# CHAPTER 9

# ENVIRONMENTAL MANAGEMENT PLAN (EMP)

## 9.1 INTRODUCTION

The formulation of the Environmental Management Plan (EMP) is a crucial step to ensure that any adverse impacts to the existing environment can be controlled. The EMP provides a framework for dealing with the pollution risks associated with the project site preparation and operation to ensure that appropriate measures are taken to handle issues that have been identified as significant and most likely to arise throughout the whole development. It functions as an effective tool to minimize the environmental impacts that are imposed by the development.

The EMP comprises a structured plan for mitigation of predicted environmental impacts, for Environmental Monitoring and Environmental Auditing. It will be then applicable to all contractors and their employees working in the project site.

The objectives of the EMP are as follows:

- To manage the environmental impacts arising during the proposed project activities
- To ensure the effectiveness of environmental protection/conservation measures
   proposed
- To ensure the project compliance with the overall project environmental objectives

These objectives will be achieved by means of in-place operational controls, environmental monitoring, inspections and auditing activities. The following are specific components of the EMP:

## a) Allocation of Responsibility

This section of the EMP describes all the roles and responsibilities of top-level management and officers. They are responsible in managing the environmental issues of the proposed project site. It will cover the responsibilities of project proponent, project developer and project consultant.

## b) Environmental Regulations

This section of the EMP describes the rules and regulations involved, which the project proponent has to abide by, pertaining to the project. It will at least cover those for water quality, atmospheric emissions, noise level, air, solid wastes and scheduled wastes.

## c) Environmental Monitoring Program

The main purposes of the environmental monitoring program are:

- To provide a database aligned with any short or long term environmental impacts of the project;
- To provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standard.

## d) Audit Program

Audit program represents the efforts of the project proponent with the intention of monitoring the implementation of environmental protection measures by the contractors, as specified in the construction specifications and contract documents. An audit checklist shall be developed and distributed. It will be then briefed to the contractors and all personnel that are responsible for the environmental protection activities. The auditor is an external DOE registered specialist who reports findings on environmental performance to the DOE.

#### e) Remedial Action

This outlines specific construction activities in the proposed project site and address work specifications and codes, and adherence to specific work practices and ethics in order to avoid or minimize any damage and interference to watercourses or drainage systems, utilities, structures, roads or other properties, public or private vehicular or pedestrian access, and trees or any exclusive areas, such as graves, monuments, etc.

## 9.2 MAINSTREAMING OF ENVIRONMENTAL AGENDA AND SELF-REGULATION

#### 9.2.1 Self Regulation (SR)

Self regulation (SR) has been adopted by the Department of Environment (DOE) as a long-term goal to be achieved and a culture to be inculcated within the regulated sectors through mainstreaming of environmental agenda. Environmental mainstreaming has been integrated into all the recent regulations of the DOE. On a wider perspective, self-regulation which complements the existing command and control approach of the DOE, would result in cultivating environmental ownership and excellence in environmental commitment from the regulated sectors.

This section is discusses the roles, functions and core duties of the various players involved in the (SR) in a project development: the Project Proponent, the EIA Consultant, and the Competent Environmental Officer (EO). The project organization chart presents the structure and line of responsibility of key personnel and the organization for environmental management of the project.

Legal responsibility rests on the shoulders of the Project Proponent hence he shall be totally committed towards ensuring regulatory compliance of his project with the EIA conditions at all stages of project planning and implementation. The Project Proponent is the key driver for ensuring the success self-regulation approach in environmental management through the mainstreaming of environmental agenda throughout his project implementation phases. The project proponent shall ensure top-down organizational commitment to environmental regulatory compliance to all personnel, at all levels of the organization, including the registered EIA consultant, the EO, the contractors, and other parties involved in the project implementation.

## 9.2.2 Roles and Core Duties of Different Players

#### a) Project Proponent

The Project Proponent (PP) is not only legally responsible for ensuring regulatory compliance, but is the driver for mainstreaming the environmental agenda in all stages of project implementation. The major roles and responsibilities of the PP include the following:

 Formulating an Environmental Policy (EP) of the company with respect to the EIA project, which shall be communicated to the stakeholders, consultants, contractors and other parties involved in the project planning and implementation.

- 2) Establishing an organizational structure which clearly shows the emplacement of a Registered EIA Consultant and an Environmental Officer (EO), where they are charged with specific responsibilities to ensure environmental aspects are taken into consideration, and pollution prevention and mitigation measures (P2M2) are integrated into every stage of project planning and implementation.
- 3) Allocating sufficient funds for all steps in the EIA process and every stage of project planning and implementation with itemized budget required for water quality monitoring, air quality and noise monitoring, for comprehensive site survey and investigation of the specific existing site conditions, for implementation of Environmental Management Plan (EMP) including temporary pollution prevention and mitigation measures (P2M2). P2M2 shall be those which can be described as state of the art technologies, best available technologies (BATs), or industry best practices.
- 4) Appointing a Competent Environmental Officer (EO), at the stage of post submission of EIA Report to be charged with responsibilities to execute environmental quality control and performance monitoring functions during the construction and operation phases of the project implementation. Service of an EO can also be obtained from an Environmental Officer Service Provider. Service of EO from EO service provider is allowed during the construction stage only. However, at the operational stage, the Project Proponent shall employ his own EO.
- 5) Establishing a project Environmental Performance Monitoring Committee (EPMC) to monitor the environmental performance, effectiveness of pollution prevention and mitigation measures (P2M2), and status of regulatory compliance of the project. The EPMC shall be represented by all relevant parties involved in project implementation and chaired by a senior member representing the Project Proponent. The chairman who shall be formally appointed by the Project Proponent shall be responsible for ensuring the decisions of the meeting are responsibly executed. The EPMC shall meet at a minimum, once in a quarter and the minutes of the meeting shall be maintained.
- 6) Setting up a "mini laboratory", wherever appropriate, to facilitate the implementation of environmental performance monitoring program. This mini laboratory shall be adequately equipped with relevant resources including staff and portable analytic testing equipment.
- Ensuring the Environmental Management Plan (EMP) including temporary and permanent pollution prevention and mitigation measures (P2M2) are implemented and maintained according to industry's best practices.

8) Designate a Project Coordinator who is responsible for environmental matters and will work closely with the environmental consultant and contractor. The Coordinator will report to Project Proponent on a weekly basis.

## b) Project Coordinator

In the event of a breach of the environmental criteria limit or non-conformances observed on site, the Coordinator will be notified immediately. The Coordinator will proceed to implement the necessary remedial action and formally inform Project Proponent on the cause, nature, and extent of breach and the actions taken to rectify the situation. The responsibilities of project developer are as follows:

- To ensure that the Contract Documents include provisions for compliance with environmental requirements. The *Environmental Quality Act, 1974* and other subsidiary legislation and guidelines shall be used as reference.
- To allocate an adequate budget for implementing the EMP.
- To organize a structure for Environmental Management for the Project, with clear defined roles and responsibilities, and reporting mechanism.
- To establish a system to respond promptly to public complaints.
- To review periodically, the overall monitoring program with respect to monitoring locations, frequency, parameters, environmental controls and mitigation measures, and revise if necessary.
- To conduct meetings with the Project Proponent and Contractor to review environmental performance of the proposed works and to identify any improvements in working practices to avoid breaches of limit levels.
- To provide leadership and commitment for the overall implementation of the Blasting Plan and the Operational Excellence Management System in the organization.
- To maintain regular and effective liaison with explosive suppliers, authorities and external parties in the industry to keep abreast of technology and economic development and regulatory requirements.
- To chair the monthly Blasting Plan Review Committee Meetings.

## c) Environmental Consultant

The EMP Environmental Consultant (EC) is an environmental specialist in a field of greatest concern to the proposed project and who would best understand the project being developed, its impacts on the environment and the meaning and correlations between the parameters

obtained from the monitoring results; nevertheless the EC should have enough experience to understand the other potential impacts in other areas as predicted in the EIA. The EC might be consulted on a day to day basis or weekly basis, depending on project type. Should critical issues arise the EC might have to consult other specialist(s) and resources should be allocated for such a situation.

## d) Environmental Officer (EO)

The Environmental Officer (EO) is the main project personnel at site responsible for ensuring day to day regulatory compliance at the project implementation stage (post submission of EIA Report). The roles and core duties of the EO include the following:

- Implementing the environmental management plan (EMP), and installing the temporary and permanent pollution prevention and mitigation measures (P2M2).
- Preparing Environmental Performance Monitoring Document (EPMD). PMD describes in detail how EIA approval conditions are going to be complied and how performance monitoring\* of the various pollution prevention and mitigation measures (P2M2) will be conducted to ensure the optimal functionality of the P2M2 is maintained. The details shall include, among others: performance monitoring equipment/instruments, sampling protocols and analysis, monitoring parameters, sampling frequency, preventive and corrective maintenance procedure for the P2M2, discharge compliance, record keeping, etc. EPMD also includes compliance monitoring (CM) and impact monitoring (IM) wherever relevant.

(\* Note: Performance monitoring in this context refers to the monitoring of certain characteristics that would indicate that a P2M2 is functioning in an optimal manner. It also includes the preventive and corrective maintenance of the P2M2 to maintain their optimal performance. P2M2 refers to all measures to prevent and mitigate pollution and includes temporary pollution prevention and mitigation measures).

 Performing or supervising the conduct of performance monitoring (PM) program as specified in the PMD. Preparing Performance Monitoring Report (PMR). PMR discusses the results of the performance monitoring conducted as described in the PMD. Wherever relevant, PMR shall include data interpretation and assessment of the effectiveness of the pollution prevention and mitigation measures (P2M2) by making comparison of the performance monitoring parameters with their recommended ranges (or standards). Statistical techniques and graphical presentation of the performance monitoring parameters should be used wherever appropriate. PMR shall

also make some definitive conclusions on the overall performance of the P2M2 and suggest improvement measures to be taken if necessary. PMR shall be submitted to the Environmental Performance Monitoring Committee (EPMC) as established by the Project Proponent for the EIA project and maintained for the inspection of the DOE officers.

- Communicating the status of environmental regulatory compliance of the project during development and operation phases to the Project proponent.
- Maintaining a detailed record of major upset conditions encountered, if any, for the duration of the project development and operation phases. The date of occurrence, nature and causes of upset conditions, and the corrective actions taken shall be recorded. Upset conditions refer to failures of pollution prevention and mitigation measures (P2M2) which result in noncompliance with the EIA approval conditions or discharge/emission standards, or pollution that affects the immediate neighbourhood or seriously threatens the environment or public health and safety.
- Acting as an environmental advisor to the Project Proponent in advising him to undertake additional efforts, if any, to further ensure effective implementation environmental management plan (EMP) including temporary pollution prevention and mitigation measures (P2M2) on a sustained basis.

## 9.3 COMPLIANCE MONITORING PROGRAMME (CMP)

## 9.3.1 Preliminary

Monitoring is mandatory at all stages of a prescribed activity, covering the following stages:

- Site preparation
- Construction
- Operation
- Post operation

Monitoring conditions as spelt in EIA approval conditions must be tabulated into an executable format, and becomes an important part of the EMP report for approval by the DOE. An important part of an EMP report is the pledge by the project proponent (PP). Once the EMP report is approved, it becomes a legally binding document between the PP and the Government of Malaysia. The monitoring programme (MP) is budgeted into the contractor's cost. Part of the EO's role is to ensure the contractor closely follows the MP. Adjustment to the MP is not unusual, e.g., where rain events have become more frequent, necessitating higher frequency of monitoring due to sensitive downstream receptor(s). Such adjustment

should be anticipated and appropriately budgeted in as possible variation order (VO) at an agreed rate. The basic MP for this project is given in **Table 9.3(1)**.

Monitoring	Period	Monitoring Location	Parameters of concern	Acceptable values	Frequency
1) Water Quality	During construct ion	At outlet of retention pond and other outlets into public drain.	Total Suspended solids (TSS) & Turbidity (TU)	TSS (<50mg/l) Turbidity (250NTU)	Monthly and after heavy rainfall (>12.5mm)
2) Air Quality	During construct ion	At AQ1 and AQ2	Particulates (24hr averaging time)	As per MAQS2020: PM <sub>10</sub> ≤100µg/m <sup>3</sup> PM <sub>2.5</sub> ≤35µg/m <sup>3</sup>	1/month
3) Noise level	During construct ion	N1(industrial) N2(Suburban me medium density)	Daytime Night-time	N1 70dBA N2 60dBA N1 65dBA	1/month
4) Erosion and slope stability inspection	During construct ion	Along access road and on site.	Eroding patches & Success of revegetation or protection.	Full coverage	1/week
5) Drainage	During construct ion	Drain from SCaRF site entering Sg. Baluk	Deposits in drain/river	No deposits	1/week
6) Solid Waste Managem ent	During construct ion	On site and around its perimeter	Compliance to Solid wastes management SOP	No litter at site	1/week
7) Schedule d Waste (SW) Managem ent	During construct ion & Operatio n	On site and around its perimeter	Scheduled waste management compliance to EQ(SW)R 2005 & reporting.	All SW inventorised and accounted for.	1/month
8) Water Quality	During operation	At Discharge Point from IETS to public drain	30 parameters as in EQ(IE)R2009	Less than Std. B limit values	1/month
9) Air Quality	During operation	At Stacks	Parameters as per CAR2014	Less than values in CAR2014	Continuous via CEMS

#### Table 9.3(1) Monitoring Program for SCaRF

Compliance of monitoring data has to be checked against the following:

## 9.3.2 Water Quality

In rivers and drains, compliance is to classes of water quality for inland surface waters as recommended in the National Water Quality Standards for Malaysia (NWQS) (**Table 9.3(2)**). For effluents, compliance required would be to the emission standards as in **Table 9.3(3**).

DADAMETED		CLASS					
PARAMETER	UNIT	I	IIA	IIB	Ш	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	>2.7
Biochemical Oxygen Demand	mg/l	1	3	3	6	12	>12
Chemical Oxygen Demand	mg/l	10	25	25	50	100	>100
Dissolved Oxygen	mg/l	7	5-7	5-7	3-5	<3	<1
рН	-	6.5- 8.5	6-9	6-9	5-9	5-9	-
Colour	TCU	15	150	150	-	-	-
Electrical Conductivity*	μS/cm	1000	1000	-	-	6000	-
Odour	-	Ν	Ν	Ν	-	-	-
Salinity	%	0.5	1	-	-	2	-
Taste	-	Ν	N	N	-	-	-
Total Dissolved Solid	mg/l	500	1000	-	-	4000	-
Total Suspended Solid	mg/l	25	50	50	150	300	300
Temperature	°C	-	Normal + 2 °C	-	Normal + 2 °C	-	-
Turbidity	NTU	5	50	50	-	-	-
Total Coliform	Count/100 ml	100	5000	5000	50000	50000	>50000
Oil and Grease	µg/l	40	N	-	-	-	-

Table 9.3(2): NWQS for Parameters of Concern

Note: N- Free from visible film sheen, discoloration and deposits

Source: Department of Environment, Malaysia

PARAMETER	UNIT	STANDARD		
		A	В	
Temperature	°C	40	40	
рН	-	6.0-9.0	5.5-9.0	
Biochemical Oxygen Demand	mg/l	20	50	
Chemical Oxygen Demand	mg/l	120	200	
Suspended Solid	mg/l	50	100	
Oil and Grease	mg/l	5.0	10.0	
Ammoniacal Nitrogen (river)	mg/l	10.0	20.0	
Nitrate (river)	mg/l	20.0	50.0	

#### Table 9.3(3): Effluent Discharge for Some Parameters of Concern

Source: Department of Environment, Malaysia

## 9.3.3 Air Quality

Ambient air quality compliance is to the DOE's Malaysian Ambient Air Quality Standard (Table 9.3(4)).

Table 9.3(4): Ambient Air	Quality Standard
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Pollutant	Averaging Time	*IT-1(2020) (μg/m³)
Particulate Matter with the size of less	1 Year	40
than 10 micron (PM <sub>10</sub> )	24 Hour	100
Particulate Matter with the size of less	1 Year	15
than 10 micron (PM <sub>2.5</sub> )	24 Hour	35
Sulphur dioxide (SO <sub>2</sub> )	1 hour	250
	24 hours	80
Nitrogen dioxide (NO <sub>2</sub> )	1 hour	280
	24 hours	70
Ground Level Ozone (O <sub>3</sub> )	1 hour	180
	8 hours	100
Carbon monoxide (CO)	1 hour	30
** mg/m <sup>3</sup>	8 hours	10

Source: Department of Environment, Malaysia

\* Interim Target - 1 (2020)

Emissions of black smoke from diesel powered vehicles and construction equipment must comply with the emission limits specified under the *Environmental Quality (Control of Emissions from Diesel Engines) Regulations 1996.* 

## 9.3.4 Noise Level

Noise generated during construction phase is governed by The Planning Noise Limits and Control. Protection of site personnel from the effect of excessive exposure to noise falls under the Department of Occupational Health and Safety (DOSH) via the *Factories and Machinery (Noise Exposure) Regulations 1989.* The noise emitted from motor vehicles is controlled under the *Environmental Quality (Motor Vehicle Noise) Regulations 1987.* **Table 9.3(5)** presents The Planning Noise Limits and Control.

Table 9.3(5): The Planning Guidelines for Environmental Noise Limits and Control(Schedule 1: Maximum Permissible Sound Level (LAeq) by Receiving Land Use forPlanning and New Development)

Receiving Land Use Category	Day Time 7.00 a.m – 10.00 p.m	Night Time 10.00 p.m – 7.00 p.m
Noise Sensitive Area, Low Density Residential, Institutional (School, Hospital), Worship Areas.	50 dBA	40 dBA
Suburban Residential (Medium Density) Areas, Public Spaces, Parks, Recreational Areas.	55 dBA	45 dBA
Urban Residential (High Density) Areas, Designated Mixed Development Areas (Residential – Commercial)	60 dBA	50 dBA
Commercial Business Zones	65 dBA	55 dBA
Designated Industrial Zones	70 dBA	60 dBA

Source: Department of Environment, Malaysia

## 9.3.5 Solid Wastes Management

Solid wastes are controlled by the *Local Government Act 1976* and *Refuse Collection, Removal and Disposal By-laws* under the Act. The Act enables Local Authorities to prohibit deposition of waste in streams, watercourses and public drains (Section 69). The by-laws specify that commercial and industrial waste maybe collected and disposed of on a fee basis prescribed by local authorities. Contravention of the by-laws is an offence.

The Solid Waste and Public Cleansing management Act 2007 provides and regulates the management of controlled solid waste and public cleansing for the purposes of maintaining proper sanitation and for the matter of incidental. Under section 71 (2) of the Act clearly stated that all controlled solid waste shall be deposited, treated, kept, stored or disposed of only at solid waste management facilities licensed under this Act.

The controlled solid waste means any solid waste falling within any of the following categories:

- a) Commercial solid waste
- b) Construction solid waste
- c) Household solid waste
- d) Industrial solid waste
- e) Institutional solid waste
- f) Imported solid waste
- g) Public solid waste
- h) Solid waste prescribed from time to time

The project proponent will be responsible for ensuring that solid wastes generated on site shall be the domestic waste (worker's quarters and site offices) are properly stored and then transported and disposed of at approved disposal sites.

#### 9.3.6 Scheduled Wastes Management

The management of scheduled waste shall follow the rules and regulations set in *Environmental Quality (Scheduled Wastes) Regulations 2005.* According to this regulation, scheduled waste can be defined as "any waste falling within the categories of waste listed in the First Schedule".

The Regulation 8 (1) describes the responsibilities of the Project Proponent which shall ensure that the scheduled wastes generated are properly stored, treated on-site, recovered onsite for material or product from such scheduled wastes or delivered to and received at prescribed premises for treatment, disposal or recovery of material or product from scheduled wastes.

In addition, the Regulation 9 (1) describes that any scheduled wastes shall be stored in containers which are compatible with the scheduled wastes to be stored, durable and which are able to prevent spillage or leakage of the scheduled wastes into the environment.

These Regulations introduce the "cradle to the grave" waste management concept whereby a historical record is maintained providing documented details of the life-cycle of the waste from its generation through to its ultimate disposal. Specific requirements can be referred at Environmental Quality Act 1974 under Environmental Quality (Scheduled Wastes) Regulations 2005.

## 9.4 ENVIRONMENTAL AUDIT PROGRAM

The environmental audit program is proposed to track and ensure the enforcement of specified environmental protection and pollution control measures. The audit should be undertaken regularly by the audit team to ensure that the appropriate environmental protection and pollution control mitigation measures are properly implemented. The main points of audit program are:

- Include the general environmental conditions in the vicinity of the site
- The pollution control and mitigation measures within the sites
- Environmental condition outside the site area which is likely to be affected, directly or indirectly by site activities

The audit team shall make reference to the following information in conducting the audit:

- The EIA approval conditions from DOE
- The EIA recommendations on environmental protection and mitigation measures

The audit findings and their associated recommendations on improvements to the environmental protection and mitigation measure shall be submitted to the project proponent for immediate action. The contractor shall follow the procedures and time frames stipulated in the environmental audit for the implementation of the mitigation proposal. An action reporting system shall be implemented to report on any remedial measures implemented subsequent to the environmental audit. All auditors must be registered with DOE. Auditor for the construction stage should have the CESSWI Certificate (competency to inspect the sedimentation control plan).

## 9.5 REMEDIAL ACTIONS

As mentioned earlier, the EMP consists of measures that are proposed to mitigate potential adverse impacts through guidelines/procedures to be followed in compliance with the regulations imposed by the authorities. The remedial actions are as detailed in **Chapter 8** of this report.

## 9.6 EMERGENCY RESPONSE PLAN (ERP)

#### 9.6.1 Preliminary

An STP poses dangers, to the workers most notably, due to presence of mechanical equipment, deep water tanks and noxious substances. Thus, an Emergency Response Plan (ERP) is an essential component of the facility's safety and loss strategy. It provides an organized structure for a chain of action to be put into motion in the event of an emergency at the project site. In the context of emergency of the ERP, it is defined as an incident which has the potential to cause injury or loss of life, and/or damage to property and the surrounding environment.

This section of EMP outlines the requirements for the preparation of an ERP for the operational phase of the project. The general outline of this plan is not intended to provide specific details on how to handle potential emergency situations but has been included to highlight the salient areas of concern. Once the project commences operation, this plan shall be used as template or guide for the development of a more detailed site specific plan. A description of various actions need to be taken in response to specific emergencies are discussed below.

#### 9.6.2 Objective of ERP

The main objectives of developing the ERP are:

- a) To establish a formalized emergency team and to control and contain any emergency on site through prompt and effective response measures so that its effect is localized.
- b) To ensure that trapped or injured persons are rescued and given prompt and appropriate medical assistance.
- c) To control the spread of the damage arising from the emergency situation to the environment including the nearest sensitive receptors.
- d) To communicate information on the emergency to the relevant facility personnel and the relevant parties, including the Hospital Emergency Department (ED), Fire and Rescue Department (BOMBA), Police, Department of Occupational Safety and Health (DOSH), Department of Environment (DOE) and the local authority.
- e) To keep information and records for investigation into the incidents/accidents
- f) To restore normality at the project site prior to personnel re-entering the project site after an emergency and resuming work

g) To provide training for all the workers in emergency response management to maintain a high level of preparedness at all times

## 9.6.3 Basis for Emergency Response Plan

The Emergency Response Plan (ERP) is a formal document that identifies the potential emergency conditions at the project site and specifies pre-planned actions to be followed and to minimize property and environmental damages and loss of life. The document specifies the actions the facility's management shall undertake to moderate or alleviate the impact from accidents and contains step-by-step procedures and information to assist in issuing early warning and notification messages to responsible emergency management authorities. An emergency response plan generally contains six main elements (Figure 9.6.(1)).



Figure 9.6(1): Six Elements of Emergency Response Plan.

The elements shown are elaborated below:

## a) Identification of Possible Emergency Situations

An emergency identification exercise is to list emergency or hazard or abnormal situations resulting in the operation of the project. From the exercise, the high and medium risks can be identified and the possible incidents documented. The emergency response actions relevant to each of these hazards will be the focus of the emergency planning exercise.

#### b) Notification Flow Chart

A notification flowchart indicates the nominated persons who are to be notified during the emergency and in the order of priority. The information presented on the flowchart is needed to ensure the timely notification of persons responsible for handling the emergency situations.

## c) Emergency Detection, Evaluation and Classification

Early detection and evaluation of the situation(s) or triggering event(s) that initiates or requires an emergency action is crucial. The establishment of procedures for reliable and timely classification of an emergency situation is necessary to ensure the appropriate course of action is taken based on the urgency of the situation.

#### d) Responsibilities of Personnel in an Emergency

A clear definition of the responsibilities of personnel for ERP related tasks must be determined during the formulation of the plan. Project manager or facility operators are responsible for developing, maintaining, managing and implementing the ERP.

The Federal and local emergency management officials have the statutory obligations for warning and evacuating affected areas. The ERP must clearly specify the responsibilities of operator and when/how those responsibilities are transferred to government officials, to ensure timely and effective action.

## e) Emergency Awareness

Actions of the ERP are taken to moderate or alleviate the effect of a potential situation and facilities responses to the situations.

## f) Impact Zone Maps

Impact zone map delineates the areas that could be affected as a result of accidental events at the project site. Impacted zone maps are used both by the project manager and emergency management officials to facilitate timely notification and evacuation of areas affected by accidental events.

## 9.6.4 ERP for the Project

#### a) Organization

Within the facility management, a health, Safety and Environmental (HSE) committee has to be established to ensure all issues related to safety, health and environment pertaining to the facility, employees and surrounding environment, are adequately incorporated into the actual implementation of the ERP. However, the setting up of the committee is dependent on the number of persons employed at the facility. If the number is below 40, then the formation of the committee is not required by law.

Upon agreement or acceptance of the proposed ERP by DOE and DOSH, the HSE committee shall ensure that all personnel are familiar with the plan. To ensure workability of the plan, training sessions and regular rehearsals by means of drills have to be conducted.

## b) Establishment of 'Local Response Team'

A 'Local Response Team' may be established through the initiation of the nominated HSE Committee. The team would comprise of the relevant from the project proponent, government agencies and local authorities such as the local BOMBA (Fire and Rescue Department), DOSH (Department of Occupational, Safety and Health) and DOE (Department of Environment).

#### c) Types of Emergency

An emergency is an unforeseen combination of circumstances that disrupts normal operating conditions and poses a potential threat to human life, health and property or the environment if not controlled, it has to be contained or eliminated immediately. Generally, emergencies in the project facility areas can be categorized into the following **(Table 9.6(1)).** 

	TYPE	COMMON CAUSE
1)	Fire	Caused by equipment malfunction
2)	Explosion	Caused by equipment malfunction
3)	Rescue	A worker is trapped and has to be rescued to save him/her
4)	Spillage	Involves a highly toxic or reactive compound or flammable materials.
5)	Disasters	Structural collapse, etc

Table 9.6(1) Types of Emergencies in a plant

## d) Emergency Classification Levels

Emergencies are classified according to their severity and urgency. An emergency classification system is one means of classifying emergency events according to the different times at which they occur and to the varying levels of severity.

The emergency classification level for the types of emergencies described in the previous section can be further divided into three (3) levels of response. This three level system is proposed as a general principle to activate the type of emergency response and is listed below:

## LEVEL 1 (LOCAL LEVEL)

This is an emergency situation where only the transfer stations operations personnel would be required to manage and control the emergency. Level 1 emergency would normally call for the station's own resources and equipment for the response.

## LEVEL 2 (AREA LEVEL)

This is an emergency situation which requires action and management by the combined efforts of the in-house transfer station's response teams or any of the relevant government agencies (e.g. BOMBA).

## LEVEL 3 (DIVISIONAL LEVEL)

This is an emergency situation where a Level 2 emergency has escalated into an uncontrolled situation and has resulted, or would result in, loss of many human lives, extensive property or environmental damage, and has reached a scale that is beyond the control and capabilities of all response teams combined. Consequently an Evacuation action plan is then needed to be activated.

# 9.6.5 General Responsibilities of On Scene Commander (OSC) and Emergency Response Team

The purpose of having a nominated emergency response team is to take immediate action to combat the emergency at local level (Level 1). In the event the emergency escalates to Level 2 or 3, the emergency response has to ensure proper actions are taken to control the emergency while waiting for the arrival of external assistance, such as from BOMBA and other external aids.

The emergency response team is led by an On Scene Commander (OSC). The OSC is usually a general officer who has operational control of emergency response forces and supervises all on-site operations at the scene of the accident. He is the responsible person for all decisions relating to the management of the incident. As an OSC, he should be well versed with the plant's operation and must have in-depth knowledge on occupational safety and health. The general responsibilities of an OSC during an emergency are as follows:

- To ensure all emergency response team members are assembled at predetermined location according to their respective responsibilities.
- To assess information and the situation, and decide on the actions to be taken as outlines in the response flowchart.
- To approved changes to the response plan during the event, if necessary.
- To direct the orderly evacuation of personnel not involved in the emergency response to a safe place.
- To ensure that all personnel are accounted for and coordinate search and rescue.
- To decide raising alarm for external assistance in the event the emergency escalates from Level 1 to Level 2 or 3.
- To coordinate between the team members and the sub-team members.
- To coordinate efficient hand over of firefighting, area containment or other responsibilities upon the arrival of external assistance such as BOMBA.
- To assist the external assistance team(s) to combat the emergency event as whenever required.
- To ensure that the incident is recorded and reported to the HSE committee and the necessary government agencies, such as BOMBA, DOSH and DOE.

Typical emergency team members shall acknowledge his/her responsibilities as an emergency response member having pertinent duties and responsibilities in the event of an emergency situation. For each designated position in the team, there should be at least one (1) name assigned and two (2) others as standby.

For this project in particular, the following sub-teams are to be established as part of the emergency response team.

## • Fire and Explosion Fighting Team

The Team members should comprise of employees that are familiar and trained for firefighting. Preferably, the team members should be experienced in handling the firefighting equipment.

## • Security Control Team

During an emergency event the Security Control Team will be responsible to maintain order at the premises and ensuring security at all time. This is crucial as there may be presence of outsiders on the site during the emergency event. Some of the responsibility of the Security Control Team is to prevent unauthorized entry during the emergency, control of vehicle movement and providing access to external assistance team(s), take head counts and conducts search and rescue, if needed.

#### • First Aid Team

The First Aid team members shall be ideally personnel with basic knowledge of First Aid and CPR. In an emergency event, the First Aid Team will be required to provide immediate first aid to injured persons while waiting for the arrival of ambulance, depending on its necessity.

#### Communication Team

The communication Team assumes the role of team coordination and providing instructions through the command of OSC. The main responsibility of the team is to ensure the instructions are correctly and timely conveyed to the right party during an emergency. The team will record instructions conveyed out by OSC and received from all parties.

## • Restoration/Remediation Team

The Restoration/Remediation Team is responsible for the recovery of any losses and damages caused by the incident. After overcoming the emergency and the situations has been secured, the team will investigate the cause of the incident and estimate the damages and losses. It is also the team's duty to propose remedial steps to restore the affected area (with the collaboration of government agencies if required) and proposed the mitigation measures to prevent future occurrence.

The personnel selected for the various teams named above may comprise of the same persons but it is important that they understand their function in each specific contingency team.

## 9.6.6 Emergency Equipment

An emergency response plan must be based on realistic assessment of the availability of the emergency response facilities and equipment. To ensure that the Emergency Response Team is able to control an emergency situation, the team has to be fully equipped by proper facilities and dedicated equipment. It is the responsibility of the Facility Manager with the assistance of HSE committee to ensure its efficiency.