; bearing in mind that government regulations may mandate certain strategies, equipment and capabilities to be put in place, such as the Fire Safety (Company Emergency Response Team) Regulations, requiring the setup of the organisations' CERT.

**Read**

Fire Safety (Company Emergency Response Team) Regulations 2013 at https://sso.agc.gov.sg/SL/FSA1993-S540-2013

#### 2.2.5.1 Intervention Procedure for CERT

The CERT response approaches to be considered are:

- SIC on-scene immediately to conduct situation assessment;
- Establish the Hot Zone and Warm Zone demarcation to prevent unintended entry;
- Conduct snatch-rescue within the Hot & Warm Zones for life safety priority;
- Immediate safe intervention of fire-fighting and spill control within CERT capability;
- Taking defensive actions such as setting up fire-protection water jets to protect the exposure of surrounding properties;

- Taking aggressive actions such as internal or close proximity fire-fighting, close-contact spill control, etc.

### 2.2.5.2 Evacuation Procedure for EWT

The EWT response approaches to be considered are:

- All designated evacuation wardens (EW) proceed to sub-alarm panel (SAP) upon alarm activation to check and verify source of alarm;
- EW inform all occupants on the designated floor to standby for evacuation;
- EW communicate with FSM/FCC for instruction to evacuate in phases;
- EW standby the floor register for personnel accounting at the EAA;
- EW check and clear rooms and tag room checked (or unchecked) to ensure all occupants are being notified;
- Gather all occupants at designated exit staircase for movement to EAA;
- Usher all occupants to EAA as directed by FCC;
- Conduct headcount using the floor register and report to EAAT.

**Read**

SCDF Guidelines for Company Emergency Response Team (2017)

### 2.2.6 Develop and Implement the Emergency Plan

The above response approaches, when adopted, are to be translated into the organisation's intervention procedure or evacuation procedure respectively for the company's ERP. These adopted procedures will establish the standing operating procedures for the CERT

or EWT and every member of the CERT and EWT is to be trained to the required competency.

The consolidation of these procedures will be developed into and form the organisation's ERP. The determined response approaches for different groups of personnel can be categorised into:

- CERT Intervention procedure; which establishes the standing operating procedure for the CERT members when to activate and respond to the incident scene to carry out immediate rescue, fire-fighting or spill control tasks;
- EWT Evacuation Procedure; which establishes the standing operating procedure for the EWT members when to begin evacuating their charge, how to check room for clearing occupants to the exit staircases and eventually to the emergency assembly area;
- EAAT Headcount Procedure; which establishes the standing operating procedure for the EAAT members to conduct personnel accounting from various departments and final headcount for the entire organisation; and
- IMT Incident Management Procedure; which establishes the standing operating procedure for the SMC and ESG members to organise and operate the ECC/EOC to support the emergency operation.

#### 2.2.6.1 Disseminating and Implementing the Emergency Plan

Disseminating the plan is simple, but implementing it is challenging. One of the daunting tasks for emergency planners is conveying the contents of the plan to the masses and the difficulties in the buying-in process. Note that the plan is only "workable" if, and only if, all stakeholders know what to do as planned. To validate this, the planner needs to exercise the plan regularly, review the provisions periodically, and conduct joint drills/ exercises to familiarise all parties (internal and external) at least twice annually.

One of the important things to do immediately upon disseminating the plan is to organise a training/briefing session to orientate all stakeholders. One common complaint/criticism

is that the plan is too complicated. If the plan is a thick and complex document, you are sure to lose the attention of your readers. Planners may have to develop Actions Checklist or Detailed Action Plan to augment the plan. Emergency Actions Checklist provides a form of memory joggers for actions, with concise reminders to personnel of key actions that need to be undertaken, for example:

- Command Priorities and Tasks Checklist
- Evacuation Checklist

#### 2.2.6.2 Testing and Revising the Plan

There are various ways planners can test out the plan:

- Tabletop Exercises/Roundtable Discussions
- Component Drills (such as Evacuation, Fire Response, Medical Emergency, etc.)
- Full scale deployment field exercise
- Command Post Exercise
- Joint Exercise with external agencies

For instance, it is the Fire Safety Manager's statutory duty to organise two table-top exercises and two fire evacuation drills per year to validate the organisation's Emergency Response Plan. After each drill/exercise, the planning team will have to review and revise the plan provision if required. Lessons learnt and recommendations adopted must be documented in the annual fire safety report. Hence, the entire emergency planning process is cyclical.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

# Summary

Study Unit 3: Establishing Emergency Preparedness would have provided you with essential understanding of the emergency planning stage, comprising the (1) Prevention-Mitigation Phase and (2) Preparedness Phase. You would have gained an understanding of how organisations go about their daily functions of safety and health management, safety inspection, work process risk assessment, to build a safe work environment in the Prevention-Mitigation Phase; and how organisation uses scenario planning to determine the type of capability to build in terms of the resources at hand during the Preparedness Phase.

# Formative Assessment

1. The REACH approach is the cornerstone of any hazard-risk management programme as follows:
    a. Recognition/Identification of Hazard; Evaluation of the Hazard; Assess its associated Risk; and Containment of Hazard through engineered or administrative methods.
    b. Recognition/Identification of Hazard; Elimination of the Hazard; Assess its associated Risk; and Control of Hazard through engineered or administrative methods.
    c. Reassessment of Hazard; Evaluation of the Hazard; Assess its associated Risk; and Control of Hazard through engineered or administrative methods.
    d. Recognition/Identification of Hazard; Evaluation of the Hazard; Assess its associated Risk; and Control of Hazard through engineered or administrative methods.

2. Which of the following is an element of an effective workplace safety and health management system (WSHMS)?
    a. Marketing management
    b. Cost effectiveness
    c. Hazardous chemical management
    d. Business resilience

3. HIRA stands for _____.
    a. Hazard identification and risk aversion
    b. Hazard indication and risk assessment
    c. Hazard identification and risk analysis
    d. Hazard identification and risk assessment

4. _____ is one of the steps to achieve the desired state of readiness in the preparedness phase.
    a. Business impact analysis
    b. Outsourcing or best sourcing of production
    c. Assessing the company resources and capability
    d. Quality control and productivity

5. There are three main groups of personnel that need emergency training, one of them are _____.
    a. People that need to respond to intervene the emergency (company emergency response team, first aid team)
    b. People that need to ensure business continuity
    c. People that need to ensure continued customer service level
    d. People that need to ensure continued production operation

# Solutions or Suggested Answers

## Formative Assessment

1. The REACH approach is the cornerstone of any hazard-risk management programme as follows:

    a. Recognition/Identification of Hazard; Evaluation of the Hazard; Assess its associated Risk; and Containment of Hazard through engineered or administrative methods.

    Incorrect. Containment is a form of hazard mitigation. Refer to Study Unit 3, Chapter 1.

    b. Recognition/Identification of Hazard; Elimination of the Hazard; Assess its associated Risk; and Control of Hazard through engineered or administrative methods.

    Incorrect. Elimination is one form hazard control. Refer to Study Unit 3, Chapter 1.

    c. Reassessment of Hazard; Evaluation of the Hazard; Assess its associated Risk; and Control of Hazard through engineered or administrative methods.

    Incorrect. Hazard need to be first recognized before they can be assessed. Refer to Study Unit 3, Chapter 1.

    d. Recognition/Identification of Hazard; Evaluation of the Hazard; Assess its associated Risk; and Control of Hazard through engineered or administrative methods.

    **Correct! Refer to Study Unit 3, Chapter 1.**

2. Which of the following is an element of an effective workplace safety and health management system (WSHMS)?

    a. Marketing management

Incorrect. This is not a relevant element. Refer to Study Unit 3, Chapter 1.

b. Cost effectiveness

Incorrect. This is not a relevant element. Refer to Study Unit 3, Chapter 1.

c. Hazardous chemical management

**Correct! This is in accordance to workplace safety and health act (WSHA). Refer to Study Unit 3, Chapter 1.**

d. Business resilience

Incorrect. This is not a relevant element. Refer to Study Unit 3, Chapter 1.

3. HIRA stands for _____.

a. Hazard identification and risk aversion

Incorrect. Risk aversion is a form of risk attitude. Refer to Study Unit 3, Chapter 1.

b. Hazard indication and risk assessment

Incorrect. Hazard indication is akin to hazard labelling to inform people of potential hazard. Refer to Study Unit 3, Chapter 1.

c. Hazard identification and risk analysis

Incorrect. Risk analysis is part of risk assessment. Refer to Study Unit 3, Chapter 1.

d. Hazard identification and risk assessment

**Correct! Refer to Study Unit 3, Chapter 1.**

4. _____ is one of the steps to achieve the desired state of readiness in the preparedness phase.

a. Business impact analysis

Incorrect. This is related to business continuity planning. Refer to Study Unit 3, Chapter 2.

b. Outsourcing or best sourcing of production
Incorrect. This is not relevant to emergency response planning. Refer to Study Unit 3, Chapter 2.

c. Assessing the company resources and capability
**Correct! Assessing one own resources and capability enable the company to decide on their response strategy. Refer to Study Unit 3, Chapter 2.**

d. Quality control and productivity
Incorrect. This is not relevant to emergency response planning. Refer to Study Unit 3, Chapter 2.

5. There are three main groups of personnel that need emergency training, one of them are _____.

a. People that need to respond to intervene the emergency (company emergency response team, first aid team)
**Correct! This is in accordance to the National CERT Standard. Refer to Study Unit 3, Chapter 2.**

b. People that need to ensure business continuity
Incorrect. Business continuity is a crisis function. Refer to Study Unit 3, Chapter 2.

c. People that need to ensure continued customer service level
Incorrect. Continued customer service is one form of business continuity functions. Refer to Study Unit 3, Chapter 2.

d. People that need to ensure continued production operation
Incorrect. Continued production is one form of business continuity functions. Refer to Study Unit 3, Chapter 2.

References

CCPS (1995). *Guidelines for Technical Planning for Onsite Emergencies*, Center for Chemical Process Safety, New York: American Institute of Chemical Engineers.

*Fire Safety (Company Emergency Response Team) Regulations 2013* (Singapore), S.540 (Singapore).

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NFPA (2013). *NFPA 1600: Standard for Emergency/Disaster Management and Business Continuity*, Washington: National Fire Protection Association.

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SCDF (2017). *Guidelines for Company Emergency Response Team*, Singapore Civil Defence Force, Singapore: SCDF.

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*Workplace Safety and Health Act 2009* (Singapore) Chapter 354A (Singapore).

*Workplace Safety and Health (First Aid) Regulations 2007* (Singapore), Rg 4 (Singapore).

*Workplace Safety and Health (General Provision) Regulations 2007* (Singapore), Rg 1 (Singapore).

*Workplace Safety and Health (Risk Management) Regulations 2007* (Singapore), Rg 8 (Singapore).

*Workplace Safety and Health (Safety and Health Management System & Auditing) Regulations 2009* (Singapore), S. 607 (Singapore).

Study Unit 4

# Managing the Emergency Incident

# Learning Outcomes

At the end of this unit, you are expected to:

- Understand the steps in the incident management stage
- Explain the focus of the incident management stage
- Understand the response approaches
- Explain the respective response step
- Understand the purpose of IMS-ICS in the Response Phase
- Explain the focus of IMS-ICS for incident command and control
- Explain the focus of ensuring life safety in Response Phase
- Understand the purpose of stopping the problem in Response Phase
- Explain the functions of IMT and ESG in EOC
- Understand the steps in Recovery Phase
- Explain the recovery approaches
- Explain the focus of damage assessment and salvage planning in Recovery Phase
- Explain the focus of business continuity in Recovery Phase
- Explain the focus of Incident Investigation and recovery management in Recovery Phase
- Explain the focus of terminating the incident in Recovery Phase

# Overview

Study Unit 4: Managing the Emergency Incident aims to provide basic understanding of the incident management stage, comprising the (1) Response Phase and (2) Recovery Phase; illustrating how organisations go about implementing their established emergency functions of the on-scene incident command, on-site incident support and management; from immediate activation to intervention, to stopping the problem at hand, and terminating the emergency in the Response Phase; and how organisations deploy their disaster recovery team (DRT) to manage recovery efforts such as damage assessment and salvage planning to determine the extent and scope recovery resources in the Recovery Phase.

**Chapter 1: Response Phase,** aims to provide a good understanding of the elements and activities of an effective on-site incident management system and on-scene incident command system (IMS-ICS).

**Chapter 2: Recovery Phase,** aims to provide a good understanding of how organisations should organise their recovery efforts through the establishment of the disaster recovery team (DRT) to spearhead the damage assessment, ensure business continuity, facilitate investigation, and eventual management of all clean-up, reconstruction activities.

# Chapter 1: Response Phase

## 1.1 Introduction

Incident management is the on-going process to respond to, and recover from an emergency incident that threatens life, property, operations, or the environment. It began with the first handling of an alarm; be it a process deviation indication or a call-in observation by personnel; the prompt and proficient handling of these alarms or activations must be taken seriously. When the emergency alarm is confirmed, the swift response of the company emergency response team plays an important role to minimise the potential loss and its rapid intervention would aim to bring about rapid recovery to normalcy – in a nut shell, this is the incident management process, an integral process in damage control and impact minimisation in the following steps:

- Detect, Warn and Notify of the Emergency
- Take Control of the Situation
- Ensure Life Safety
- Stop the Problem
- Conserve Property and the Environment
- Terminate the Emergency
- Assess Damage and Salvage
- Ensure Business Continuity
- Facilitate Incident Investigation
- Manage Recovery
- Restore Normalcy
- Terminate the Incident

All the above steps enable the organisation to manage the emergency incident at hand, to bring the situation to a state of eventual restored normalcy through the well-established infrastructure:

- Emergency Structures: Crisis Management Team, Incident Management Team, EOC Support Teams, Company Emergency Response Team (CERT), Disaster Recovery Team (DRT), Business Continuity Team (BCT), etc.
- Emergency Systems: Emergency Plans, Incident Management System, Incident Command System, Prevention Systems, Detection Systems, Mitigation Systems, Protection Systems, etc.
- Emergency Resources: Support Facilities, Support Equipment, Supplies, Competent Personnel, etc.
- Emergency Capabilities: Strategies, Tactics, Knowledge, Skills, Attitude

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

## 1.2 Response Approaches

Response begins with the detection of the emergency incident and subsequent activation of alarm and notification to responding personnel. Situation assessment by the site incident controller (SIC) will subsequently determine the scale of response to be activated. The response approach is the backbone of any incident management programme as follows:

- Early Detection, Warning & Notification
- Take Control of the Situation
- Ensure Life Safety

- Stop the Problem
- Conserve Property & the Environment
- Terminate the Emergency

During the response phase, the top priority is to protect lives and property. It would not be the best time to try to resolve time-sensitive management issues. This can be minimised by identifying and resolving these issues during the emergency planning phases. Some of the management issues surrounding a response are:

- Authorisation to activate emergency services
- Mastering of response resources
- Alternate control points at incident site
- Evacuate or adopt in-place protection
- Complete or partial plant shutdown
- Authorisation to activate unit emergency shutdown (ESD) or plant-wide shutdown, etc.

Apart from these operational issues, there are site-specific hazards requiring special planning considerations and provisions and catering for the different scenarios the site/ facility would be exposed to. Such specialised considerations are:

- Medical: mass casualty situations, pandemic, specific occupational disease
- Veterinary: evacuation of livestock, animal diseases
- Terrorism: domestic or international impact
- Decontamination: People versus terrain

The EPT must recognise that these response-related issues and specialised planning required are best discussed and their respective solutions adopted to facilitate executions during the response phase.

### 1.2.1 Detect, Warn and Notify

An early detection, warning and notification system is one of the key support systems that planners need to establish during the planning phase. It is important that planners appreciate the integration of Alert-Warning-Evacuate-Response Procedures when putting in place the emergency plan. This system must form an integral component of your emergency plan and the emergency planning team must be able to visualise the various alerting channels and procedures that people can use to raise the alarm.

Planners should adopt a big-picture visualisation of the site-wide reactions to such notification and foresee how the handling (or mishandling) of such alert notification can lead to a caution warning, activating the response and eventually evacuating the masses. Typically, detection must lead to some form of alert or alarm requiring the attention of:

- Operator in security office;
- Operator in process or operation control room;
- Operator in fire command centre; or
- Operator in facility control room.

Upon receiving the detection alarm, the operators in the respective control room are expected to adhere to a system/protocol of alarm verification such as sending personnel on-scene to verify the alarm; while informing the SMC and SIC of possible emergency incident. Depending on the information flow, the CERT is activated when the emergency incident has been confirmed that:

- The SIC proceed straight to on-scene;
- Upon arrival, the SIC assume command of the incident scene, conduct situation assessment, determine response approach, update SMC of the situation and deployment;
- CERT members proceeded to gather at the designated RV-point (e.g. emergency store), collect the emergency equipment and ER-PPE, proceed to meet the SIC at the Field/Forward Command Post (FCP);

- CERT members obtain instruction from SIC to secure scene, demarcate the hazard zones, enter into Hot Zone to carry out intervention fire-fighting or spill control actions.

### 1.2.2 Take Control of the Situation

Effective and efficient incident management during the emergency is of critical importance to minimise unnecessary loss of life, property damage, and environmental impact. A proven system used for command, control and coordination of an emergency response is known as Incident Management System-Incident Command System (IMS-ICS).

Many incidents – whether major or minor incidents, or emergencies and major disasters – require a response from a number of different agencies such as the Singapore Civil Defence Force, the Singapore Police Force, Police Coast Guard, Maritime Port Authority, Land Transport Authority, etc. depending on the nature, type, and location of the incidents. For chemical or process facilities, all incidents require a coordinated effort to ensure an effective response and the efficient, safe use of resources. The key principles of the IMS-ICS are the application of the following:

- A common organisational structure
- Standardised way in response management

All IMS-ICS Organisations are built around five similar major components:

- Command
- Planning
- Operations
- Logistics
- Finance & Administration

#### 1.2.2.1 Incident Command System

The Incident Command System (ICS) is a proven system for on-scene command, control and coordination of emergency response. The purpose of ICS is to establish:

- An efficient system of coordination, control and command of the situation
- An effective on-site emergency organisation
- Traceable accountability in the overall management of the incident

In a small-scale incident, all of the components may be managed by one or two persons and the Site Main Controller (SMC). Larger scale incidents involving large chemical or process facilities would require that each component to be set up separately depending on the organisational structure of the companies. In other words, the ICS organisation should be expanded or contracted to meet the needs and prevailing circumstances of the incident, but all incidents will require a Site Main Controller. Considerations for an effective ICS include:

- Should be developed to offer coverage for all shift periods regardless of whether the facility is a full 24-hour operation;
- Should be an extension, as much as possible, of routine operations applied to emergency requirements;
- Must be realistic, based on the actual capability of available personnel, both in numbers and qualifications;
- Roles, duties, and responsibilities of command positions should be clearly identified and understood by all members;
- Action levels and the accompanying activities must be well-defined and practised by key members;
- Should be routinely implemented on all incidents to instil familiarity and confidence in the system;
- Weak areas or procedures needing modification can be identified and corrected by the constant use of system;

- Pre-developed incident action checklists should be used to ensure complete coverage of vital response aspects and ensure consistency in response;
- All Command Positions should be position-specific and not person-specific;
- All responders should be trained in the implementation and operation of the system;
- Command positions should be at least three-person deep in backup;
- Identifying and assigning a site safety officer to account for entrance and exit of emergency responders in the incident hot areas and determine the PPE required and that all responder activities are safe.

#### 1.2.2.1.1 Sizing Up and Response Tactics

Under the ICS, it is noteworthy to mention that planners must appreciate the different operational risks posed by different hazards when the company emergency response team (CERT) springs into action, such as:

- Fires and explosions
- Toxic industrial chemicals (TIC) releases or spills

Hence, prior to the company emergency response team springing into action, the team members must be properly trained and equipped to do the job. Planners need to make provision to supply them with personal protective equipment (PPE) such as fire gloves, thermal protective gears, chemical resistance apparel, and respiratory protection assemblies. Only a well trained and equipped CERT can safely and promptly respond to control the situation at hand. Some guiding principles when planning for response to fires and explosions:

- Response: incident pre-plans, initial assessment and size-up
- Suppression: contain and extinguish the fire
- Location and extent of fire/explosion
- Apparatus and equipment

- Water supply management
- Response priorities and safety of people
- Preventing escalation
- Protecting properties and the environment

A useful method (LOCATE) for quick assessment and size-up can be considered:

- Life – what needs to be done to protect people?
- Occupancy – what is inside buildings, tanks, pipes and other structures?
- Construction – what is the size, height, type of material used in buildings?
- Area – what activities in the immediate area?
- Time – Time and weather
- Exposure – protection needed (people, buildings, nearby areas, the environment)

When developing response tactics for hazardous material (HazMat) response, the US OSHA's HAZWOPER (Hazardous Waste Operations and Emergency Response regulations can be referred to. A useful HazMat initial assessment and size-up (DECIDE) can be adopted:

- Detect – Detect the hazardous materials present
- Estimate – Estimate the likely harm with or without intervention
- Choose – Choose appropriate response objectives
- Identify – Identify actions required
- Do – Do the best option available
- Evaluate – Evaluate the progress

While the CERT looks into controlling the problem, planners must foresee the possible escalation and incorporate forward planning elements in the Incident Management System. This can only be achieved if planners are able to appreciate the different risks and uncertainties that surround each scenario; bearing in mind the various facets and priorities

of emergency incident management, planners can then make provisions for these possible escalations well ahead before the undesirables happen.

#### 1.2.2.2 Incident Management System

On a higher platform, the Incident Management System (IMS) is the framework that defines the roles and responsibilities to be assumed by responders and the standard operating procedures to be used in the management and direction of emergency incidents. It is designed to enable effective and efficient incident management by integrating facilities, equipment, personnel, procedures, and communications for the management of resources during incidents. It identifies incident management functions and ensures that they are assigned.

When the incident impact spans across different locations, beyond the command span of one SIC, a second SIC may be appointed to be the on-scene commander of the second incident location, henceforth, one SMC may have an incident management span of up to 7 SICs (or incident locations), each a standalone ICS in operation. Incident Command System (ICS) is therefore a critical component within the IMS; and emergency planners need to know the various elements and programmes required to put in place an efficient Incident Management System (IMS) vis-à-vis an effective ICS. The key word is: Someone is ALWAYS In-Charge and Accountable.

##### 1.2.2.2.1 Communications and Transportation

The IMS will need to deal with the issues of communications and transportation. Do not underestimate the demand for communications and transportation support. Not being able to manage and support these demands may render the entire emergency planning efforts useless and your response crippled.

For communications, it is imperative that individual responders need to communicate with one another to carry out their tasks effectively. Each individual rescuer must be equipped with a communication means as a safety requirement, allowing him/her to call for help, in the unfortunate event he/she is trapped or injured, while performing

rescue work. In addition, his/her communication channel should not interfere with other personnel in different sectors. This is only for one agency, and the demand can multiply within that one agency, given its scope of work, deployment and level of command established.

For transportation support, planners should realise that evacuation of the masses will require coordinated effort to car pools, charter buses, pre-arrangement for ferries services (for island/offshore), flight requirements, etc. This is in addition to managing the influx of emergency response vehicles from mutual aid, and various government agencies.

It is also obvious that multi-agencies coordination and cooperation are required in most disasters and planners must have the ability to appreciate the magnitude of communications and transportation demand and supports that interlink each responding agency.

#### 1.2.2.2.2 Engineering and Sheltering

The importance and need for technical expertise in emergency engineering and sheltering can often be underestimated. Depending on the scale of disaster, these demands can increase exponentially when the boundary stretches into urban and residential settings. Engineering for disaster embraces the design and construction of protection works, surveying and stabilising damaged structures, restoration of utilities and sanitary, etc. Whilst these are underway, temporary shelters to house displaced people and special facilities to manage the vulnerable, such as the very young, the aged and the critically ill, will add demand to the response.

#### 1.2.2.2.3 Medical Support and Care of Vulnerable Groups

The Asian Tsunami that struck Indonesia, Aceh on 26 December 2004 would have given the world a good feel of the magnitude of medical support and the importance of care to be provided to vulnerable or disadvantaged groups. Depending on the scope and scale of extent the designated emergency planners are working on, planners must not lose sight of the hygiene needs and medical care these people will require.

**Read**

SCDF Guidelines for Company Emergency Response Team (2017)

### 1.2.3 Ensure Life Safety

Upon sizing up the situation, the SIC has to make critical decision with respect to managing the emergency at hand. One of the top priorities is to ensure life safety of personnel, amongst others such as controlling the fire, stopping the spill, and prevent further property damage. The SIC has to consider:

- Safety of responding CERT members: ensuring the responders are properly protected by ER-PPE and use appropriate emergency equipment;
- Safety of people around the incident scene: ensuring no personnel enter the hazard zones intentionally or unintentionally by clearly demarcating the hazard zones;
- Safety of people in the Hot Zone: ensure snatch-rescue of the injured or trapped person within the hazard zone, conducting rapid decontamination, immediate first aid treatment and transporting the rescued to safety.

From the situation picture, the SMC has to decide on partial or site-wide evacuation, or implementing in-place protection measure. For the safety of personnel on-site, the SMC may order for partial or total emergency shutdown (ESD) of the chemical processes which may pose further danger to life safety.

### 1.2.4 Stop the Problem

The next priority is to put a stop to the problem, be it a fire, spill, or medical emergency; the CERT personnel should be trained and equipped with the appropriate ER-PPE and emergency equipment to deal with the problem. Stopping the problem includes:

- Reducing overpressure built up, diverting overpressure, relieving overpressure to atmosphere;
- Extinguishing the fire, or controlling the fire incident from escalating;
- Capping the chemical leak or release, diverting the hazardous chemicals to the flare or blowdown drum; controlling the spillage in confined area.

Stopping the problem in most cases would have stopped the emergency at hand. However, even if the emergency at hand is under control, the incident itself would still have lingering peripheral problems such as managing the injured workers, next-of-kin, neighbour companies, concern public as well as truthful media.

#### 1.2.4.1 Media Relations and Next-of-Kin (NOK) Management

The importance of media relations has been discussed in an earlier study unit. However, planners need to see that there is an undeniable link between Next-of-kin (NOK) management and media relations, especially during response phase.

Note that the media has a role to report what is happening and the public will see how NOK are managed through their reporting. In contrast to incident site management (which is secured), NOK management is relatively open and subjected to uncertain factors such as families' emotional reactions, hospitals' handling, etc. In NOK management, planners will need to look at:

- Ways to break the news;
- Psychological counselling;
- Transport, food, and accommodation arrangement;
- Facilitation at hospital, include holding area;
- Assistance in funeral rituals; etc.

### 1.2.5 Conserve Property & the Environment

The next priority is to conserve property and the environment, especially in the control of fire-water runoff or toxic chemical discharge into the environment. The IMT and on-scene CERT should be trained to take appropriate damage control measures that may affect structure and property due to:

- Water damages
- Smoke damages
- Other physical damages

These include control measures to prevent environmental contamination or pollution of the air, soil, & water bodies due to:

- Fire-water runoff
- Discharge rainout
- Released material/s
- Suspended particulates

Second to saving life, property protection or damage control is the next focal point in emergency management. In businesses, loss reduction became critical when something went wrong. And it is in the planners' interest that measures and provisions are put in place to ensure property loss can be prevented, minimised, and salvageable, if required.

Closely link to recovery and business continuity, conservation of property and protecting the Environment include:

- Damage Control affecting Structures and Property from firewater damages, smoke damages, and/or other physical damages;
- Contamination/Pollution of Air, Soil, and Water Bodies from firewater runoff, discharge rainout, released materials, and/or suspended particulates.

The impact on the environment is obvious and needs no introduction when the most recent explosion at a Transocean oil drilling rig killed many workers and sank off the Gulf of Mexico, leaking huge amount of oil into the ocean.

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

### 1.2.6 Terminating the Emergency

Terminating the Emergency is the conclusion of an emergency incident where emergency response activities have ceased. The hazard has been put under control and no further damage is expected. Decision to terminate lies with the local authority in consultation with the SMC. The key criteria to terminate an emergency include that:

- The emergency conditions no longer constitute a hazard;
- Releases of hazardous material to the environment have ceased; and
- The needs of all contaminated or injured personnel have been fulfilled.

It is important that emergency planners recognise, at this point, the difference between terminating the emergency and terminating the incident. It is only the state of emergency that has been terminated, but the incident is not over yet. Incident management is still on-going; this step only marks the end of the response phase; the beginning of the recovery phase.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

# Chapter 2: Recovery Phase

## 2.1 Introduction

The Recovery Phase comprises activities taken to return the facility to normal operation following the termination of emergency response. Recovery from emergency requires time, personnel, resources, and leadership. Factors that determine how long the recovery phase will take:

- Extent of property damage
- Availability of personnel, resources and finances
- Regulatory requirements
- Weather
- Availability of critical equipment

Management needs to set up a recovery team. Generally, duties of recovery team include:

- Coordinating entire recovery efforts
- Assigning tasks and responsibilities, such as setting up taskforce/workgroups to carry out damage assessment and salvage planning
- Supervising equipment inspection and testing
- Overseeing clean-up

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

## 2.2 Recovery Approaches

Recovery begins with the assessment of damages sustained and subsequent salvage plan. Damage assessment will subsequently determine the scope and extent of recovery planning and resource requirements. The steps to restore normalcy in the recovery phase are as follows:

- Assess Damage/Salvage
- Ensure Business Continuity
- Facilitate Incident Investigation
- Manage the Recovery Activities
- Restore Normalcy
- Terminate the Incident

### 2.2.1 Damage Assessment and Salvage Plan

Assessing damage and putting up a viable salvage plan need to be carried out as soon as the incident scene has been rendered safe. Delay in assessing damages will affect eventual salvage as more equipment becomes unsalvageable and beyond repairs. These require close coordination with the investigating government authorities and insurance adjusters.

The damage assessment team is usually led by a company senior management and assisted by external specialists. The team will need to assess building, plant, infrastructure, services, software, etc. and maintain record of assessment; documenting compensable losses.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

### 2.2.2 Ensure Business Continuity

Business Continuity Planning is the on-going process supported by senior management and funded to ensure that the necessary steps are taken to:

- identify the impact of potential losses in the event of an emergency
- maintain viable business continuity strategies and recovery plans
- ensure continuity of services
- safeguard critical records
- provide alternate supply chain arrangement

The Business Continuity Team (BCT) will look into how customers and suppliers are informed of the situation; and how they will be affected. Generally, BCT duties include:

- Coordinating with recovery team
- Determine how customers' needs can be met
- Make alternate arrangement to meet clients' need
- Determine how suppliers' deliveries can be accommodated
- Make alternate delivery site, withhold orders, etc.

**Read**

Blyth, M. (2009). *Business Continuity Management: Building an Effective Incident Management Plan*. New York: Wiley

### 2.2.3 Facilitate Incident Investigation

When things have gone wrong, people begin to worry if they were at fault and would be blamed for the wrong. Fear begins to set in and incident investigation might appear to be a fault-finding process. Emergency planners are no different, especially when they are tasked to oversee the company's emergency preparedness and response planning; one can very quickly become defensive towards investigators' questions during the fact finding process. Hence, it is important that planners understand the incident investigation approach and methods; thereby understanding the importance of facilitating incident investigation and learning from the finding.

### 2.2.4 Recovery and Reconstruction Plan

Managing recovery and reconstruction involves intensive planning and scheduling, such as:

- Identifying required recovery activities based on damage assessment results
- Prioritise activities and resources
- Plan for proper handling and disposal of hazardous wastes
- Coordinating clean-up, repair and restoration
- De-conflicting recovery activities vis-à-vis normal work processes
- Co-ordinating onsite and offsite activities
- Protecting workers' health and safety
- Monitoring and reviewing work progresses

- Ensuring any discharges from recovery activity are controlled within regulatory and environmental compliance limits
- Replenish, repair, or replace any emergency equipment or consumable materials used during emergency response
- Establish standing work orders to get this work performed as soon as possible

Depending on the size and extent of damages sustained, and the population affected, reconstruction may take months to years to complete. Not only do planners need to appreciate the magnitude of reconstruction plan and re-development works required, planners also must take into consideration unforeseen setbacks that often dog the progress of re-development, such as funds and resources availability, community and political supports, suitability of site after the emergency, and likelihood of recurrence.

**Read**

Alexander, D. (2002). *Principles of Emergency Planning and Management*. Oxford: University Press

### 2.2.4.1 Clean-up, Repair and Restoration Activities

Planners need to understand the various activities surrounding the recovery and reconstruction process which include damage assessment, salvage planning and overlap with business continuity and reconstruction activities. Having a good understanding of their linkages enables planners to put in place a workflow framework where BCT and Recovery Team can work together and facilitate/coordinate the recovery and business continuity activities more effectively. The following should be considered:

- Ensure that any discharges from recovery activity are controlled within regulatory and environmental compliance limits. If discharges are necessary beyond these

limits, ensure that all necessary documentation is prepared, approvals obtained, and notifications made.

- Conduct recovery activities through normal work organisation and procedures.
- Replenish, repair, or replace any emergency equipment or consumable materials used during emergency response. The maintenance department could establish standing work orders to get this work performed as soon as possible. Purchasing should expedite all repair orders regarding these systems.
- Environmental clean-up may also be required if the release during the incident is excessive. Some common clean-up and decontamination methods are:
    - Solution clean-up: ordinary cleaning & decontamination using water or solution is effective for small areas. Solution used must be compatible with the contaminated items.
    - Vacuum: exhaust must be filtered. Applicable to open areas. Effective for porous and nonporous surfaces.
    - Absorption: disposal could be an issue.
    - Steam Cleaning: effective for most nonporous surfaces and contaminants. Runoffs must be collected.
    - Grading, Scraping: disposal of large quantities of material could be an issue. May create airborne dust hazard.
    - High pressure washing: effective for most nonporous surfaces and contaminants. Runoff needs to be collected for disposal.
    - Carbon Dioxide Pellet Blasting: Effective for most nonporous surfaces and contaminants.
    - Sand Blasting/Abrasive: effective for nonporous surfaces. Sand used requires disposal.
    - Water Washing: ideal for paved areas, roofs, metal surfaces, and external walls. Should not be used on porous surfaces. Water used needs to be collected & processed.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

### 2.2.5 Interim Provisions and Restoration of Services

It is clear that the emergency response phase is immediately followed by a period of recovery of basic facilities, thereafter followed by reconstruction. However, before any long-term restoration can begin, the need to put in place interim measures and provisions to sustain day-to-day essential services is pertinent. Immediate problems such as provision of food, shelter, and other basic necessities that were lost as a result of the emergency/disaster must be solved.

### 2.2.6 Terminating the Incident

Only when normalcy is restored can the incident be terminated. Such restorations include re-establishment of all basic facilities, reconstruction of essential infrastructures (different for residential or industrial settings) and resume day-to-day essential services or commercial operations. Do not forget to address the psychological impact on the affected people/population in an event of a chemical process plant emergency, and upon termination of the incident:

- Conduct de-brief (operational and psychological)
- Analyse causes of incident
- Identify areas for improvement
- Follow-up with families of injured personnel, if any
- Follow-up with regulatory agencies, insurance companies, etc.
- Revise procedures, where appropriate.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

# Summary

Study Unit 4: Managing the Emergency Incident would have given you a broad understanding of the incident management stage, comprising the (1) Response Phase and (2) Recovery Phase. You would have gained the basic understanding of how organisations can go about implementing the on-scene incident command system with the CERT headed by the SMC and SIC, and the on-site incident support and management system supported by the ESG. Terminating the emergency, you would have gain insights into how organisation deploys its disaster recovery team (DRT) to manage recovery efforts such as damage assessment and salvage planning to determine the extent and scope recovery resources in the Recovery Phase.

## Formative Assessment

1. _____ is the on-going process to respond to, and recover from an emergency incident that threatens life, property, operations, or the environment.
    a. Emergency Management
    b. Incident Management
    c. Emergency response planning
    d. Incident Command

2. _____ is a proven system for on-scene command, control and coordination of emergency response.
    a. Incident Management System (IMS)
    b. Incident Command System (ICS)
    c. Emergency response
    d. Emergency incident

3. The _____ comprises activities taken to return the facility to normal operation following the termination of emergency response.
    a. Recovery phase
    b. Response phase
    c. Prevention-Mitigation phase
    d. Preparedness phase

4. The _____ will look into how customers and suppliers are informed of the situation; and how they will be affected.
    a. Business Continuity Team (BCT)
    b. Traffic warden team (TWT)
    c. First aid team (FAT)
    d. Emergency assembly area team (EAAT)

5. Which of the following is a Recovery Approach?
    a. Early detection and warning
    b. Stopping the problem
    c. Facilitate investigation
    d. Conserve property and the environment

# Solutions or Suggested Answers

## Formative Assessment

1. _____ is the on-going process to respond to, and recover from an emergency incident that threatens life, property, operations, or the environment.

    a. Emergency Management

    Incorrect. This is a larger concept that includes emergency planning and incident management. Refer to Study Unit 4, Chapter 1.

    b. Incident Management

    **Correct! This is on-going management of incident that has happened. Refer to Study Unit 4, Chapter 1.**

    c. Emergency response planning

    Incorrect. This is known as emergency planning. Refer to Study Unit 4, Chapter 1.

    d. Incident Command

    Incorrect. This is on-scene incident organization and construct. Refer to Study Unit 4, Chapter 1.

2. _____ is a proven system for on-scene command, control and coordination of emergency response.

    a. Incident Management System (IMS)

    Incorrect. This is a larger concept for on-site and off-site management of incident issues that include on-scene incident command system (ICS). Refer to Study Unit 4, Chapter 1.

    b. Incident Command System (ICS)

**Correct! This is the on-scene system to managing the incident consequences at hand. Refer to Study Unit 4, Chapter 1.**

c. Emergency response
Incorrect. This is one component of incident management. Refer to Study Unit 4, Chapter 1.

d. Emergency incident
Incorrect. This is defined as an event with dire urgency affecting life safety and property. Refer to Study Unit 4, Chapter 1.

3. The _____ comprises activities taken to return the facility to normal operation following the termination of emergency response.

a. Recovery phase
**Correct! This is the phase that organization recovers, repair, and rebuild to restore normalcy. Refer to Study Unit 4, Chapter 1.**

b. Response phase
Incorrect. This is the phase where organization responds to handle/manage the incident at hand. Refer to Study Unit 4, Chapter 1.

c. Prevention-Mitigation phase
Incorrect. This is the phase where organization practice proactive risk management with appropriate control measures to prevent the risk from materializing. Refer to Study Unit 4, Chapter 1.

d. Preparedness phase
Incorrect. This is the phase where organization builds the state of readiness through equipping, training and exercising the personnel. Refer to Study Unit 4, Chapter 1.

4. The _____ will look into how customers and suppliers are informed of the situation; and how they will be affected.

a. Business Continuity Team (BCT)

**Correct! This is to keep the business operating at its predetermined minimum business continuity objective. Refer to Study Unit 4, Chapter 2.**

b. Traffic warden team (TWT)

Incorrect. TWT is deployed to ensure safe marshaling of vehicular movement as part of evacuation management. Refer to Study Unit 4, Chapter 2.

c. First aid team (FAT)

Incorrect. FAT is deployed to set up and man the first aid post (FAP) near to the Emergency Assembly Area (EAA). Refer to Study Unit 4, Chapter 2.

d. Emergency assembly area team (EAAT)

Incorrect. EAAT is deployed to set up and manage the emergency assembly area (EAA). Refer to Study Unit 4, Chapter 2.

5. Which of the following is a Recovery Approach?

a. Early detection and warning

Incorrect. This is one of response approaches. Refer to Study Unit 4, Chapter 2.

b. Stopping the problem

Incorrect. This is one of response approaches. Refer to Study Unit 4, Chapter 2.

c. Facilitate investigation

**Correct! This is one of critical function the recovery team to work closely with authorities for swift release of affected site. Refer to Study Unit 4, Chapter 2.**

d. Conserve property and the environment

Incorrect. This is one of response approaches. Refer to Study Unit 4, Chapter 2.

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Study Unit 5

# Implementing the Incident Management Process

# Learning Outcomes

At the end of this unit, you are expected to:

- Understand the steps in the incident management process
- Explain the desired outcomes of the incident management process
- Understand the activation and response requirements
- Explain the expected roles of the person who discovers the emergency
- Explain the expected roles of the FCC operators upon receiving notification
- Understand the activation and response requirements of the CERT
- Explain the expected functions of the SIC and SMC
- Explain the expected functions of the CERT members
- Understand the Incident Size-up requirements
- Explain the functions of the SIC during incident size up
- Understand the fire-fighting and mitigation requirements of the CERT
- Explain the expected capability of the CERT, SIC and SMC
- Understand the support activities requirements of the IMT and CERT
- Explain the expected functions of the Evacuation Support Team, EWT, EAA Team
- Explain the expected functions of the Security Team, FAT, ESG
- Understand the link up requirements of the SIC and SMC
- Explain the expected functions for joint operation

# Overview

Study Unit 5: Implementing the Incident Management Process aims to provide essential understanding of the incident management process, comprising the 6-step methodology adopted by the SCDF, namely (1) Activation and Response, (2) Incident Size-up, (3) Fire-fighting and Mitigating Operations, (4) Support Activities, (5) Linking-up with SCDF Upon Arrival, and (6) On-going Operations and Recovery; illustrating how organisations can go about implementing the incident management process as part of the ERP.

**Chapter 1: Incident Management Process** aims to provide a basic understanding of the 6-step incident management process adopted by the SCDF Incident Management requirements.

# Chapter 1: Incident Management Process

## 1.1 Introduction

Incident management is the on-going process to respond to, and recover from an emergency incident that threatens life, property, operations, or the environment. The main focus of the incident management process enables the organisation to establish the chain of command and control in the course of managing the emergency incident at hand. The stipulated process allows the SMC and SIC to direct and control the actions of all personnel under their supervision. It also avoids confusion by requiring that orders flow from supervisors. Effective incident command relies on a tight command and control structure.

The SCDF adopted a six-step approach methodology towards managing an incident and requires the designated organisation to adopt for their CERT and EOC operation as follows:

- Activation and Response
- Incident Size-up
- Fire-fighting and Mitigating Operations
- Support Activities
- Linking-up with SCDF Upon Arrival
- On-going Operations and Recovery

The desired outcomes of the incident management process are:

- Quick dispatch and arrival
- Swift initiation of emergency response system
- Rapid assessment of incident scene, update of situation
- Timely request for appropriate resources

- Effective containment and management of threats in accordance with emergency response plans and safety procedures

**Read**

SCDF Guidelines for Company Emergency Response Team (2017)

## 1.2 Activation and Response

### 1.2.1 Notification Phase

Upon discovery of an incident, the first person who discovered the fire or hazardous material incident is expected to act according to the first person action plan as follows:

- Activate the nearest fire alarm call point
- Confirm the location with Fire Command Centre
- Attempt to put out the fire or mitigate the hazardous material by shutting valve or activating drenching system if situation permits
- Keep other personnel out of the hazard area
- Brief the SIC of the situation upon his arrival on-scene

### 1.2.2 Activation Phase

Upon receiving the emergency notification, the Fire Command Centre operators are expected to act according to the FCC Standing Operating Procedure such as:

- Call 995 and alarm monitoring agency
- Announce the nature and location of the emergency over the emergency voice communication (EVC) system
- Activate the CERT to respond to incident site

- Notify the neighbouring companies of the emergency

Upon receiving the activation notification from the FCC, the CERT members are expected to act according to the response and intervention procedure of the ERP as follows:

- Gather at the CERT rendezvous-point in 1 minute to obtain the necessary ER-PPE and emergency equipment
- Respond to the incident scene in 5 minutes to receive instruction from the SIC at his FCP

**Read**

SCDF Guidelines for Company Emergency Response Team (2017)

## 1.3 Incident Size-up

Upon receiving the activation notification from the FCC, the SIC is expected to act according to the response and intervention procedure of the ERP as follows:

- Respond straight to the incident scene
- Verify the incident
- Conduct site assessment
- Determine extent of emergency (risk, hazard, casualties)
- Provide a verbal situation report to SMC and FCC
    - Nature & Type of Incident & Number of Casualties Involved
- Prioritise tasks and deploy CERT accordingly

When sizing up the situation, the SIC should consider the following possible information:

- Is there a fire, a spill or a leak?

- What are the weather conditions?
- What is the terrain like?
- Who/what is at risk: people, property or the environment?
- What actions should be taken: Is an evacuation necessary?
- Is diking necessary? What resources (human and equipment) are required and are readily available?
- What can be done immediately?

## 1.4 Fire-fighting and Mitigation Operations

Upon receiving the deployment instruction from the SIC, the Response Team Members (RT-Member) are expected to follow the emergency operation safety procedure such as:

- Don appropriate ER-PPE such as Self-Contained Breathing Apparatus (SCBA), chemical protective clothing (CPC), fire bunker gears, etc.

The RT-Members are then expected to carry out as instructor by the SIC to:

- Perform rapid snatch-rescue of any casualties within their means safely
- Conduct immediate fire-fighting or HazMat mitigation operations
    - Competently and swiftly deploys and operates emergency response equipment
    - Ensure protection of surrounding facilities or monitor and disperse vapour clouds
    - Effectively contain and mitigate the fire or HazMat incident
    - Able to react to changing situations at incident site
    - Ensure activities are conducted safely
- Competent in using correct tactics for mitigation operations
- Able to deploy their in-house emergency equipment fast and effectively
- Competent in tactics employed

- Use appropriate extinguishing medium
- Ensure effective containment
- Swift rescue and evacuation of casualties safely
- Conduct initiate search for trapped or missing personnel

The SIC, as the on-scene commander, is expected to:

- Command and direct the Response Team(s)
- Maintain constant communication with the SMC and Response Team(s)

The SMC, as the on-site overall incident commander, is expected to:

- Command and direct the Incident Management Team
- Maintain constant communication with the SIC and the Emergency Support Group (ESG)
- Focus on managing the incident priorities, such as life safety
- Provide strategic and tactical guidance to the SIC and Response Team

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

## 1.5 Support Activities

Upon receiving the evacuation instruction from the SMC, the Evacuation Support Team Members, led by the appointed Fire Safety Manager or appointed Evacuation In-Charge, together with the evacuation warden team (EWT) and Headcount Team are expected to carry out the established evacuation procedure as follows:

- Guide the evacuees to the Emergency Assembly Area (EAA);
- Perform a head count at the Emergency Assembly Area to account for all company personnel
- Perform a thorough search of the premises to ensure that no personnel are left behind

Upon receiving the activation notification from the FCC, the Security Team is expected to act according to the scene security procedure of the ERP as follows:

- Secure the company premises and incident site to prevent any unauthorised personnel from entering
- Lead and guide the arriving SCDF resources to the incident site to link up with the SIC

Upon receiving the activation notification from the FCC, the First Aid Team (FAT) is expected to act according to the medical support procedure of the ERP as follows:

- Set up the First Aid Post (FAP) at the designated location
- Man the First Aid Post to provide first aid, CPR, and AED treatment to the injured
- Keep record of the casualties and first aid treatment
- Update the FAT In-Charge, who will in turn update the SIC and SMC accordingly

Upon the instruction of the SMC, the company's Emergency Control Centre will be set up by the appointed ECC-Team. The Emergency Support Group (ESG) comprising planning staff to support the SMC is expected to:

- Gather at the ECC within stipulated timeframe, generally within 1 hour upon activation
- Establish the Situation Picture of the incident to brief the SMC and Authority Commanders

- Manage the incident issues such as logistics on fire-fighting foams, fire-water supply
- Provide SMC and Authority Commander with courses of actions for decision-making
- Provide crisis communication support to corporate crisis management centre

**Read**

SCDF Guidelines for Company Emergency Response Team (2017)

## 1.6 Linking-up with SCDF upon Arrival

Upon the arrival of SCDF, the Site Incident Controller (SIC) is expected to immediately link up with the SCDF Ground Commander to provide information and situation updates as follows:

- General description of the incident
- Possible risks and hazards
- Printed copy of the inventory of the affected P&FM and their immediate surroundings
- CERT resources deployed
- Casualty number and personnel unaccounted for
- Resources available to assist SCDF operations
- Methods of mitigation

In addition, the following supporting documents are expected to be made available to the SCDF upon arrival:

- Site/ Plant layout diagrams

- Map illustrating emergency control points (e.g. CERT assembly point, evacuee assembly point, first aid point)
- Inventory list of hazardous substance
- Emergency contact list
- Safety Data Sheets (SDS) for all chemicals used in the plant
- Government agencies contact numbers (e.g. SCDF, SPF, NEA)
- Recovery contractor contact number

## 1.7 On-going Operations and Recovery

Joint operation with the SCDF is crucial in the overall successful management of the emergency incident. The company's IMT is expected to continue its planning support while the CERT is expected to continue its operational support to the SCDF till the end of the emergency operation. These include:

- First Aid
- Casualty Evacuation
- Hazard Zone Entry/Exit Control
- Fire-fighting and HazMat Intervention
- Recovery

As the incident develops, additional factors may make the original course of action inappropriate, e.g. Decision making may change from being proactive to reactive as conditions change in unforeseen ways, e.g. hidden fire spread may result in fire breakout in other areas. Fire-fighting actions will change and defensive rather than offensive tactics employed. New hazards and their associated risks may arise, e.g. locating unexpected hazardous materials where priorities change towards dealing with chemicals rather than previous tasks. Existing hazards may present different risks, e.g. uncontrolled fire may make a building unstable so that internal fire-fighting is not an option. Operational activities may produce risks to people and/or the environment, e.g. run-off water may

consist of substances harmful to the environment and may need to be contained. Personnel may have to be monitored for signs of fatigue, e.g. arduous BA wears where increased welfare arrangements are needed.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

# Summary

Study Unit 5: Implementing the Incident Management Process would have provided you with the essential understanding of the incident management process, comprising the 6-step methodology adopted by the SCDF, namely (1) Activation and Response, (2) Incident Size-up, (3) Fire-fighting and Mitigating Operations, (4) Support Activities, (5) Linking-up with SCDF Upon Arrival, and (6) On-going Operations and Recovery; illustrating how organisations can go about implementing the incident management process as part of the ERP.

# Formative Assessment

1. Which of the following is one of the six-step incident management process?
    a. Linking up with SCDF upon arrival
    b. Quick dispatch
    c. Timely request for appropriate resources
    d. Effective containment and management of threats

2. Based on the National CERT Standard, company in-house CERT must be capable be to respond to on-scene within ____ minutes.
    a. 1 minute
    b. 3 minutes
    c. 4 minutes
    d. 5 minutes

3. Upon the instruction of the _____, the company's Emergency Control Centre (ECC) will be set up by the appointed ECC-Team to play supporting roles to the incident management process.
    a. Fire-fighting team (FFT)
    b. Site main controller (SMC)
    c. Site incident controller (SIC)
    d. Response team (RT)

4. The _____ is one of the critical relevant emergency information that organisation must provide to the SCDF for intervention consideration.
    a. In-Place Protection Plan
    b. Emergency Response Plan
    c. Evacuation Plan
    d. Safety data sheet (SDS) of the chemical involved

5. Upon receiving the activation notification from the Fire Command Centre, the _____ is expected to act according to the response and intervention procedure of the ERP and carry out appropriate incident size-up to determine the scale and severity of the incident at hand.
    a. Fire-fighting team (FFT)
    b. Site main controller (SMC)
    c. Site incident controller (SIC)
    d. Response team (RT)

# Solutions or Suggested Answers

## Formative Assessment

1. Which of the following is one of the six-step incident management process?

   a. Linking up with SCDF upon arrival

      **Correct! This is one where the site incident controller (SIC) and site main controller (SMC) link up and brief the SCDF arriving ground commander (GC) and incident commander (IC). Refer to Study Unit 5, Chapter 1.**

   b. Quick dispatch

      Incorrect. This is one of desired outcomes for the six-step incident management process. Refer to Study Unit 5, Chapter 1.

   c. Timely request for appropriate resources

      Incorrect. This is one of desired outcomes for the six-step incident management process. Refer to Study Unit 5, Chapter 1.

   d. Effective containment and management of threats

      Incorrect. This is one of desired outcomes for the six-step incident management process. Refer to Study Unit 5, Chapter 1.

2. Based on the National CERT Standard, company in-house CERT must be capable be to respond to on-scene within ____ minutes.

   a. 1 minute

      Incorrect. This is the activation time. Refer to Study Unit 5, Chapter 1.

   b. 3 minutes

      Incorrect. The required response time is within 5 minutes upon activation. Refer to Study Unit 5, Chapter 1.

   c. 4 minutes

Incorrect. The required response time is 5 minutes upon activation. Refer to Study Unit 5, Chapter 1.

d. 5 minutes
**Correct! Refer to Study Unit 5, Chapter 1.**

3. Upon the instruction of the _____, the company's Emergency Control Centre (ECC) will be set up by the appointed ECC-Team to play supporting roles to the incident management process.

a. Fire-fighting team (FFT)
Incorrect. The FFT is part of the company emergency response team (CERT). Refer to Study Unit 5, Chapter 1.

b. Site main controller (SMC)
**Correct! The SMC is the senior management representative responsible for the entire incident management. Refer to Study Unit 5, Chapter 1.**

c. Site incident controller (SIC)
Incorrect. The SIC is the in-charge of the incident scene and co-ordinates the activities of all emergency responders, providing support to SCDF for mitigation of the emergency situation on-scene. Refer to Study Unit 5, Chapter 1.

d. Response team (RT)
Incorrect. This is part of the company emergency response team (CERT). Refer to Study Unit 5, Chapter 1.

4. The _____ is one of the critical relevant emergency information that organisation must provide to the SCDF for intervention consideration.

a. In-Place Protection Plan
Incorrect. This keeps the building occupants safely indoor from toxic exposure. Refer to Study Unit 5, Chapter 1.

b. Emergency Response Plan

Incorrect. This plan is focused on getting the CERT into the problem area to resolve the emergency at hand, such as a fire, spill, etc. Refer to Study Unit 5, Chapter 1.

c. Evacuation Plan

Incorrect. This plan is focused on getting occupant out of the affected premise safely and swiftly. Refer to Study Unit 5, Chapter 1.

d. Safety data sheet (SDS) of the chemical involved

**Correct! This provide for accurate intervention counter measures that can be taken for the SCDF to manage the incident. Refer to Study Unit 5, Chapter 1.**

5. Upon receiving the activation notification from the Fire Command Centre, the _____ is expected to act according to the response and intervention procedure of the ERP and carry out appropriate incident size-up to determine the scale and severity of the incident at hand.

a. Fire-fighting team (FFT)

Incorrect. The FFT is part of the company emergency response team (CERT). Refer to Study Unit 5, Chapter 1.

b. Site main controller (SMC)

Incorrect. The SMC is the senior management representative responsible for the entire incident management. Refer to Study Unit 5, Chapter 1.

c. Site incident controller (SIC)

**Correct. The SIC is the in-charge of on-scene incident management. Refer to Study Unit 5, Chapter 1.**

d. Response team (RT)

Incorrect. This is part of the company emergency response team (CERT). Refer to Study Unit 5, Chapter 1.

References

CCPS (1995). *Guidelines for Technical Planning for Onsite Emergencies*, Center for Chemical Process Safety, New York: American Institute of Chemical Engineers.

NFPA (2013). *NFPA 1600: Standard for Emergency/Disaster Management and Business Continuity*, Washington: National Fire Protection Association.

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Study Unit 6

# Maintaining Emergency Preparedness

# Learning Outcomes

At the end of this unit, you are expected to:

- Understand the steps in the emergency management life cycle
- Explain the cyclical process of emergency management
- Understand the maintenance requirements of emergency readiness
- Explain the 5 key maintenance activities for emergency preparedness
- Understand the maintenance requirements for risk register
- Understand the maintenance requirements for emergency plans
- Understand the maintenance requirements for emergency support resources
- Understand the maintenance requirements for emergency response equipment
- Understand the maintenance requirements for personnel competency

# Overview

Study Unit 6: Maintaining Emergency Preparedness aims to provide essential understanding of the emergency management life cycle, comprising the maintenance requirements for emergency preparedness to be sustained, covering maintenance of organisational (1) risk register, (2) emergency plans, (3) emergency support resources, (4) emergency response equipment, and (5) personnel competency; illustrating how organisations can go about maintaining the state of emergency preparedness.

**Chapter 1: Emergency Management Life Cycle,** aims to provide a basic understanding of the maintenance requirements to sustain the organisation's level of emergency preparedness; looking at the critical activities from the respective phases of emergency management life cycle.

# Chapter 1: Emergency Management Life Cycle

## 1.1 Introduction

An effective response to an emergency or a disaster does not just happen. Many agencies have a part to play dealing with an emergency and its aftermath. The effectiveness of the total response will depend on how well government agencies, emergencies services, and the utility operators have harmonised their preparations, trained their personnel, and tested their arrangement and emergency procedures.

This state of emergency readiness is achieved through months of coordination works by the emergency planning team and days of training and capability building by the incident management team and company emergency response team. It is noteworthy to mention here that emergency planners must recognise that the emergency management life cycle is a cyclical process, from emergency planning to incident management. Even at the respective phases, each phase is a cyclical process as shown below:

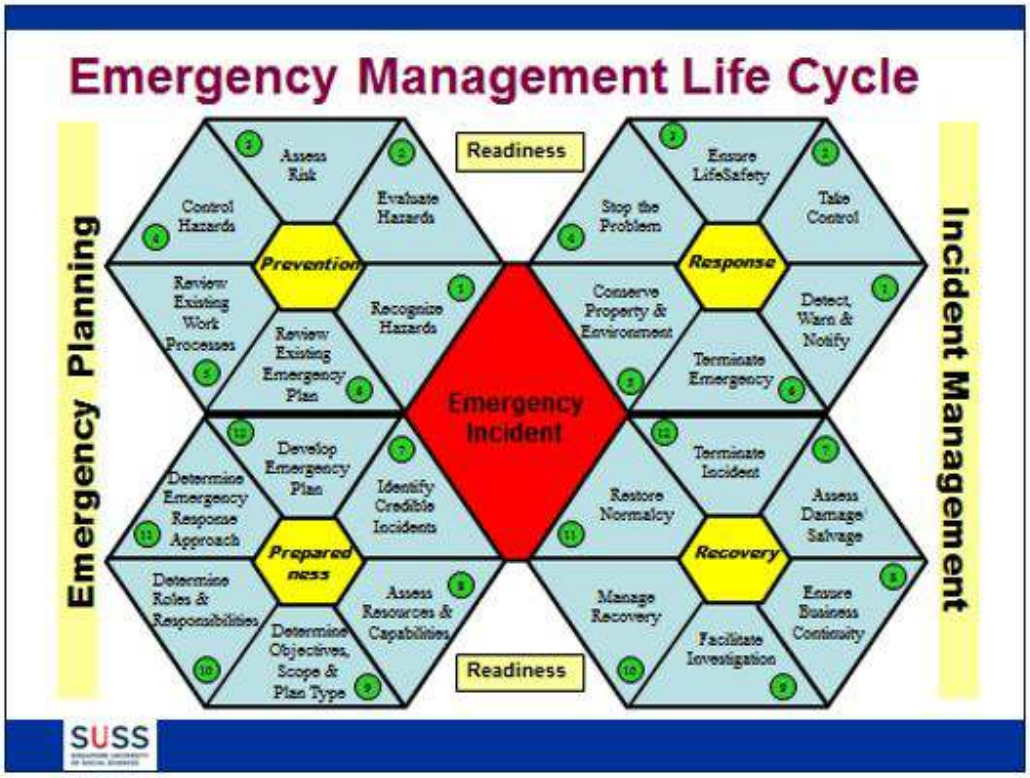


**Figure 6.1** Emergency Management Life Cycle

As much as we do not wish to have an emergency incident, the organisation's state of readiness needs to be maintained and sustained. To maintain this emergency preparedness will require sustained effort and strong management commitment and sustained efforts from various levels of the organisation to:

- Keep the risk register updated and current through continued hazard identification and risk assessment process
- Keep the emergency plans updated and current through periodic review of credible scenarios and allocated resources
- Keep the emergency support facilities and equipment at good functional level through regular inspection, test, and maintenance (ITM) programme
- Keep the emergency response equipment in good readiness state

- Keep the personnel familiar with the ERP procedures through periodic drills and exercises

To meet the legal requirements, the emergency planning team is to spearhead the regular review of the organisation's emergency response capability; such as the SCDF's National Company Emergency Response Team Standards (National CERT Standards), where premises are categorised into Tier 1, 2 and 3 premise respectively depending on the quantity of petroleum and flammable materials that are being stored in their premise. The Tier-Premises are then required to set up the CERT, trained to various level of competency and equipped with appropriate ER-PPE and mitigation equipment for spill control, fire-fighting apparatus, etc.

**Read**

SCDF Guidelines for Company Emergency Response Team (2017)

## 1.2 Maintaining the Risk Register

As discussed in Study Unit 3, the REACH approach is the cornerstone for an effective hazard identification and risk assessment process. The emergency planning team should recognise the importance of keeping the organisation's risk register updated and current through this continued hazard identification and risk assessment process; requiring the risk assessment teams within the workplace units to take on a serious view on conducting regular review of the associated risk and work processes. From the regular review, the emergency planning team hopes to gather:

- Updated risk register showing changes in hazard-scenarios
- Reviewed effectiveness of the implemented hazard controls
- Updated requirement to enhance on hazard controls

From these updated information and assessment, the emergency planning team can then ask the critical question if the current state of preparedness needs to be maintained or stepped up to meet new challenges.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014

Society of Loss Prevention in Process Industries, Singapore

## 1.3 Maintaining the Emergency Plans

The compilation of an emergency plan does not mark the end, but the beginning of a new cycle. Planners need to recognise that the first few versions of the plan are not perfect and will never be. Continuous improvement must be made to the plan so that the overall emergency preparedness can grow.

Like a piece of equipment, the emergency plans need to be periodically reviewed, its workflows updated, critical data verified, emergency procedures revalidated, etc. A good practice is to review this document at six monthly intervals and try to coincide these reviews just after a table-top exercise or drill; where gaps identified and lessons learnt can be incorporated when planner revises the emergency plan.

From the updated risk register, the planners can evaluate the sufficiency of the emergency plans with respect to the credible scenarios adopted previously, determine if the new hazard-scenario identified can be adequately addressed by the existing plan provisions. Such continuous improvement can come from review of existing safe work procedures, expansion of response capability, build-up of specialised teams, to the eventual improvement of the emergency plan.

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

## 1.4 Maintaining the Emergency Support Resources

Unlike other equipment, emergency resources are mostly utilised during an emergency. Hence, it is critically important that the facilities are functional or the piece of equipment works when required. Planners therefore need to put in place a preventive maintenance programme for all emergency resources such as all emergency support facilities and support equipment to ensure their functionality.

Regular training with those designated facilities and equipment is one way to ensure the people know how to handle those facilities and equipment when required. But planners also need to plan for redundancy; in the event that equipment is sent for repair or maintenance.

**Read**

Emergency Response Planning Guide, 3rd Edition, 2014, Society of Loss Prevention in Process Industries, Singapore

## 1.5 Maintaining the Emergency Response Equipment

Planners must have a list of emergency resource inventory. Together with the list of personnel responsible to operate the equipment during an emergency, planner will be

able to have an overall picture of your CERT's state of readiness. However, this state of readiness will need constant checking and auditing to maintain effectiveness.

It is prudent that planners put together an inspection checklist for emergency resource equipment, especially motorised/electrical equipment. An audit checklist to test out the emergency personnel in their proficiency to use emergency response equipment through a series of scheduled or surprise activation should also be put in place. The assigned auditors or inspectors will be required to conduct the inspection or audit; reporting the state of readiness to the management at regular interval.

**Read**

(1) Perry, R. & Lidell, M. (2007). Emergency Planning, New York: Wiley

(2) Kelly, R. (1989). Industrial Emergency Preparedness, New York: Wiley

## 1.6 Maintaining the Personnel Competency

For personnel competency, the emergency planning team needs to maintain the competency and proficiency of the following groups of personnel:

- The designated CERT members, namely the SMC, SIC, and RT-Members in the use of emergency response equipment, and be familiar with the ERP response and intervention procedures;
- The designated IMT members, namely the SMC, ESG-Members in the support functions at the emergency control centre (ECC);
    - Include the ECC-Team that is responsible for the setting up and management of the ECC;
- The designated Evacuation Support Team (EST) members, namely the FSM, EWT-Members in the respective evacuation functions and the setting up of the Emergency Assembly Are (EAA);

- Include the EAA-Team that is responsible for the setting up and management of the EAA and headcount functions.

Planners can plan and schedule for component drills and joint exercises (deployment or table-top exercises) at various levels to validate the objectives of the emergency plan. During the deployment of personnel and equipment, emergency planners need to carryout effectiveness evaluation of the drills and exercises conducted by organising a team of observers/checkers. A checklist of critical tasks and related actions must be documented so that gaps can be identified and training need analysis can be conducted.

# Summary

Study Unit 6: Maintaining Emergency Preparedness would have provided you with essential understanding of the emergency management life cycle, comprising the maintenance requirements for emergency preparedness to be sustained, covering maintenance of organisational (1) risk register, (2) emergency plans, (3) emergency support resources, (4) emergency response equipment, and (5) personnel competency; illustrating how organisations can go about maintaining the state of emergency preparedness.

In summary, this course would have given you a good overview on how to go about preparing workplaces to deal with emergencies and disasters effectively. It should also give you a broad perspective of comprehensive emergency management, enabling you to undertake emergency planner's role, with the essential working knowledge of how to put in place an effective incident management system for the organisations to manage and control emergencies arising from their workplaces.

Although we have come to the end of the course, this is however not the end; just the concluding unit of this course. This in fact marks the beginning for you as prospective emergency planner; there are more to emergency preparedness and response planning!

# Formative Assessment

1. The emergency management life cycle is a _____ process.
    a. Cyclical
    b. Linear
    c. One-time
    d. Seasonal

2. One of the key activities in maintaining and sustaining the emergency management life cycle is to keep the _____ updated and current through continued hazard identification and risk assessment process.
    a. Business plan
    b. Work procedures
    c. Risk registers
    d. Inventory list

3. To keep the emergency plans update, a good practice is to review these documents at six monthly intervals and try to coincide these reviews just after a _____ or drill; where gaps identified and lessons learnt incorporated.
    a. Emergency response training
    b. Table-top exercise
    c. Incident management training
    d. Evacuation training

4. For maintaining the effectiveness of the emergency management life cycle, it is prudent that planners put together _____ for all emergency resource equipment, especially motorised/electrical equipment for preventive maintenance.
    a. Procurement listing
    b. Inspection and maintenance checklist

c. Headcount register

d. List of training courses

5. To maintain the personnel competency, planners can plan and schedule for _____ at various levels to validate the competency level of the personnel.

a. Component drills and exercises

b. Safety training

c. Fire safety inspections

d. Table-top exercises

# Solutions or Suggested Answers

## Formative Assessment

1. The emergency management life cycle is a _____ process.

    a. Cyclical

    **Correct! This is akin to continuous improvement process. Refer to Study Unit 6, Chapter 1.**

    b. Linear

    Incorrect. Emergency management is a cyclical process for continuous improvement. Refer to Study Unit 6, Chapter 1.

    c. One-time

    Incorrect. Emergency management is a cyclical process for continuous improvement. Refer to Study Unit 6, Chapter 1.

    d. Seasonal

    Incorrect. Emergency management is a cyclical process for continuous improvement. Refer to Study Unit 6, Chapter 1.

2. One of the key activities in maintaining and sustaining the emergency management life cycle is to keep the _____ updated and current through continued hazard identification and risk assessment process.

    a. Business plan

    Incorrect. Refer to Study Unit 6, Chapter 1.

    b. Work procedures

    Incorrect. Refer to Study Unit 6, Chapter 1.

    c. Risk registers

**Correct! It is review the hazards and risk that may have changed over time. Refer to Study Unit 6, Chapter 1.**

d. Inventory list
Incorrect. Refer to Study Unit 6, Chapter 1.

3. To keep the emergency plans update, a good practice is to review these documents at six monthly intervals and try to coincide these reviews just after a _____ or drill; where gaps identified and lessons learnt incorporated.

a. Emergency response training
Incorrect. Training only aimed to build the competency level of the CERT. Refer to Study Unit 6, Chapter 1.

b. Table-top exercise
**Correct! This is also a statutory requirement under the Fire Safety Act. Refer to Study Unit 6, Chapter 1.**

c. Incident management training
Incorrect. This is the required training for the SMC and SIC. Refer to Study Unit 6, Chapter 1.

d. Evacuation training
Incorrect. This is the required training for all general occupants. Refer to Study Unit 6, Chapter 1.

4. For maintaining the effectiveness of the emergency management life cycle, it is prudent that planners put together _____ for all emergency resource equipment, especially motorised/electrical equipment for preventive maintenance.

a. Procurement listing
Incorrect. Refer to Study Unit 6, Chapter 1.

b. Inspection and maintenance checklist

**Correct! Refer to Study Unit 6, Chapter 1.**

c. Headcount register

Incorrect. Refer to Study Unit 6, Chapter 1.

d. List of training courses

Incorrect. Refer to Study Unit 6, Chapter 1.

5. To maintain the personnel competency, planners can plan and schedule for _____ at various levels to validate the competency level of the personnel.

a. Component drills and exercises

**Correct! Refer to Study Unit 6, Chapter 1.**

b. Safety training

Incorrect. This is the requirement under the Workplace Safety & Health Act. Refer to Study Unit 6, Chapter 1.

c. Fire safety inspections

Incorrect. This is the requirement under the Fire Safety Act. Refer to Study Unit 6, Chapter 1.

d. Table-top exercises

Incorrect. Refer to Study Unit 6, Chapter 1.

References

CCPS (1995). *Guidelines for Technical Planning for Onsite Emergencies*, Center for Chemical Process Safety, New York: American Institute of Chemical Engineers.

Kelly, R. (1989). *Industrial Emergency Preparedness*, New York: Wiley.

NFPA (2013). *NFPA 1600: Standard for Emergency/Disaster Management and Business Continuity*, Washington: National Fire Protection Association.

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