IMPAK

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HIGHLIGHTS

The haze that affected Malaysia and the region, especially during the months of July to September, 1997, was the most serious haze occurence experienced by the region. An estimated 300 million people in an area of about 2 million sq. km. covering Malaysia, Singapore, Indonesia, Brunei Darussalam, Thailand and parts of the Philippines, were seriously affected. The impact of haze on the health of the people of these countries, as well as on the economy, tourism, ecology and others, has yet to be determined.

Puan Che Asmah Ibrahim
Cik Muslina Sulaiman
Air Monitoring/International Unit

Under the Regional Haze Action Plan, ASEAN countries agreed to develop their respective National Haze Action Plan which encapsulated policies and strategies to prevent and mitigate land and forest fires in the region.

Malaysia's National Haze Action Plan was conceived primarily:

(a) to prevent and control identified subsectoral activities which are contributory to haze episode through better management policies and enforcement;

(b) to enhance operational mechanism to monitor air quality, its reporting and dissemination of information; and

(c) to strengthen intra agency cooperation and support for detection, surveillance and combating haze.

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FROM THE DG'S DESK

Hjh. Rosnani Ibarahim
Director-General
Department of Environment

This time last year, we faced the worst ever haze in the environmental history of the region, affecting the health and livelihood of some 300 million people in Malaysia, Indonesia, Singapore, Brunei Darussalam, Thailand and parts of the Philippines. Very often, a crisis sets the tone for actions to be implemented, and the one positive outcome of this environmental disaster was that the affected countries set out to address the problem of haze arising from land and forest fires and prevent them through better management policies and strategies development.

Various cooperative measures were adopted by the ASEAN member countries and these are outlined in the framework of the Regional Haze Action Plan which was agreed upon by the ASEAN Environment Ministers in Singapore on 22-23 December 1997. While some member countries have already developed their national policies and strategies, others are formulating theirs based on their own requirements and priorities.

Malaysia's National Haze Action Plan covers strategies to prevent air pollution from domestic, industrial and other activities. Preventive programmes are also being implemented throughout the year. Inter-agency coordination including communication and data link between DOE, and Departments such as the Ministry of Health, Police, Local Authorities and the Road Transport Department, are, too, being strengthened. Public awareness, education and feedback are also being carried out through information dissemination via the distribution of educational pamphlets and also through various channels of the mass media, which, in particular, has been an effective tool of reaching a larger section of the population.

Suffice to say that a clean environment is achieved not only by a set of plans, but also through a committed effort from each one of us. Protecting our environment is the responsible of everyone.

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Among the policies that have been established and implemented are :-

(i) Open burning of industrial wastes, construction wastes and at waste dumping sites are prohibited;

(ii) Agricultural waste disposal through open fires will be strictly controlled and to be prohibited during haze period; and

(iii) Smoke and particulate emissions from mobile sources (motor vehicles) and stationary sources (industries) will be strictly controlled and monitored.

In terms of programmes and activities to mitigate haze, enforcement of legislations such as Environmental Quality (Clean Air) Regulations 1978, Environmental Quality (Control of Emissions From Petrol Engines) Regulations 1996, Environmental Quality (Control of Emissions From Diesel Engines) Regulations 1996, are stepped up. Public awareness and educational campaign against open burning are accelerated nation wide.

Institutional cooperation were strengthened by establishing National, State and District Haze Committees, and improving communication and data link up amongst Department of Environment, Road Transport Department, Fire Services and

Rescue Department, Police, Local Authorities and Ministry of Health.

The plantation industries are asked to target for zero burning on their agricultural wastes generated. Controlled burning are strictly monitored and minimised whilst waste recycling and utilisation for those with economic market (e.g rubber) is further encouraged.

A National Committee on Haze was formed to formulate strategies and response plans to control and mitigate the impact of the haze. Chaired by YB Datuk Law Hieng Ding, the Minister of Science, Technology and Environment, with representatives from relevant ministries and agencies, the National Haze Committee works closely with the National Committee on Disaster Relief and Management for emergency management resulting from haze, e.g. haze action lines, health care centres and medical suppliers and evacuation centres.

Under the National Haze Action Plan, further prevention programmes were introduced to detect early outbreak of fires, including aerial surveillances on fire prone areas such as the peat swamps, inspections of solid waste dump sites, plantation and construction sites.

The monitoring of Air Pollutants Index (API), was being intensified. All air pollution monitoring stations were operating daily and in addition samples were collected from selected stations for chemical analysis.

The ASEAN member country set out cooperative measures to address the problem of haze in the region arising from land and forest fires by adopting the Regional Haze Action Plan (RHAP), on 22-23 December 1997 in Singapore.

The primary objectives of the plan are :

(a) to prevent land and forest fires through better management policies and enforcement;

(b) to establish operational mechanisms to monitor land and forest fires; and

(c) to strengthen regional land and forest fire fighting capability and other mitigating measures.

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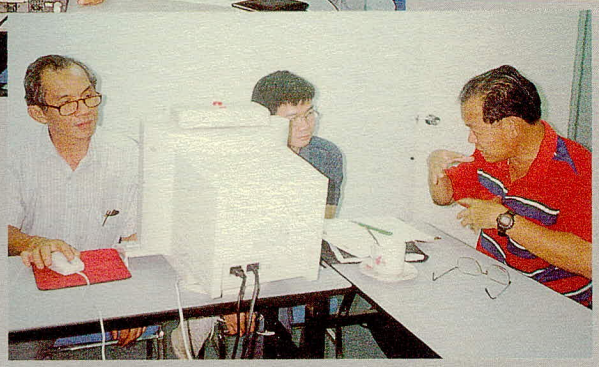
Environmental Management and Research Association of Malaysia (ENSEARCH) has been playing an important role in the efforts of environmental management and research in Malaysia for the past 12 years. To further implement the set of programmes that was identified in its strategy plan in 1996, ENSEARCH had embarked on a new project to set up an environmental information database. Initial idea of the project was conceptualised at the end of 1997.



THE MALAYSIAN ENVIRONMENT INFORMATION NETWORK (MEI-Net)

ENSEARCH

Seminar on MEI-Net

After further discussion and progress work, on 8 June 1998, ENSEARCH organised a half-day seminar to launch the Malaysian Environmental Information Network (MEI-Net) with the following objectives:

- To present the concept and current work in progress of the Malaysian Environmental Information Network (MEI-Net).
- To gather feedback from the participants on how the MEI-Net database can be developed to serve the needs of our society.
- To identify potential contributors, network partners and sponsors.

Twenty-four participants from various organizations attended the seminar. There were lively discussions on the content of MEI-Net and future directions. Nine participants volunteered to be involved in the various Content Task Forces for MEI-Net.

The primary objective of MEI-Net is : "To provide the necessary environmental information database support required to enhance our national capacity in environmental protection and management"

Specifically, MEI-Net is intended to be used by :

- The government, the private sector and anyone carrying out work related to environmental protection and management in Malaysia.
- The public to increase their awareness on the need to protect and manage the environment .
- Education institutions for their environmental education related programmes.

First Content Task Force for MEI-Net Meeting

The first Content Task Meeting for MEI-Net was held on the 27 June 1998 at the ENSEARCH Resource Centre. 11 volunteers attended the meeting. The objectives of the meeting were as follows:

- To form the various Content Task Forces for MEI-Net
- To identify the priority content areas where work can be started
- To allocate the content areas to the various task Forces on a voluntary basis

At present, 13 content areas have been identified for inclusion in MEI-Net. The content areas are as follows:

- Dictionary of Environmental Terms
- Environmental Issues
- Environmental Technologies
- Environmental Related Legislation
- Environmental Related Treaties
- Malaysian EIA Reports
- Environmental Case Studies
- Directory of Local and International Expertise on Environmental Engineering and Sciences

- Directory of Local and International Environmental Related Companies
- Environmental Related Technical Papers and Articles
- Environmental News
- Directory of Local Environmental Database
- Environmental Related Internet Sites

These content areas have been allocated to the volunteers on a voluntary basis and are subject to change based on the discretion of the Task Force.

Workshop on INFOMAP for the MEI-Net Task Force

The MEI-Net uses a software programme called INFOMAP (a Multicentric Information Mapping System) to manage, structure, maintain and map all information so that the information can be viewed from different perspectives. A workshop on INFOMAP was held specifically for the MEI-Net Task Forces on the 11 July 1998 at the ENSEARCH Resource Centre. 9 volunteers participated in the workshop. The objective of this workshop was for the members of the Task Force to gain familiarity with the INFOMAP software and learn the basics on how to map information in a database. At the end of the day, the participants were able to understand the mapping of information and how the MEI-Net is compiled and used.

ENSEARCH would like to invite all interested organizations and individuals to join these Content Task Forces in order to make MEI-Net a success in serving the environmental protection and management needs of Malaysia. Those who are interested in joining, please get in touch with the ENSEARCH Secretariat.

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The RHAP consists of 3 major components as follows :

(i) Preventives Measures (Coordinator-Malaysia)
To date all ASEAN member country has developed National Plans containing policies and strategies to curb activities that may lead to land and forest fires and control emissions from mobile and stationary sources.

(ii) Regional Monitoring Mechanisms (Coordinator-Singapore)
The ASEAN Specialised Meteorological Centre (ASMC) in Singapore will serve as a regional information centre for compiling, analysing and disseminating information derived from satellite imagery and meteorological data necessary to detect and monitor land and forest fires and the occurrence of smoke haze. Information is made available on the internet.

(iii) Fire Fighting Capability (Coordinator-Indonesia)
National and regional land and forest fire fighting capability are strengthened through on-going preparation of the inventory of land and forest fire fighting capability of each country and identify resources that can be made available for regional fire-fighting efforts; both within and outside ASEAN. Technical assistance may include forest fire fighting equipment, aircraft such as water bombers, and high-tech equipment and experts for command post operations.

As of July 1998, five meetings of ASEAN Ministers on haze have been held with the main objective of promoting cooperation and coordination between the ASEAN countries in the efforts of combating forest fires and the haze problem. while reviewing the progress in the implementation of the RHAP.

Considerable progress has been achieved in establishing collaborative programmes with donor agencies, that include :

i) Asian Development Bank (ADB) on Regional Technical Assistance on Strengthening ASEAN's capacity to prevent and mitigate Transboundary Atmospheric Pollution; and

ii) United Nation Environment Programme (UNEP)/Global Environment Facility (GEF) Project On Emergency Reponse To Combat Fires In South East Asia.

In conclusion, with the operationalisation of the RHAP, the continued cooperation and intensified efforts of ASEAN member countries will help to prevent occurrence of haze in the region arising from land and forest fires.

ENVIRONMENTAL Issues In Quarrying Activities

Charanpal Singh
EIA Section

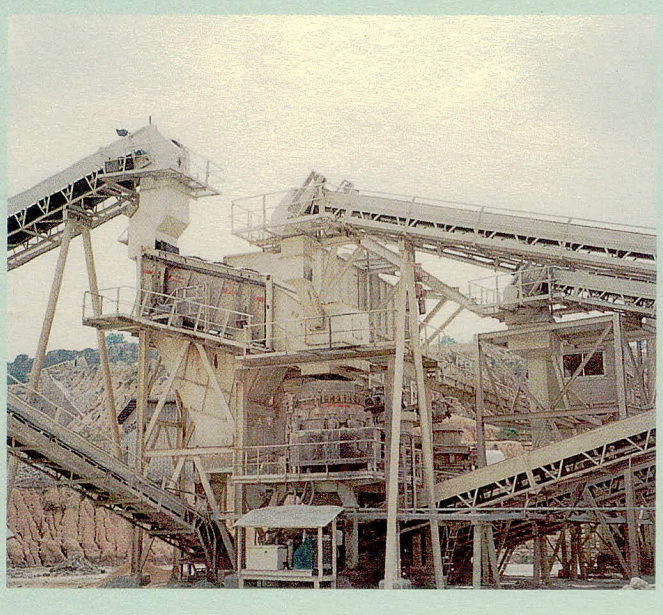
Quarrying activities are vital for the development of the country especially to meet the increasing demand for infrastructure and housing. The operations of quarries are often associated with a number of environmental problems which can be resolved or minimized by employing up to date techniques and good housekeeping rules. The other area which has received little attention in the past is rehabilitation of quarry areas.

Quarrying activities are listed as Activity 14 under the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order 1987 and are subject to EIA under Section 34 A, Environmental Quality Act 1974.

The environmental impacts of Quarrying vary from the type, size, location and method of extraction. The impacts also vary at different stages of the project namely development operation, closure and rehabilitation. Environmental control should be looked into as a total process which must be considered right at the planning stage, implemented and managed at development stage and carried on through closure and final rehabilition.

Some of the environmental issues which the quarry management must seriously monitor are:-

i) Open burning of vegetation carried out during site clearing.



ii) Soil erosion during earthworks.
iii) Overburden disposal site.
iv) Dust from drilling, blasting and crushing plant.
v) Flyrocks, dust, vibration and noise from blasting.

The Department of Environment has been monitoring compliance of EIA conditions of approval on those quarries which have started construction and operation and it has been observed that conditions which have not been fully complied with include :-

i) poor erosion and silt control.
ii) improper road construction.
iii) poor dust control.
iv) inadequate vehicle cleaning facilities, and
v) no monitoring programme.

Quarry operators should also formulate plans for rehabilitating areas opened up as quarrying works as the need arise and not wait until right at the end of the period permitted for removal of rocks. On abandonment quarry areas can be turned into recreation areas, dumping grounds or even for housing.

Finally, it is important for Quarry Operators to formulate and document an Environmental Management Plan which includes the company's environmental policy, its environment objective and targets and only through total commitment by the management can quarrying be done in a safe and environmental acceptable way.

CHEMICAL EMERGENCIES AND THEIR MITIGATION IN MALAYSIA

Vellayutham Pachaimuthu
Chemical Unit

INTRODUCTION

The past two decades have witnessed the transformation of Malaysia from an agro-based country to an industrial one, partly triggered off by the abundant reserves of oil and gas. As Malaysia moves towards its status of a developed country via Vision 2020, more industrial activities and processes are being developed all over the country, causing concern for the safety of workers, the community at large and the health of the environment.

Chemical-related industries have resulted in disasters in some parts of the world. The release of toxic methyl isocynate in Bhopal, India caused 2,500 fatalities and 200,000 injuries in December 1984. In June 1974, 28 people were killed and over 400 injured in a blast involving cyclohexane in Flixborough, Great Britain. In Malaysia, the Bright Sparklers incident, involving an explosives manufacturing factory, caused 22 fatalities and 103 injuries.

Proper planning to identify an emergency response system is thus vital to handle things which can otherwise go wrong causing a chaotic situation.

NATIONAL STRUCTURES ON CHEMICAL SAFETY

Policy

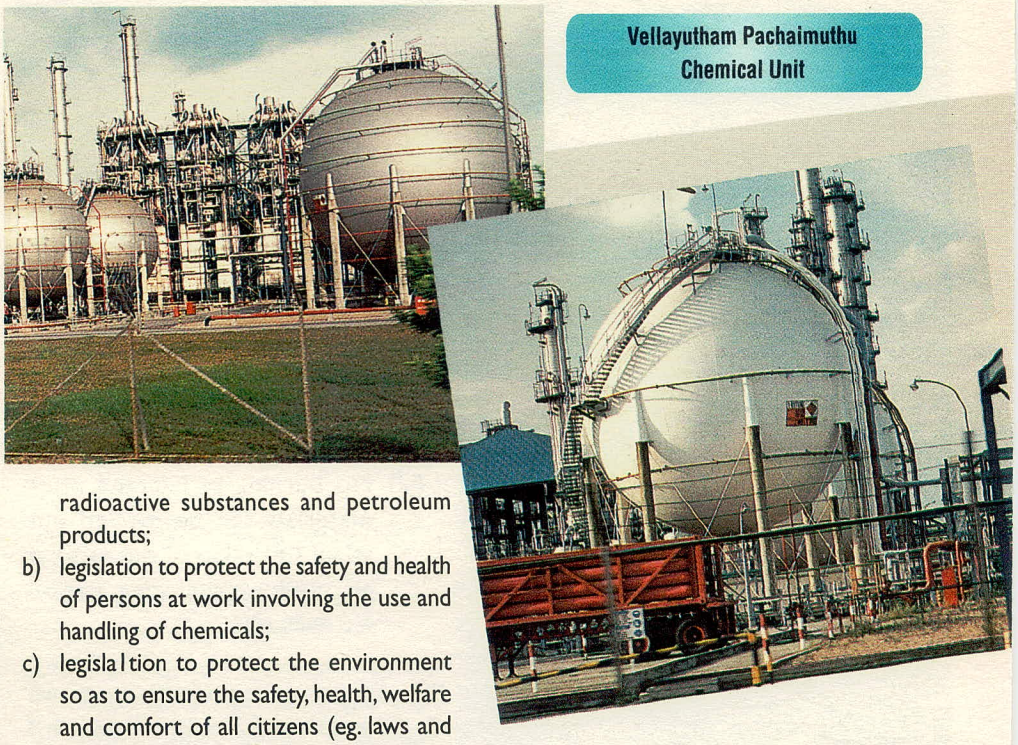
No single comprehensive legislation on chemical safety per se which covers all chemicals, all situations, all stages of chemical life cycle and all aspects of chemical safety management exists in Malaysia. Chemical management falls under the purview of various governmental organisations.

Following the Bright Sparklers disaster in May 1991, the National Council for Industries Involving Hazardous Substances was formed. Roles and functions of the Council at regional levels are carried out by the respective state Industrial Disaster Committees.

Legislations

Existing legislations on chemical safety can be categorized into 4 functional groups.

a) legislation to control specific or groups of substances e.g. pesticides, poisons, radioactive substances and petroleum products;
b) legislation to protect the safety and health of persons at work involving the use and handling of chemicals;
c) legislation to protect the environment so as to ensure the safety, health, welfare and comfort of all citizens (eg. laws and regulations to control environmental quality, sewage and effluents, waste disposal, etc.); and
d) legislation to ensure public safety in the transportation of hazardous substances via land, water and air.



MITIGATION

(ERP-Emergency Response Plan)

Emergency response planning comprises of 2 parts - an on-site and an off-site plan. The preparation and implementation of the on-site plan is the responsibility of the management which is appropriate for the particular installation. It is to ensure that the manufacturer who is dealing with hazardous substances above a certain quantity is legally required to operate the activity in a safe manner encompassing his workers, the public and the environment. The above is as required by the Occupational Safety and Health Act 1994 (OSHA) and under the jurisdiction of the Department of Occupational Safety and Health (DOSH).

The objective of an off-site ERP is to localize any major disaster alongside the cooperation and coordination of external agencies, and to minimize any harmful effect on lives, health, environment and properties. Also, close cooperation is required between those responsible for on-site and off-site ERPs for effective coordination and integration.

CONCLUSION

Despite the best efforts at prevention of industrial disasters, such incidents are inevitable as long as man designs, constructs, operates similar installations and engages in the transport of toxic and hazardous materials. Thus, it is the duty of every government agency and the installation operator to exercise due care and diligence to prevent major disasters.

DEPARTMENT OF ENVIRONMENT'S GUIDELINES FOR ACTIVITIES EXEMPTED FROM OPEN-BURNING PROHIBITION

The following guidelines pertain to activities that are exempted from open burning prohibition and can only be carried out under strict conditions as outlined. Violation of any of the conditions imposed on these activities shall be an offence under the Environment Quality Act, 1974.

(a) Fires purposely set to agricultural land for disease and pest control;

(i) Only infected plant crops as certified by the Department of Agriculture may be burned;

(ii) Infected plant crops must be felled and shall be dry prior to burning;

(iii) Burning of infected plant materials shall be carried out during day time between 1:00p.m. to 6:00p.m.

(iv) Fires shall be constantly attended by a competent person until such fires are extinguished;

(v) Materials such as old tyres, rubber, plastics, heavy oils and other materials that emit black smoke shall not be used as tinder materials to ignite fires to the infected plant crops;

(vi) Burning of infected plant materials shall only be carried out during dry weather;

(vii) Burning of infected plant materials shall be carried out away from roads and major routes;

(viii) Measures must be taken to ensure that smoke from the fire shall not be a nuisance to nearby residents and interfere with normal visibilty; and

(ix) No burning of infected plant materials can be carried out when API value of the nearest air quality monitoring station exceeds 100.

(b) Fires purposely set to carcasses of diseased animals or poultry;

(i) Burning of carcasses of diseased animals or poultry shall only be carried out where other alternatives such as incineration are not available;

(ii) Only carcasses of diseased animals or poultry which are certified by the Department of Veterinary Services may be burned;

(iii) Burning of carcasses of diseased animals or poultry shall only be carried out at designated areas as determined by the Department of Veterinary Services;

(iv) Materials such as old tyres, rubber, plastics, heavy oils and any other materials that emit black smoke shall not be used as tinder materials to ignite fires to the carcasses of diseased animals or poultry;

(v) Burning of carcasses of diseased animals or poultry shall be carried out away from roads and major routes;

(vi) Measures must be taken to ensure that smoke from the fire shall not be a nuisance to nearby residents and interfere with normal visibility; and

(vii) No burning of carcasses of diseased animals or poultry can be carried out when API value of the nearest air quality monitoring station exceeds 100.

(c) Fires purposely set to solid or liquid fuels or structures for carrying out research into causes and control of fires, or for training of public, volunteer and industrial fire fighting personnel in the methods of fighting fires under the direct control and supervision of qualified instructors;

(i) No fires for carrying out research, instruction and training of fire fighting personnel shall be carried out when API value of the nearest air quality monitoring station exceeds 100;

(ii) Fires for carrying out research, instruction and training of fire fighting personnel shall be carried out only at sites which are approved by the Director General of Environment Quality; and

(iii) Fires set shall be closely monitored and controlled.

(d) Fires purposely set to lands for shifting cultivation;

(i) Only plant materials from land clearing covering an area of not more than 2 hectares for one

household for cultivation of food or cash crops are allowed to be burned;

(ii) Fire breakers such as trenches shall be created to ensure that the fires set do not spread to adjacent areas;

(iii) Burning of felled plant materials shall be carried out during day time between 8:00a.m. to 6:00p.m.;

(iv) Burning of plant materials shall be closely monitored and controlled until all fires and embers have been put out;

(v) The person intending to carry out open burning shall inform the Penghulu or Village Headman of the area prior to open burning; and

(vi) No burning of felled plant materials can be carried out when API value of the nearest air quality monitoring station exceeds 100.

(e) Fires purposely set to paddy stalks and straw prior to replanting;

(i) Paddy stalks and straw shall be dried a minimum period of 7 days prior to burning;

(ii) Fire breakers shall be created to ensure that the fires set do not spread to adjacent areas;

(iii) Fields to be burned shall not contain any other combustible materials other than paddy stalks and straws;

(iv) Burning of paddy stalks and straw shall be carried out during day time and sunny weather between 1:00p.m. to 3:00p.m.

(v) Burning of paddy stalks and straw near roads and major routes shall be closely monitored and controlled to ensure smoke and particles resulting from the burning do not interfere with the traffic and adequate warning must be provided to warn road users of the potential hazards;

(vi) Measures must be taken to ensure that smoke from fires set to paddy stalks and straw shall not be a nuisance to nearby residents and interfere with normal visibility;

(vii) No burning of paddy stalks and straw can be carried out when API value of the nearest air quality monitoring station exceeds 100; and

(viii) The farmers concerned shall inform the nearest Police Station prior to open burning of paddy stalks and straws.

(f) Fires purposely set to sugar cane leaves prior to harvesting;

(i) Burning of sugar cane leaves shall not exceed 20-hectare plot;

(ii) Burning of sugar cane leaves shall be carried out during the harvesting period of December to May each year;

(iii) Burning of sugar cane leaves shall be carried out during day time and sunny weather between 9:00a.m. to 12:00p.m. or between 3:00p.m. to 6:00p.m.;

(iv) Burning of sugar cane leaves near roads and major routes shall be carried out in smaller plots to ensure smoke and particles resulting from the burning does not interfere with the normal traffic and adequate warning must be provided to warn road users of the potential hazards;

(v) Burning of cane shall be closely monitored and controlled by a competent person to ensure that only the allocated area is burned and the fires do not spread to other areas;

(vi) No burning of cane can be carried out when API value of the nearest air monitoring station exceeds 100; and

(vii) The person concerned intending to carry out open burning shall inform the nearest Police Station prior to open burning of sugar cane leaves.

(g) Fires purposely set to articles as part of religious rites or worshiping activities;

(i) No burning can be carried out when API value of the nearest air quality monitoring station exceeds 100.

(h) Fires purposely set for camping activities;

(i) Camp fires shall be closely monitored and controlled and properly supervised;

(ii) All fires and embers shall be extinguished before leaving the camping area; and

(iii) No camp fires shall be lit when API value of the nearest air quality monitoring station exceeds 100.

(i) Fires purposely set as outdoor grills and barbeques, and fireplaces for preparation of food;

(j) Burning in remote areas of agricultural plant materials for the purpose of land clearing or re planting by smallholders and subsistence farmers;

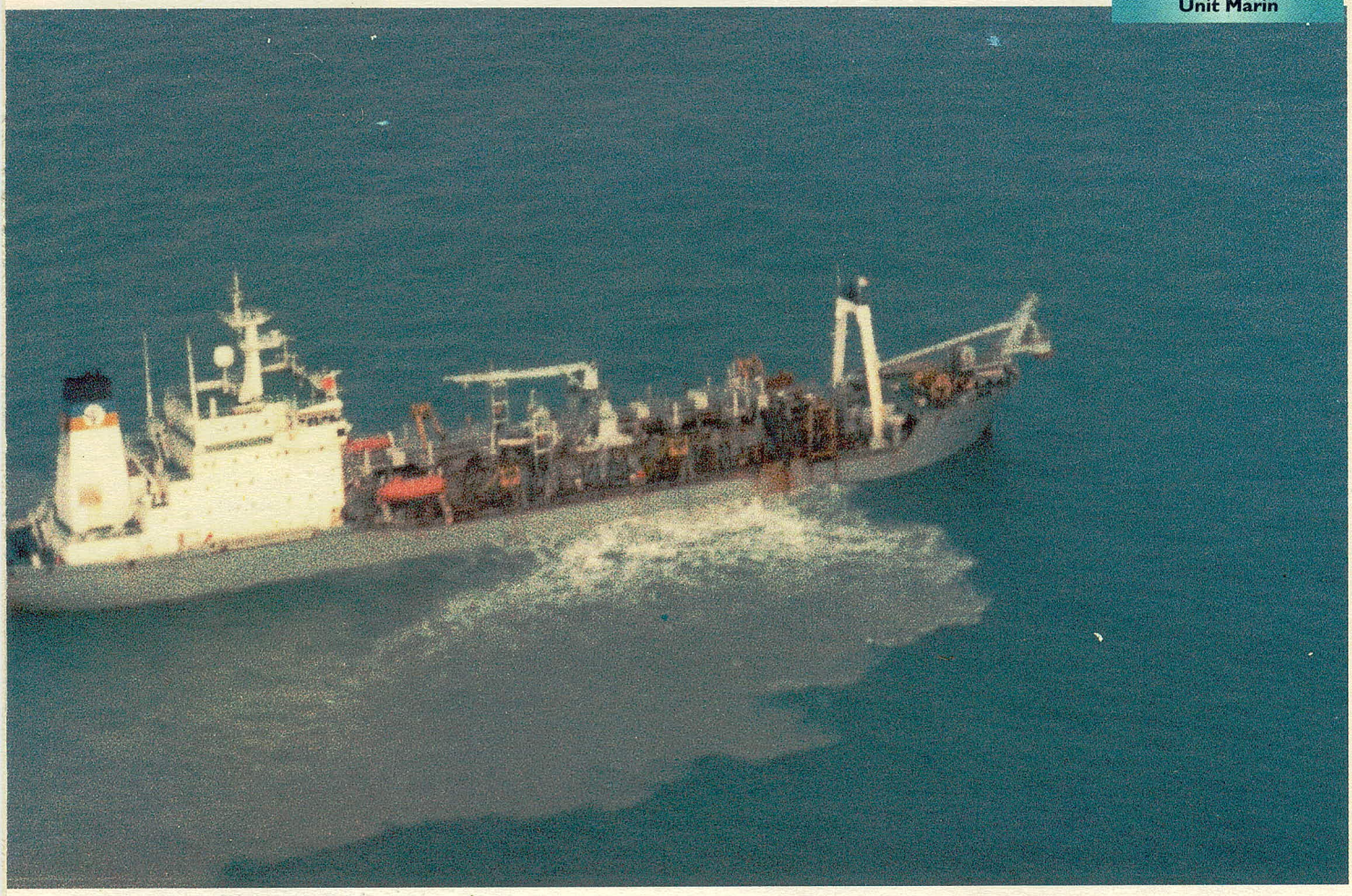
(k) Burning of leaves, tree branches and yard trimmings in villages in rural areas; and

(l) Properly operated industrial flares for combustion of flammable gases.

(First edition will be revised to become law)

PUNCA-PUNCA PENCEMARAN LAUT

Hasbullah Bin Zakaria
Unit Marin



Pendahuluan

Kebanyakan buangan yang dihasilkan di rantau ini khususnya rantau ASEAN yang mengakibatkan pencemaran laut adalah hasil daripada beberapa punca pencemaran. Lebih kurang 75% daripada pencemaran yang berlaku di lautan adalah berpunca dari daratan dan 25% lagi adalah datangnya dari aktiviti perlombongan, ' energy production' dan perkapalan. (Perangkaan UNDP, 1998)

Punca dari Daratan

Pencemaran dari daratan akan memasuki laut melalui sungai-sungai, parit-parit, pembuangan terus melalui paip, dan tumpahan atau letupan. Pembuangan buangan berair daripada paip terus ke laut mengandungi buangan industri dan buangan perbandaran. Pencemaran dari tumpahan akibat kemalangan dan letupan dari daratan juga akan memasuki ke laut. Pencemaran dari atmospheric boleh memasuki air laut daripada atmosphere dalam bentuk hujan asid dan partikel-partikel seperti *arsenic, lead cadmium, zinc dan tin*.

Terdapat lima (5) punca pencemaran daratan yang utama yang membawa kepada pencemaran sungai dan lautan seperti;

i) Pembangunan Kawasan Pantai;
ii) Aktiviti Pertanian;
iii) Buangan Perbandaran;
iv) Buangan Industri; dan
v) Perlombongan

Aktiviti perkapalan

Masa kini aktiviti pengangkutan minyak dan bahan-bahan toksid berbahaya dengan menggunakan kapal-kapal tangki semakin bertambah bilangannya ekoran dari pertambahan tapak-tapak

memproses dan pengeluar minyak samudera "Onshore" ataupun "Offshore". Pada tahun 1996, Selat Melaka sahaja telah dilalui oleh sebanyak 9815 buah kapal tangki. Menurut Lim dan Ong, (1987) pula dianggarkan sebanyak 5 -10 juta tan minyak telah dibuang ke laut setiap tahun di perairan dunia.

Di antara punca-punca utama pencemaran dari aktiviti perkapalan adalah :

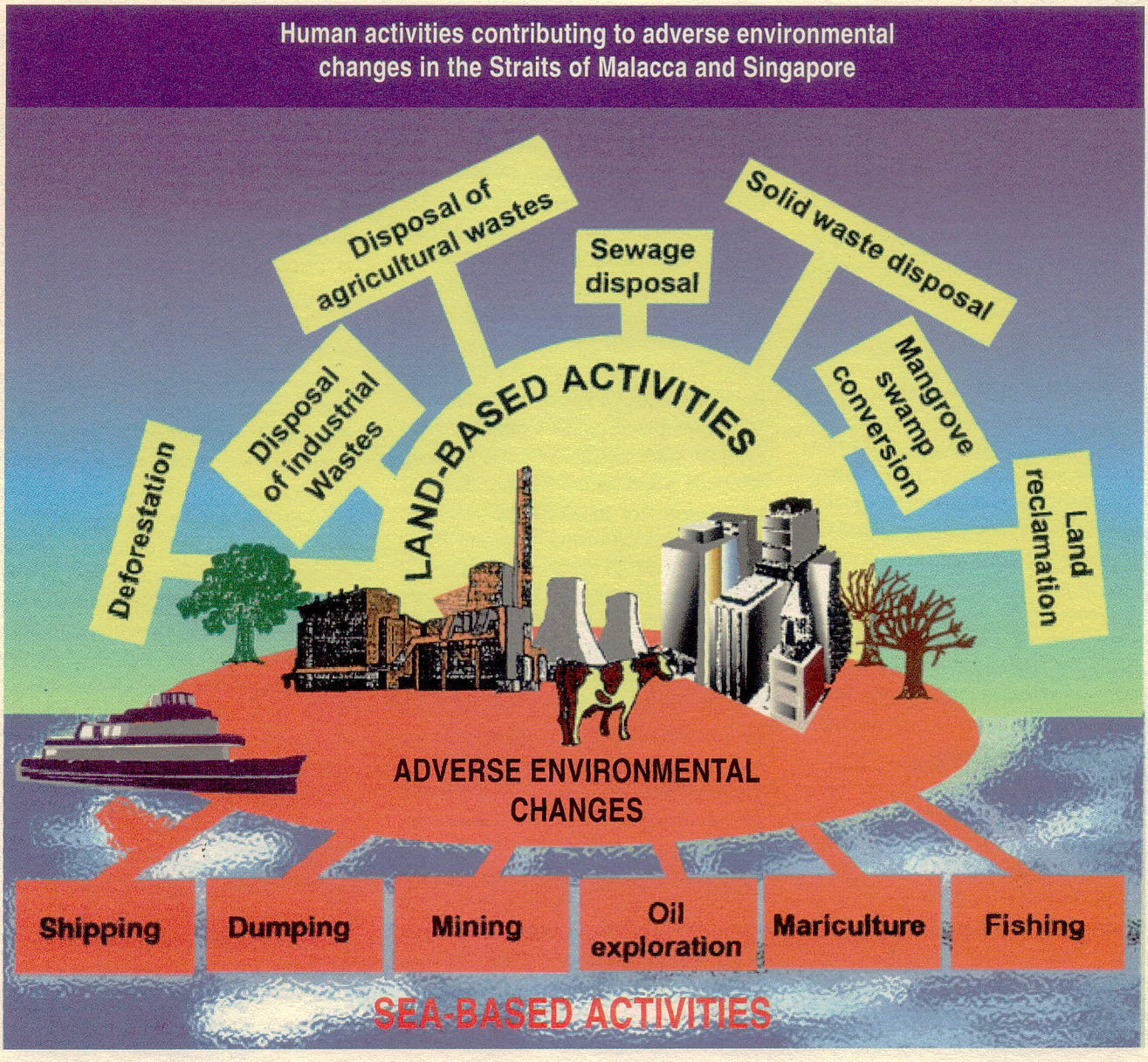
i) Pembersihan kapal tangki;
ii) "Bilges pumping" di laut;
iii) "Bilges pumping" di pelabuhan;
iv) Oily water/Ballast water; dan
v) Kemalangan dan pelanggaran kapal-kapal.

Aktiviti carigali minyak dan gas

Carigali minyak dan gas menyumbang kepada pencemaran lautan. lanya akibat daripada kebocoran paip semasa pemindahan minyak, tumpahan semasa pengorekan dan penggunaan bahan-bahan kimia. Di Malaysia, aktiviti pengeluaran dan carigali minyak dan gas telah meningkat secara mendadak. Bagi tahun 1996, purata pengeluaran minyak adalah sebanyak 645 Kilo Stock Tank Barrel sehari (645 KSTB/D) dan pengeluaran gas adalah sebanyak 4062.3 MCF (million cubic feet) sehari.

Penutup

Punca-punca pencemaran diatas telah menjadikan perairan negara kita terdedah kepada pencemaran yang serius jika tidak dikawal dengan baik dan berkesan. Walau pun kerajaan memainkan peranannya dalam menguatkuasakan akta-akta yang berkaitan, namun orang ramai juga harus sedar mengenai tanggungjawab mereka yang penting demi menjaga alam sekitar.



Biological Indicators: Theory *Verses* Implementation

Pauziah Hanum Hj. Abdul Ghani
Monitoring Section

(Continuation of article from Bil. 1 1998)

Use of Indices

Biological indices are usually for certain types of pollution since they are based on the presence or absence of indicator organisms (bioindicators), which are unlikely to be equally sensitive to all types of pollution. Most indices use data on the macroinvertebrate population because there are more easily and reliably collected, handled and identified. In addition, there is often more ecological information available for such taxonomic groups.

The Saprobic System And Saprobic Index

This system is based on the fact that point source pollution from sewage discharges produced an effect on aquatic fauna and flora. As self purification occurs downstream, ecosystem changes can be observed, especially in the components of the biotic community. This system was developed in the beginning of the twentieth century by Kolwits and Marsson (1902, 1908, 1909 cited in Chapman 1992) and is currently used in Central Europe.

Biotic Indices

Alternative approaches to the Saprobic Index have been developed based on the presence or absence of certain "indicator" groups (eg. Plecoptera, Ephemeroptera, Gammaridae and/or "indicator" species at the sampling point). As with the Saprobic Index, they are best suited to use in waters polluted with organic matter, particularly sewage, since the indicator organisms are usually sensitive to decreases in oxygen concentration.

The Trent Biotic Index was originally developed for assessing pollution in the River Trent in England. The index is based on the number of defined taxa of benthic invertebrates in relation to the presence of 6 key organisms found in the fauna, the index ranges from ten, for clean water, to zero for polluted water. Modifications of this index (such as the Chandler Biotic Score) have been further developed to take into account the abundance data.

There are many variations on the biotic index widely employed mainly for the temperate zones. Computation of indices such as the SCORE system, which is based on the "family" level of taxonomy are used in the UK, the Biological Monitoring Working Party score (BMWP in France, Germany and the UK, the Total Biotic Index in France (Coste 1978) and modifications of the Belgian Biotic Index in Denmark (Andersen at al 1984).

Methods based on indicator organisms and the Trent Biotic Index are simple to use and have minimal requirements for taxonomic expertise. However, as with all biotic indices, they may not work well in rivers with toxic pollution or those which have been canalised. It is important therefore that all biotic indices are not used in isolation, but together with all other data available to ensure correct interpretations.

Community Structure Indices

The community structure approach examines the numerical abundance of each species in a community. The methods most widely used to assess aquatic pollution are based in indices of community structure, either a diversity index or similarity index. A diversity index attempts to combine the data on species abundance in a community into a single number. A similarity index is obtained by comparing two samples, one of which is a control. These methods have the advantage that a knowledge of biology or ecology is not required in order to interpret whether a situation is getting better or worse, since this is indicated by the scale of index.

The most common diversity indices in use are those based on information theory, such as the Shannon-Weaver Index (H'), Simpsons Index (D) and Margalef Index (D)

Similarity indices are based on the comparison of the community structure in two samples, one of which is often a control. Different indices compare abundance in particular species, or abundance in any species, found at the sampling area.

When interpreting results from programmes incorporating the use of community structure and biotic indices, it is important to realise that the absence of a species does not always indicate contamination. Absence may be caused by unfavourable changes in the environment which occur naturally. For example, severe storms can lead to drift in the organisms downstream or to changes in the vegetation of an area causing a subsequent loss of species. Since most indices are based on natural occurrences of certain organisms in a river system, and all of which are susceptible to changes in abundance caused by natural events in the ecosystem, it is not possible to recommend any one index. Each index has its advantages and disadvantages and only a complete understanding of the aquatic system of a region and the ecology of its biota can enable suitable indices to be selected.

To be continued - Next Issue

POST EIA MONITORING AND AUDIT *In Malaysia*

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INTRODUCTION

The objective here is to describe the practice of post EIA monitoring and audit which are carried out after submission of EIA reports. However, various types of EIA monitoring too, are outlined here before proceeding to the actual subject matter.

CONCEPT AND DEFINITIONS

EIA monitoring may be defined as :-

"a system of continued observation, measurement and evaluation for defined purposes"

(Harvey, 1981)

" an activity undertaken to provide specific information on the characteristics and functioning of environmental and social variables in space and time"

(Bisset and Tomlinson, 1988)

TYPES OF MONITORING

Given below are the types of monitoring in EIA.

(a) Baseline or Pre-project Monitoring
Environmental variables are measured before disturbances occur so as to determine the normal range of variations, as part of EIA studies ie. before the submission of the EIA report.

(b) Effects or Impact Monitoring
It is carried out at post-submission of EIA report. Environmental variables are measured during the construction and operation phases to determine changes in environmental quality as a result of the activity. (Figures 1 & 2)

(c) Compliance or Regulatory Monitoring
Also known as environmental surveillance during project construction or post-project phases. Involves periodic sampling and/or continuous measurement so as to ensure that regulations, terms & conditions and standards are met eg. measurements of levels of waste discharges, noise and similar emissions.

Monitoring Environmental Impacts, Functions of (Handbook of EIA Guidelines 1995/DOE, 1995)

The important functions and benefits of monitoring environmental impacts are :

a) ensures that the project developer meets the conditions in respect of the project approval;
b) the feedback obtained helps improve database for EIA prediction in future project planning;
c) the data obtained in respect of environmental and socio-economic variables help identify harmful trends before it is too late to mitigate them;
d) the data will help improve knowledge about the impact of different projects on specific environments. Eventually, with the availability of more data, corresponding savings in time and money.

EIA AUDITING

EIA auditing provides continuous assessment of environmental performances during the operational phase of project development.

Several types of EIA Audit are used (see Figures 1 & 2).

a) EIA report audit
Helps to formulate an independent opinion on the environmental implications based on EIA report.
b) Decision-point audit
To evaluate the value of EIA reports in making decision.
c) Implementation audit
Also referred to as Compliance Audit. To determine compliance to conditions, standards, etc. undertaken by a regulatory agency, after the project has commenced.
d) Performance audit
A management activity aimed at ensuring the project is properly managed to avoid harmful effects and disasters. It is carried out during project construction and operation.
e) Project impact audit
Aimed at determining and recording project impacts.
f) Predictive techniques audit
To assess the accuracy of impact prediction.
g) EIA Procedure Audit
To assess the effectiveness of EIA procedure and the EIA process.

An EIA audit offers benefits in terms of :

- assessment of compliance with regulatory consents
- verification of impact predictions
- identifying current and potential environmental problems
- improvements to project operation management

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ROLE OF DOE

EIA PROCEDURE AUDIT
- Issue EIA-Notification to project developer informing type and size of project subject to EIA requirement or 'EIA ORDER'
- Obtained feedback on the status of the project proposal whether :
- the project proposal will go on,
- the project proposal is abandoned, or
- further investigation is needed since no response from the project developer.

EIA PROCEDURE AUDIT
- Provide advice and guidance on EIA Report preparation as well as feedback to input from relevant agencies and public to the project developer.

EIA PROCEDURE AUDIT
- Registration of EIA Report Submission.
- Monitoring Timing of EIA Report Submission against Project Planning Cycle.
- Checking key impacts based on EIA Report, site visit and input obtained from the relevant state authorities.

EIA REPORT AUDIT (QUALITY CONTROL OF EIA REPORT)
- Review quality of EIA Report according to specified checklists
- Four major review areas of concern by the DOE are :-
  - Description of the development, the local environment, and baseline conditions.
  - Identification and evaluation of key impacts (particularly magnitudes, significants and threshold limits).
  - Communication of results.

DECISION-JOINT AUDIT ON THE EIA APPROVAL CONDITIONS
- Decision made based on EIA Report Review tabled at either EIA-Technical or One-Stop EIA Agency Committee meeting or both.
- EIA Technical Committee will refine EIA conditions before imposing on the project developer.
- Registration of EIA Approval and issue letter undertaking of acceptance on the EIA approval to the project developer.

EIA PROCEDURE AUDIT DURING IMPLEMENTAION
- Ensure project developer submit undertaking letter of acceptance from (KBEIA) stating their commitment on all EIA conditons will be followed and complied.
- State DOE will follow through with project developer on the status of project implementation (using standard forms PPE 1 and PPE 3) and update the latest data bases regularly.
- Based on updated declaration form (PPE 1) or (PPE 3), state DOE will double-check by investigating the progress of the project implementation and compliance of EIA approval conditions. (If there cases of non-compliance against EIA conditions appropriate legal actions will be taken against project developer).

IMPLEMENTAION AUDIT
- The State DOE review post-monitoring proposal submitted by the developer. (The project developer may consult State DOE for advice on post-monitoring).

IMPLEMENTATION AUDIT
- State DOE conduct compliance audit based on monitoring report submission.
- If necessary, DOE may request the project developer to carry out the necessary remedial works or mitigation measures

EIA PROCESS FOR PROJECT

1. SCREENING
2. SCOPING
3. EIA PREPARATION
   - Description of Project, The Local Environment & The Baseline Conditions
   - Identification & Evaluation of Key Impacts
   - Consideration of Alternatives
   - Commitment To Mitigation & Safety Measures
   - Proposed Monitoring Programmes
4. REVIEW PROCESS
5. DECISION MAKING
6. MONITORING PROJECT IMPACTS
7. EIA PROCEDURE AUDIT & IMPLEMENTATION AUDIT

ROLE OF PROJECT DEVELOPER

FOR EIA PROCEDURE AUDIT
- Project developer need to provide feedback to the DOE whether :
  - the project proposal will go on,
  - the project proposal is abandoned, or
  - a change in the schedule of phases of implementations.

FOR EIA PROCEDURE AUDIT
- Ensure scope and geographical boundary of study is sufficient.
- Perform Baseline Monitoring.
- Monitor consultant works.
- Ensure undertaking letter on project developer commitment and agreement to all mitigation measures detailed out in the EIA report is attached in the EIA report.
- Check all inputs after consultation are considered.
- Check the quality of the EIA Report before submission to the DOE.

FOR EIA PROCEDURE AUDIT
- Ensure project is not implemented until EIA's approval is granted.
- Ensure project developer attend EIA Technical and One-Stop Agency Meetings and not to be delegated to the consultantsalone
- Monitor or oversee their consultants to ensure all additional information and plans pertaining to the EIA report submission are furnished to the DOE, if requested.
- Provide to the DOE completed questionaire on "Cost and Time of EIA Study" i.e. Form EIA/Kos/1/94.

FOR EIA REPORT AUDIT
- Providing additional information if requested.

FOR EIA PROCEDURE AUDIT
- Upon receive EIA approval, the project developer must go through all the EIA conditions and response to DOE using standard form KBEIA.
- Project developer must update DOE on any changes to the project implementation including such as schedule of implementation, changes in technical plans, and change in ownership.
- Project developer must ensure EIA conditions are included in any contract between them and other parties involved in the implementation of the project.
- The project developer should provide an environmental coordinator or set-up environmental management unit within their project organisation.
- The project developer must allocate budget for post-monitoring, remedial works and compliance requirements.

POST-MONITORING & PROJECT IMPACT AUDIT
- Ensure post-monitoring programme identify monitoring indicators, who is responsible for monitoring and reporting, techniques, location and justification of sampling, date of monitoring programmes, expected output and proposed mitigation measures.
- Ensure post-monitoring highlight key aspects such as key impacts, monitoring indicators, responsibility for post-monitoring, and the output, period and frequency of sampling and report submission , techniques, location and rationale of sampling, date of monitoring programmes, output expected and proposed committed mitigation measures.
- Ensure key impacts are within compliance limit or otherwise detailed out mitigation measures committed to be implemented.
- Ensure post-monitoring report is submitted to DOE as scheduled.
- Project developer follow-through all legal instructions or recommendations by the DOE and other relevant authorities regarding remedial works and compliance requirements.

Figure 1

cont'd from page 13

POST-MONITORING BY DOE

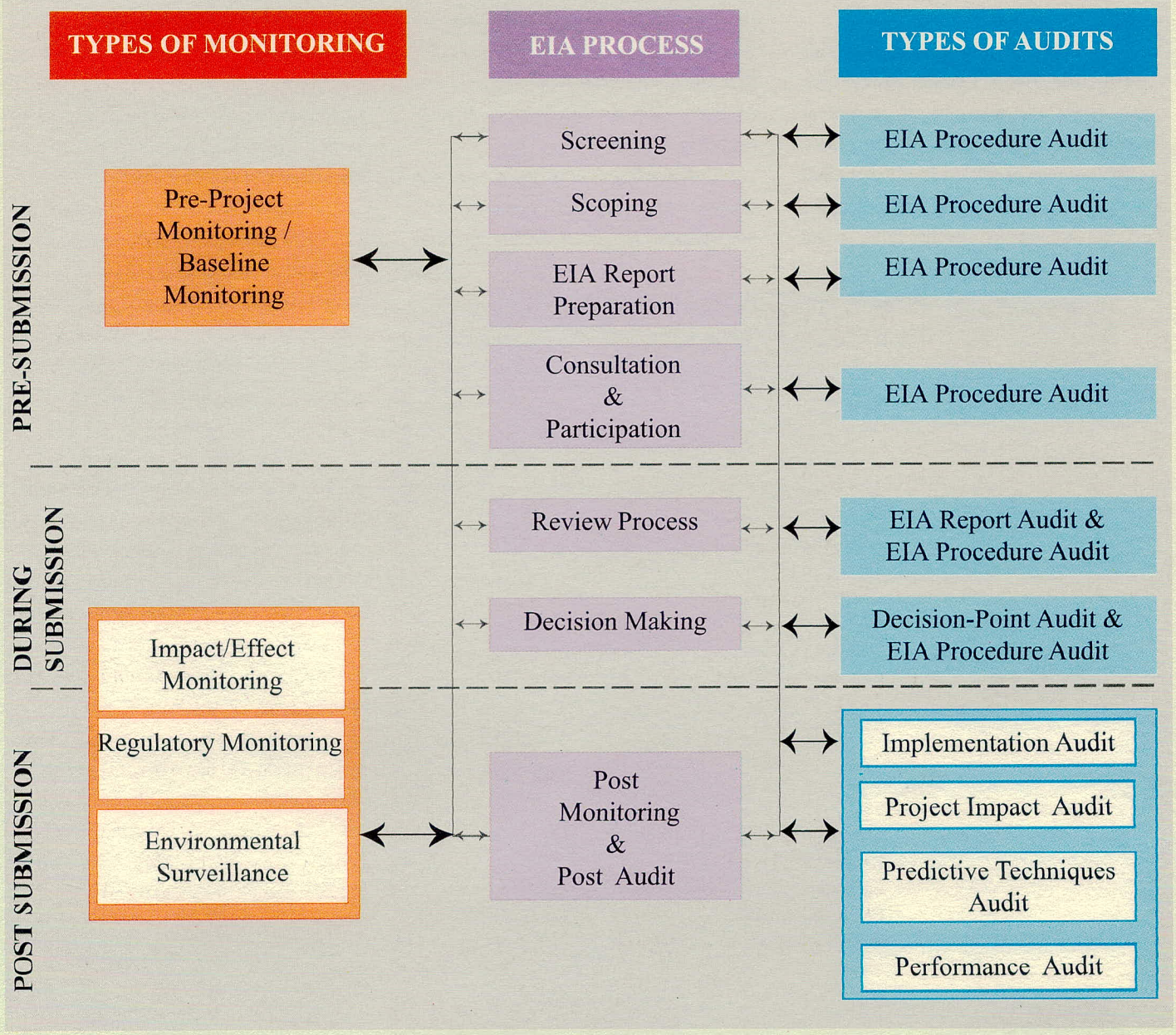
Post-monitoring requirement refers specifically to the EIA system enforced under Section 34A(7) of the Environmental Quality Act, 1974. Subsequent to EIA report approval, the project developers are required by DOE to provide proof that the requirements are complied with. The Act states that :-

"If the Director General approves the report, the person carrying out the prescribed activity, shall provide sufficient proof that the conditions attached to the report (if any) are being complied with and that the proposed measures to be taken to prevent, reduce or control the adverse impact on the environment are being incorporated into the design, construction and operation of the prescribed activity."

Thus, the EIA procedure clearly establishes the legal requirements and responsibilities of the project developers towards environmental management so that the spirit of post EIA monitoring and audit is fully achieved.

The DOE, in turn, has to ensure that the developers satisfy its requirements during project implementation.

Figure 2
SCHEMATIC REPRESENTATION SHOWING THE MAIN COMPONENTS OF EIA PROCESS WITH VARIOUS TYPES OF MONITORING AND AUDITS



RECYCLE AND REDUCE THE WASTE

The Voice Of The Young

The sea is turning murky with garbage such as empty cans, plastics bags and chemical wastes. This irresponsible behaviour by human beings, does not only kill marine life but also damages our ecological system.

There is water pollution and air pollution. As a result of carbon monoxide and dumping of potassium cyanide, living organisms on this planet suffer, we may get all kinds of cancer and diseases due to inhaling and exposure to the poisonous smoke. That is the price we have to pay for modernisation. In other words, it is nature's revenge on us for torturing her.

Modern technology is destroying nature with synthetic substances which resist decay. They include aluminium cans that do not rust and inorganic plastics that last for decades. There is only way to put a stop to this. That is through recycling.

Recycling is a process whereby empty cans, glass bottles and newspapers are reclaimed after they have been used. They are then recycled through a special process so that they can be used again in another form. This saves money and deplete our natural resources too quickly. It saves Mother Earth from further damage. For example, when you recycle paper you reduce the number of trees from being cut down. So you are actually saving the forest from further destruction. This prevents landslides and floods.

Paper can be recycled again and again. The same goes for aluminium can, glass and plastic bottles. They, too, can be recycled. In recycling, you save water, energy and other sources. Recycling can be done a lot more easily by supplying schools, houses and companies with separate kinds of rubbish bins.

What else can you do to keep the world green and clean? Plant trees, avoid littering and open burning. Use public transport and car pool whenever possible. There should be more information and education for the public on packaging so that people do not over use materials. There should also be stricter laws for the litter bugs.

So, what are you waiting for? Save old papers, cardboards, magazines, bottles, plastics and have them recycled.

Act now so that our future generation will be able to admire Mother nature in its clean and beautiful state.

Divya Arumugam
Tarcissian Convent, Ipoh, Perak

Calendar of Events
September - October 1998

Date	Place	Activity
September		
3	Manila	10th Meeting of ASOEN Haze Technical Task Force
4	Manila	6th ASEAN Ministerial Meeting on Haze
11 - 12	Jakarta	7th Meeting of ASEAN W/G on ASEAN Seas and Marine Environment
11 - 12	Brunei Darussalam	8th Meeting of ASEAN W/G on Environmental Information Public Awareness and Education
13 - 15	Hong Kong	Dialogue on expanding Public-Private Partnership Economic Competitiveness and Environmental Concern in the Asia Pacific Region
29 Sept - 1 Oct	Singapore	9th ASEAN Senior Officials Meeting on Environment
October		
21 - 27	Terengganu	Launching and activities for the Malaysian Environmental Week
Oct	Washington D.C	International Conference on CFCS Technology
Oct	Washington D.C	World Bank Financial Intermediaries Meeting

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