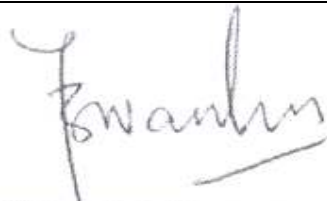


**PETRONAS GROUP  
MINIMUM ENVIRONMENTAL MANAGEMENT  
STANDARDS  
IMPLEMENTATION GUIDE**

PTS 60.3006

**June 2007**



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PETRONAS Group  
Minimum Environmental Management Standards  
Implementation Guide  
Amendment Record Sheet

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## ACKNOWLEDGEMENT

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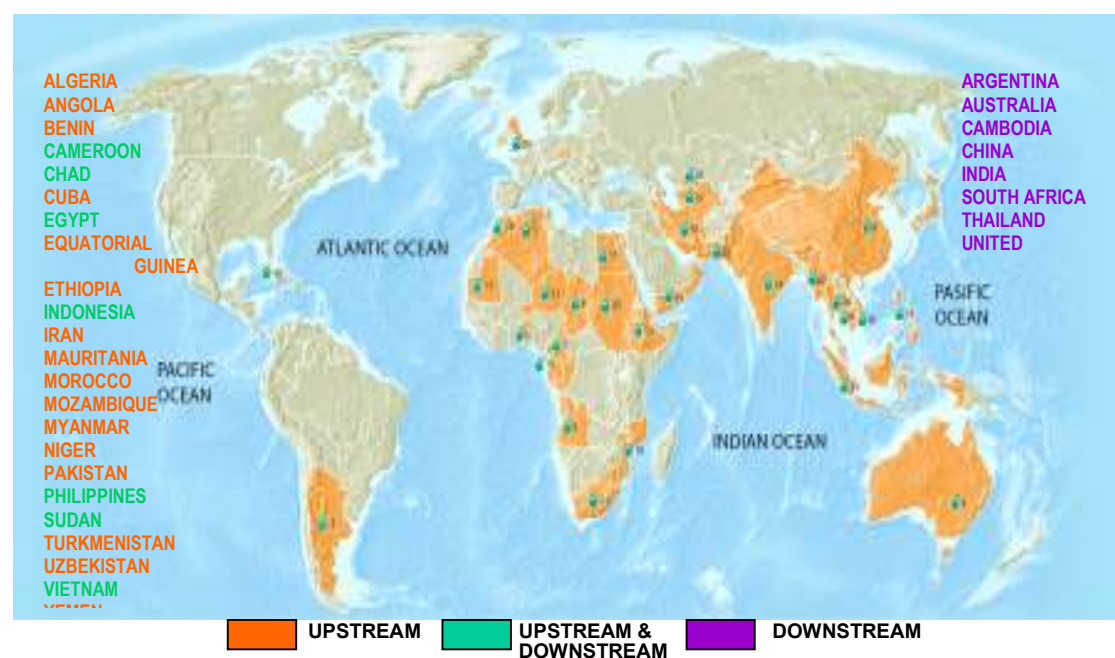
## 1.0 INTRODUCTION

PETRONAS Group Minimum Environmental Management Standards (MEMS) is a set of standards that PETRONAS Group of Companies adopts for implementation in all its operating units (OPUs) to ensure consistent practice that endeavours to protect, conserve and minimize impact to the environment.

## 1.1 BACKGROUND

PETRONAS Group of Companies is currently operating in more than 30 countries across the globe where environmental related national regulations and practising standards differ.

Figure 1: PETRONAS Worldwide Operations



Some of its OPU is more established than the other in terms of environmental management and the environmental management practices differ in one way or the other. The Group finds it appropriate to establish a set of “Minimum Environmental Management Standards” for its operations worldwide as one of its strategic approaches to sustainable development.

## 1.2 CONCEPT

MEMS are group requirements for its OPUs. They are set by the Group Health, Safety & Environment Division (GHSED) for all OPUs to implement and comply with.

OPUs are, however, encouraged to set specific environmental goals (EGs) which are appropriate to the nature of the site operations, over and above the MEMS. Environmental Goals (EGs) are voluntary in general and may be mandatory for specific OPUs operating in particular country/region. EGs are set by respective OPUs.

## 1.3 OBJECTIVES

Many of the MEMS elements are not new to PETRONAS OPUs, especially for the more established OPUs. The implementation of MEMS shall ensure consistent approach for all PETRONAS OPUs to meet a common and minimum standard.

Implementation of a common standard shall enable PETRONAS to make inventory, reference and reporting at group level. It also acts as a baseline for PETRONAS OPUs to strive towards environmental excellence by achieving beyond the MEMS and meeting environmental goals set forth by

each operation/plant, while taking proactive steps towards conservation of the environment.

PETRONAS shall then use this as a foundation to influence its Joint Venture Partners\* in the implementation of MEMS for their operations

[ \* At this stage, the Joint Venture Partners exclude the Upstream Production Sharing Contractors (PSCs) ]

## 1.4 CRITERIA

MEMS are developed based on a set of criteria, viz.:

- a) Common environmental issues in petroleum industry due to large emissions (e.g. CO<sub>2</sub>), consumption (e.g. energy) or potential impact o the environment (e.g. oil spill)
- b) Key stakeholders' concerns e.g. SO<sub>x</sub> and NO<sub>x</sub> emissions, bio-diversity conservation
- c) Data collection capability & availability – OPU's are able to collect data without much difficulty

## 1.5 DEVELOPMENT PROCESS

Extensive research and benchmarking against industrial best practices; and stakeholders consultation were conducted in order to develop the elements of MEMS. The MEMS has been endorsed by PETRONAS Health, Safety & Environment Committee in March 2007.

Figure 2: MEMS Development Process



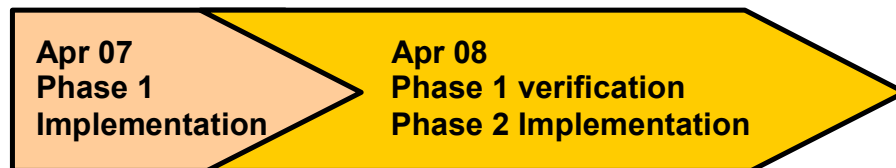
## 1.6 IMPLEMENTATION SCHEDULE

The MEMS shall be implemented in phases. Phase 1 implementation is made effective April 2007. Later phases shall be developed and implemented when the relevant guidelines are made available and when the phase 1 implementation status are reviewed and assessed.

The implementation of phase 1 MEMS shall be verified under the Tier 3 Assurance Program commencing from 2008.

Phase 2 implementation shall commence from 2008 and beyond.

Figure 3: Implementation Schedule



## 2.0 MINIMUM ENVIRONMENTAL MANAGEMENT STANDARDS

The MEMS elements are developed based on project life cycle:

1. Project phase - 2 MEMS: 1 for new project development (green field) and 1 for facilities acquisition or merger (brown field)
2. Operation phase – 11 MEMS

3. Exit/Decommissioning phase – 2 MEMS: 1 for transfer of facility and 1 for decommissioning of facility

## 2.1 MEMS for Project Phase

### Phase 1

Project managers are required to assess the need to conduct Environmental Impact Assessment (EIA) in accordance to the PETRONAS Group project EIA List (Appendix 1). Every EIA shall be accompanied by an Environmental Management Plan (EMP).

### Phase 2

Asset acquisition team shall ensure appropriate due diligence, including the environmental aspects as established in the “HSE Due Diligence Guidelines” be conducted prior to the acquisition.

Table 1: MEMS for Projects Phase

| Aspect                                                                        | Phase 1                                                                                                                                           | Phase 2                                                                                               |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Project Development/ Asset Acquisition</b>                                 |                                                                                                                                                   |                                                                                                       |
| Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) | Conduct Environmental Impact Assessment (EIA) and establish Environmental Management Plan (EMP) In accordance to PETRONAS Group Project EIA list. |                                                                                                       |
| Environmental Due Diligence                                                   | PTS on “HSE Due Diligence Guidelines” is being developed.                                                                                         | Conduct Environmental Due Diligence prior to all hand-over of asset, or merger and acquisition (M&A). |

## 2.2 MEMS for Operating Phase

MEMS for operating sites are developed under four (4) areas viz.:

1. Management system – each OPU shall have in place an effective management system for managing environmental aspects in its operating sites
2. Common pollutants and waste streams – each OPU shall monitor and reduce the emission loading of greenhouse gases (GHG) i.e. carbon dioxide (CO<sub>2</sub>) and methane gas (CH<sub>4</sub>) and the emission of acid gases i.e. sulfur oxides and nitrous oxides (SO<sub>x</sub> and NO<sub>x</sub>). Operational oil discharges through effluent water systems and incidental oil releases from the operating sites shall be monitored. Effort shall be made to prevent and control spills in future. The generation of hazardous wastes shall also be monitored and reduced
3. Natural resources - conservation of energy, freshwater and biodiversity
4. Social responsibility – sponsorship of community projects for the development and wellness of communities around the vicinity of operating facilities

### Phase 1

OPUs shall monitor air emissions loading of two types of (2) common air pollutants from PETRONAS operations. viz. greenhouse gases (GHG) and acid gases (SO<sub>x</sub> and NO<sub>x</sub>) at source. Refer to Appendices 3 & 4 for details.

Operational effluent discharge loading of oil & grease shall be monitored as well as the incidental discharge of liquid hydrocarbon (oil and condensate). Refer to Appendices 5 & 6 for details.

The generation of hazardous wastes, which, in Malaysia are mostly regulated as “scheduled wastes” under the Environmental Quality

(Scheduled Waste) Regulations 1989 and its amendments, shall be monitored by weight in tonne. Refer to Appendix 7 for details.

Monitoring of energy efficiency and freshwater consumption are required during the phase 1 MEMS implementation. Refer to Appendices 8 & 9 for details.

## Phase 2

For phase 2 implementation, OPUs are required to integrate ISO 14001 EMS into the HSEMS as per the guide developed by GHSED. This guide shall be distributed to OPUs by 2008.

Each operating site shall account for its GHG emission, while those with significant GHG emissions shall establish a GHG emission reduction program.

OPUs shall conduct risk assessment for large emitters of SO<sub>x</sub> and NO<sub>x</sub> and provide prevention, control and abatement measures as appropriate.

OPUs shall conduct risk assessment studies for areas with high loading of oil & grease in the effluent and provide prevention, control and abatement measures as appropriate.

OPUs with high oil spill incidents shall implement oil spill prevention & control measures.

In addition to monitoring hazardous wastes generation, OPU shall proactively minimize wastes using 3Rs principles.

All existing land-based sites with bulk storage facilities for crude oils/ products/ fuels/ chemicals shall have in place a groundwater (GW) monitoring program. Refer to Appendix 10 for details.

OPUs operating in water-scarce areas are required to set target to reduce freshwater consumption.

OPUs with more than 3 years of production history shall sponsor at least 1 bio-diversity conservation project or at least a community project. Refer to Appendix 11 for details.

Table 2: MEMS for Operating Sites

| Aspect                                             | Phase 1                                                                                                                                                                                      | Phase 2                                                                                                                   |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Management System</b>                           |                                                                                                                                                                                              |                                                                                                                           |
| EMS                                                | Integration guide is being developed by GHSED                                                                                                                                                | To integrate ISO 14001 EMS elements (aspect & impact and objectives and targets setting) into HSEMS.                      |
| <b>Loading of Common Pollutants /Waste Streams</b> |                                                                                                                                                                                              |                                                                                                                           |
| Greenhouse Gases (GHG)                             | Monitor emissions loading of carbon dioxide (CO <sub>2</sub> ) & Methane (CH <sub>4</sub> )<br>Inventorize and identify main sources for reduction.<br>Implement ELMS to reduce GHG emission | Promote CDM projects to reduce GHG emissions.<br><br>Set target to reduce continuous methane venting                      |
| Acid gases (SO <sub>x</sub> , NO <sub>x</sub> )    | Monitor emission loading for SO <sub>x</sub> , NO <sub>x</sub> at source                                                                                                                     | Identify large emitters of SO <sub>x</sub> and NO <sub>x</sub> .<br>Conduct risk assessment studies for areas of concern. |
| Oil                                                | Monitor oil and grease loading for all operational effluent discharges<br>Monitor number and volume of oil spill                                                                             | Identify/ conduct risk assessment studies for areas with high loading<br>Implement spill preventive & control measures    |
| Hazardous Waste                                    | Monitor amount of hazardous waste generated                                                                                                                                                  | Implement Waste Minimization Program (a systematic waste reduction program using the 3Rs principles)                      |