

PETRONAS TECHNICAL STANDARDS

HEALTH, SAFETY AND ENVIRONMENT

ENVIRONMENTAL INCIDENT PREVENTION AND CONTROL IMPLEMENTATION GUIDE

PTS 60.3007

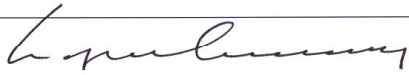
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PREFACE

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1.0 INTRODUCTION

Managing incidents is an essential part of PETRONAS's HSE Management System (HSEMS). As represented in **Figure 1** below, environmental incidents can be prevented and/or minimised if appropriate proactive controls are in place. If however, an incident did occur, effective reactive controls can help minimise the impact to the environment. Both proactive and reactive controls are therefore needed to manage environmental incidents.

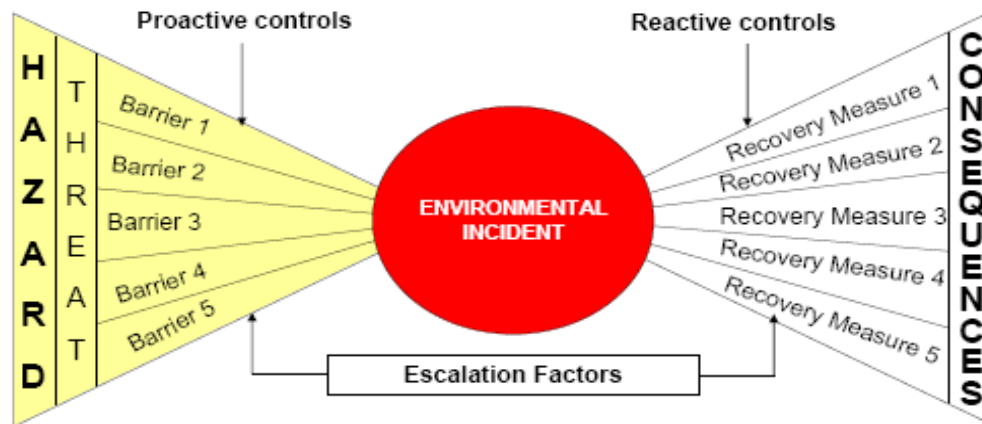


Figure 1 – 'Bow Tie' Diagram

In order to proactively conserve the environment, all PETRONAS Operating Units (OPUs) shall identify potential environmental hazards, rank them according to severity and put in place appropriate preventive and control measures. In doing so, PETRONAS can reduce the occurrence of environmental incidents, hence the risk of polluting the environment.

Environmental aspect is an element of an organisation's activities, products or services that can interact with the environment. Environmental hazard is an environmental aspect that can result in environmental incident in the absence of, or failed barrier. Environmental aspects such as energy, water raw material consumption are not considered as environmental hazards.

1.1 Purpose

The purpose of this document is to provide guidance to PETRONAS OPUs to prevent and control environmental incident.

1.2 Objective

The objective of initiating an Environmental Incident Prevention and Control (EIPC) program is to prevent, reduce and control environmental incidents at operating sites.

1.3 Definition of Environmental Incidents

In the context of this guideline, environmental incidents include:

- Oil Spill
- Chemical Spill
- Hazardous Waste Spill
- Hazardous Gas Release
- Obnoxious Odour Release
- Effluent Discharge Exceedance
- Air Emission Exceedance

Refer to the glossary in Appendix 1 for details.

For incident reporting purposes,

- All loss of containment of liquid hydrocarbon and hydrocarbon-based substances are classified as “oil spill”
- All loss of containment of liquid non-hydrocarbon-based substances are classified as “chemical spill”
- All loss of containment of gaseous substances are classified as “gas release”
- All exceedance to legal limits are classified as “legal non-compliance”

Environmental incidents from moving vessels are not included in this guideline.

1.4 Reference Documents

- PETRONAS Technical Standard 60.0401, Guideline on Hazard and Effect Management Process
- PETRONAS Technical Standard 60.2004, Hazard Identification
- PETRONAS Technical Standard 60.2209, Hazards and Operability Study
- PETRONAS Technical Standard 60.2204, Process Hazard Assessment
- PETRONAS Technical Standard 60.3202, Environment Aspect and Impact Guidelines
- PETRONAS Technical Standard, Group HSE MS Manual
- EHR Methodology Training Material - ABB Engineering Services

2.0 EIPC MANAGEMENT PROCESS

An overview of EIPC management process is depicted in **Figure 2** below. The process begins with the establishment of a proper environmental incident management policy, either as a stand-alone or incorporated within the existing HSE policy. The environmental incident management policy shall be endorsed and supported by the top management.

The setting of objective and targets for environment incident reduction should make reference to historical data on environmental incidents. Therefore, the next step is to compile and analyse environmental incidents data for a minimum of five operating years (recommended). The objective and targets should be achievable with realistic targets toward zero environmental incidents.

The allocation of appropriate resources such as the identification of roles and responsibilities, manpower requirement, training needs and budget for capital investment in equipment are necessary for the effective management of environmental incidents. Each OPU shall identify EIPC Management roles and responsibilities in the organisation. An EIPC team should be championed by a member of the top management (e.g. MD/CEO, Plant Manager, General Manager) to demonstrate leadership commitment.

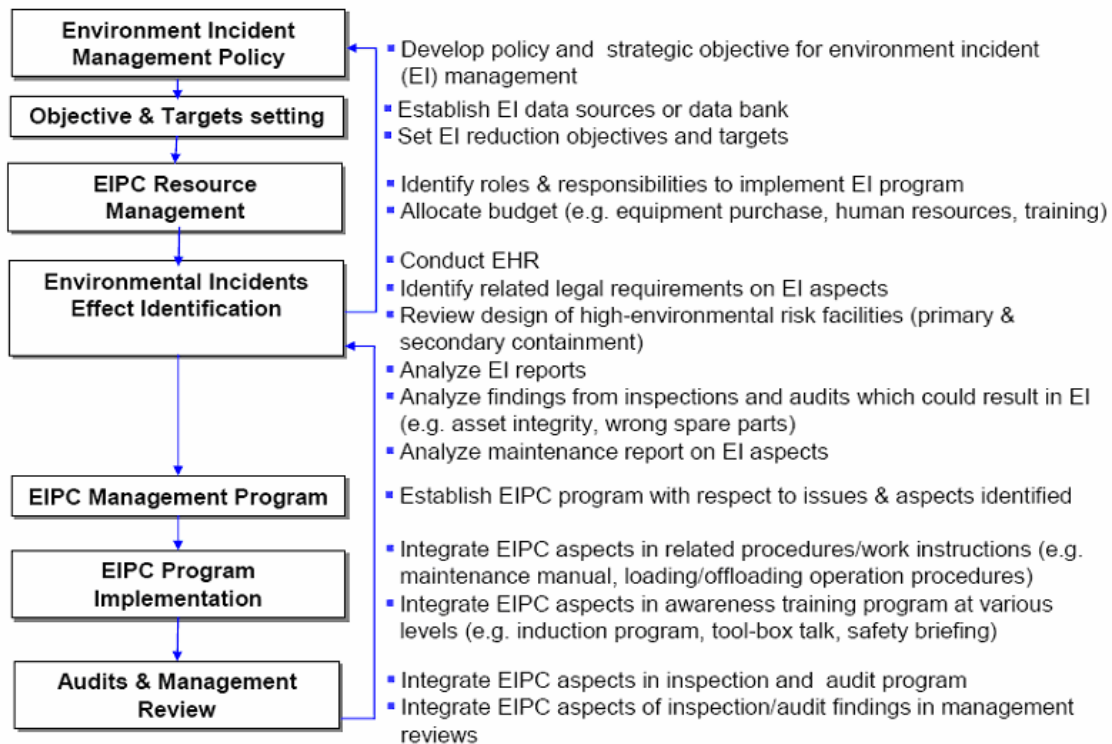


Figure 2 – Overview of EIPC Management Process

The responsibility of the EIPC management team may comprise the following;

- develop and communicate site EIPC program
- monitor and review EIPC program for continuous improvement
- develop or incorporate EIPC checklist
- close all inspection and audit findings with respect to EIPC
- allocate budget (EHR study, equipment purchase and human resources)

The effect of environmental incidents can be identified through the conduct of Environmental Hazard Review (EHR). The identification of environmental incident effects include the following reviews and analysis;

- design and operations of high environmental risk facilities
- related legal requirements
- common causes of environmental incidents
- inspections and audit findings featuring potential environmental incidents (e.g. asset integrity, equipment/devices/gadget (wrong, low quality (Non OEM)), incompatible)
- operations and maintenance procedures and reports on environmental incidents aspects

Based on the findings of the EHR, an EIPC programme can then be developed. The implementation of the EIPC programme can take various forms:

- integration of EIPC aspects in procedures or work instructions
- integration of EIPC aspects in awareness training programmes including induction course for employees and site contractors, EIPC reward program
- tracking of all items identified in EHR audits
- communication of lesson learnt from environment incidents
- installation of additional control measures

The cycle of management process is then completed with audits and management review.

3.0 ENVIRONMENTAL HAZARD REVIEW (EHR)

EHR is a systematic assessment of severity of hazardous substances in relations to appropriate receptors as a function of its eco-toxicity and chemical properties as well as the corresponding pollution pathway. The main factors to take into account are:

- The scale and nature of the hazard presented by the site and its activities
- The risks to areas of population and the environment (receptors)
- The nature of the site and complexity of the activities and the relative difficulty in deciding and justifying the adequacy of the risk control techniques.

The operational activities to be reviewed comprise the normal, abnormal and emergency conditions.

An EHR can be incorporated into a Process Hazard Review (PHR) or a HAZOP study.

3.1 Management of EHR Study

3.1.1 EHR Team

The EIPC Champion shall appoint a team leader to conduct the EHR Study. A Typical composition of an EHR team is four to five people comprising;

(i) EHR Team Leader

An EHR team leader shall be well-versed in Engineering or Operation/Process of the site, and HSE matters. The team leader shall be trained in EHR methodology.

The team leader shall;

- facilitate team in EHR methodology
- provide a comparison with best industry practices
- politely challenging from background of:
 - professional knowledge
 - experience, independence and credibility
- exhibit chairmanship skills
 - encourage team
 - control contributions
 - regulate speed
 - challenge assumptions
- ensure that adequate records are kept

(ii) Senior Process Engineer

(iii) Plant supervisor or operator

(iv) Engineering supervisor

(v) Environmental executive at site

(vi) Environmental Management Technical Professional (EM TP) who shall take the following roles:

- independent from Plant Operating Team
- provide an in depth knowledge of environmental consequence
- knowledge of environmental policy, guidelines and standards
- provide an independent view
- knowledge of environmental issues

3.1.2 EHR Information Gathering

It is necessary to gather the following site information prior to the conduct of an EHR:

- Group/company HSE Policy
- Aspect Impact Register
- HSE Legal Register
- Environment management system manual
- Reasonably up to date set of P&IDs
- Hazards information on all chemicals, e.g. MSDS
- Plot plan & Site map showing vulnerable locations
- List of process related accidents/incidents on plant
- Design manual including equipment specifications
- Operating and maintenance procedures
- Previous environmental related reports

3.1.3 EHR Timing

The recommended timing for EHRs:

- 4 hours formal study per day with a maximum of 3 meetings per week
- A typical plant averages 1 process section per day
- extra time needed for multistage batch plants
- reduced time for similar process sections, e.g. parallel trains

Meetings should be programmed to maintain momentum.

3.1.4 EHR Management Process

EHR Team Leader will call for the formation of the EHR team, preferably using internal resources. The EHR team is advised to use assessment methodology and format provided in this guideline. In the case where there is no EM TP in the team, the team leader is recommended to organise peer review with at least one EM TP within the Group. The EHR team leader shall seek endorsement from the EIPC Champion.

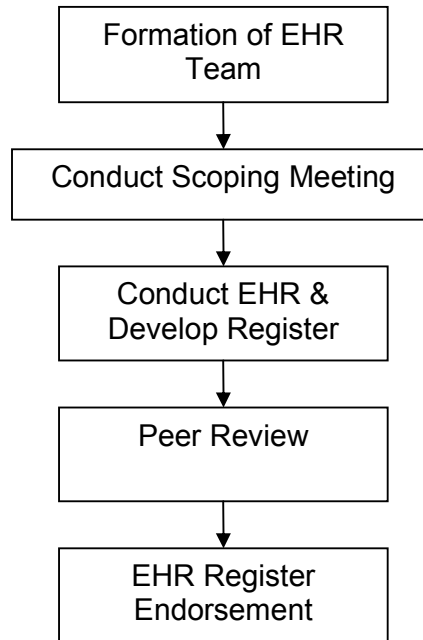


Figure 3 – EHR Management Process

3.2 EHR Scoping Meeting

It is important to conduct a scoping meeting prior to the actual conduct of EHR. The meeting may be used to achieve the following objectives:

- To establish roles and responsibilities of the team members
- To clarify objective of the study
- To define the areas or sections of the site to be included in the study
- To obtain information of environmental receptors within an agreed radius (e.g. within 10 km of site)
- To obtain information of external factors such as extreme weather historical evidence, subsidence/landslides, previous land use, major hazard installation, air traffic movements, shipping routes, major transport routes, security breaches, environmental incidents and near-miss reports, etc.
- To obtain environmental properties of chemicals/substances used, stored, processed, produced on site and substances transported, and disposed on or offsite

Templates for Scoping Meeting and the Environmental Properties Record are made available in **Appendix 1 and 2**, respectively.

3.3 EHR Methodology

EHR consists of a structured six-step process where an overview is represented in **Figure 4** below.